



ADDIS ABABA UNIVERSITY
COLLEGE OF DEVELOPMENT STUDIES
CENTER FOR FOOD SECURITY STUDIES

FOOD SECURITY SITUATION AMONG RURAL HOUSEHOLDS IN
MENZ KEYA GEBREAL WOREDA, ETHIOPIA

BY SHEWAKENA DEREJE

DECEMBER, 2020

ADDIS ABABA, ETHIOPIA



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THESIS ADVISER DESSALEGN YAYEH (Ph.D.)

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DECLARATION

This thesis paper is my original work and has not been presented for MA/MSc degree in any other University and that all the sources and materials used for the thesis have been properly acknowledged.

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This is to certify that the above declaration made by the candidate is correct to the best of my knowledge as an advisor.

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This is to certify that the thesis prepared by Shewakena Dereje entitled food security situation among rural households in Menz Keya Gebreal Woreda, Ethiopia and submitted in partial fulfillment of the requirements for the degree of master's science in food security and development studies with regulations of Addis Ababa University and meets the accepted standards with respect to originality and quality.

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Acronyms and Abbreviations

ANRS	Amhara National Regional State
DAs	Development Agents
EHNRI	Ethiopian Health and Nutrition Research Institute
EMDHS	Ethiopia Mini Demographic and Health Survey
ETB	Ethiopian Birr
FAD	Food Availability Decline
FAO	Food and Agriculture Organization
FED	Food Entitlement Decline
FGD	Focus Group Discussion
FNS	Food and Nutrition Security
FSA	Food Standard of Agency
GDP	Gross Domestic Product
GTP	Growth and Transformation Plan
Ha	Hectare
HFBM	Household Food Balance Model
IFPRI	International Food Policy Research Institute
Kcal	Kilo Calorie
KII	Key Informant Interview

m.a.s.l	Meter Above Sea Level
MDG	Millennium Development Goal
MKGWAO	Menz Keya Gebreal <i>Woreda</i> Administration Office
MoANR	Ministry of Agriculture and Natural Resources
MoFED	Ministry of Finance and Economic Development
NSAZ	North Shoa Administration Zone
PAR	Pressure and release
PDC	Policy Development Commission
PEA	Political Economic Analysis
PSNP	Productive Safety Net Program
STATA	South Texas Art Therapy Association
UK	United Kingdom
UN	United Nations
UNICEF	United Nation International Children and Education Fund
USAID	United States Agency for International Development
WADO	<i>Woreda</i> Agricultural Development Office
WFCO	<i>Woreda</i> Finance and Cooperation Office
WFP	World Food Program
WHO	World Health Organization

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Abstract

The purpose of this study was to investigate food security status of rural households, and to identify determinant factors of food security and challenges of food security in Menz Keya Gebreal woreda. In light of this objective the study adopted quantitative and qualitative method and research approaches to test a series research hypothesis and subjective analysis. Specifically, the study used survey of questionnaire, focus group discussion, key informant interview and secondary sources. Simple random sampling method was employed to select 319 sample households. Data was analyzed using Pearson's correlation, binary logistic regression analysis and descriptive statistics; however, narrative statistics was used to analyze subjective data that has been collected by focus group discussion and key informant interview. The results shows 25.7% and 74.3% of sample households were food secure and food insecure respectively. The results of this research confirmed that variables such as family size, number of working labor force, literacy status and level of education, land size possessed, nutrition awareness, fertilizer utilization and improved seed utilization were key determinants of food security. Except family size the remaining variables did have direct relationship with food security achievement. Generally it was found that natural resources degradation, climate change and low agricultural productivity are challenges of food security achievement in the study woreda. When we look at more specifically loss of soil fertility, loss of underground and surface water, loss of biodiversity, occurrence of erratic rainfall, occurrence of frost, shortage of rainfall, crop and livestock diseases outbreak, inflation of agricultural inputs price, occurrence of man-made and natural disasters, unable to develop demand driven agricultural technologies, absence of rural households participation during technology development and inaccessibility of agricultural technologies are also impose challenge on the effort to achieve food security. Food security situation of Menz Keya Gebreal woreda is most affected and needs urgent remedial intervention in collaboration with active participation of governmental organization, non-governmental organization and the ultimate user, the community.

Key words: Food security, Food insecurity, rural households, determinants, challenges, status

CHAPTER 1: INTRODUCTION

1.1. Background and Justification

Ending hunger, food insecurity and malnutrition is a key challenge facing today's world. According to UN (2015) eradicating poverty in all its forms and dimensions including extreme poverty is the greatest global challenge and an indispensable requirement for sustainable development. Moreover, overall progress notwithstanding, hunger remains an everyday challenge for almost 795 million people worldwide, including 780 million in the developing regions. Hence, hunger eradication should remain a key commitment of decision-makers at all levels. The total number of food insecure and hungry people in the world was estimated as 925 million in 2010 (FAO and WFP, 2010). This figure has declined to 822 million in 2018 (WFP, 2019).

In most of the developing countries, lack of resources and little market accessibility are among the major factors that affect small farming household food security (Ahmed UI, 2017). The cause of failure of Ethiopia to feed its alarmingly increasing population is attributed to rapid population growth, shortage of land, recurrent drought, lack of oxen, poor soil fertility, deterioration of food production capacity, outbreak of plant and animal diseases, poor farming technologies, frost attack, weak extension services, high labor wastage, poor social and infrastructure facility pre and post-harvest loss (Mequanent et al, 2015). Although sub-Saharan and Eastern Africa have shown a slow progress in reducing the proportion of hunger, Ethiopia is reported to be one of the countries that have achieved the hunger reduction target in the year 2015 (FAO et al., 2015). Ethiopia has also made significant progress in reducing hunger from 55.9 % to 28.9 %, with a 51.7% reduction in the Global Hunger Index from 2000 to 2019. The data shows that poverty in Ethiopia has declined from 45.5% in 1995/96 to 29.6% in 2010/11 and further down to 23.5% in 2015/16 (PDC, 2018).

The extent of food security problem differs from region to region. The population of the Amhara region is approximately 21.1 million people of whom 84 percent lives in rural, engaged in agriculture (UNICEF Ethiopia, 2018). The level of poverty reduction in the region has declined from 30.5 per cent in 2010/11 to 26.1 per cent in 2016. Poverty is pervasive in the Amhara region with about 26.1 per cent of the population living below the nationally defined poverty line

compared to 23.5 per cent for the entire country in 2016. The region has the highest percentage of people living in food poverty in Ethiopia, 31.3 per cent in 2016. Poverty in the rural areas is more prevalent (28.8 per cent) than in the urban areas (11.6 per cent). According to the 2014 Ethiopia Mini Demographic and Health Survey (EMDHS), nearly 14.8 per cent of the rural households in Amhara region were chronically food deficient, and they were covered with the Productive Safety Net Program (PSNP) in 2014. According to the EDHS (2016), childhood malnutrition (stunting) in the region is among the highest in the country (46 per cent in Amhara while 38 per cent in the whole country). The prevalence of poverty in different dimension requires critical analysis and setting proper development interventions.

According to Amhara national regional state disaster prevention and food security coordination office (2016) Menz keya Gebreal *woreda* is among the food insecure *woredas* of Amhara national region. The people of Menz Keya Gebreal *woreda* livelihood mostly depend on agricultural sector. According to Menz Keya Gebreal *woreda* agriculture office 20,528 (44.4 %) in 2005 and 10,937 (18.7%) in 2015 of the population are suffer from chronic food insecurity and citizens are still under the support of Productive Safety Net Program (2015 socio economic survey and WADO 2018). Even though, the number of people who are dependent on food aid are reduced the livelihood of most of the people is not resilient and vulnerable to manmade and natural hazards. According to the *woreda* agriculture office crop assessment report of 2015/16 and 2016/17 year 14,709 and 5,986 number of people respectively were affected and become dependent on relief/food assistance.

A lot of development and food security interventions like productive safety net program (2005-2018), FAO food security program, designed in different form by the joint venture of development partners, regional and local governments have been executed for the last forty years. But due to a number of reasons like the disadvantaged nature of the area, unwise utilization of natural resources, limited community involvement in project identification and appraisal, dependency syndrome, lack of productive assets and lack of infrastructure the endeavor in reducing food insecurity has not shown meaningful change. The problem of food insecurity in the study *woreda* is still a big challenge. Therefore, this study intended to understand and justify food insecurity level, determinant factors and challenges of food security and recommend possible interventions mechanisms to reduce food insecurity and its related consequences.

1.2. Statement of the problem

Food security in Ethiopia is highly dependent on the farm performance and in particular to the production level of the major food crops (cereals, pulses and oil seeds). Given the importance of yield productivity as a source of growth in production in most rural households, the situation of food security and the determinant factors was a theme of keen interest to this study so as to investigate status of food security, determinants of food security and challenges of food security. In order to combat threats of famine and pervasive poverty and thereby ensure food security for its population, the government strategy like agricultural development led industrialization (ADLI), food security strategy (FSS), plan for accelerated sustainable development to end poverty (PASDEP) have rested on increasing the availability of food grains through significant investments in agricultural technologies (high yielding varieties of seeds, fertilizer), services (extension, credit, inputs), and rural infrastructure (roads, markets). The impacts of these policies and strategies, however, have been shadowed as there are still millions of people who experience extreme hunger in the country (Ayalneh & Abebaw, 2009). Moreover, the achievement of food self-sufficiency is one of the key objectives of the government as articulated in its GTP and rural development policies and strategies, which is also consistent with the MDG goal of eradicating extreme poverty or hunger (MoFED, 2012). Mainly this is due to access to sufficient food and nutrients are essential for household welfare, as well as for accomplishing other development objectives. 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 whereby 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.

People living in Menz Keya Gebreal *woreda* have been suffering from problem of chronic and transitory food insecurity. Land degradation and shortage of land undermines the production capacity and thereby reduces agricultural production. Consequently, low agricultural production has constrained ability of households to acquire sufficient food supply. Empirical studies confirmed that having access to different kinds of livelihood assets (such as human capital, social capital, physical capital, financial capital and natural capital) as well as different institutional factors and policies more likely to improve households food security (Seid and Biruk, 2017).

The issue of solving food insecurity has been started since 1980s, during the Derg regime. Efforts have been made to ensure food security with the participation of various organizations, including the government, but so far no significant changes have been made. As a result, poverty reduction in general and food insecurity in particular, has not been eliminated.

Most of the *woreda's* rural household's income source is mixed agriculture. In the study *woreda* agricultural development has been challenged by animal and crop diseases outbreak, pests' infestation, and occurrence of natural and man-made disasters, inaccessibility of market infrastructure, road infrastructure and information. The land even not suitable for cultivation has been cultivated for a long period of time without proper management of natural resources. Inadequate natural resource management has led to loss of soil fertility, loss of biodiversity, depletion of groundwater and surface water, and ultimately to reduction of productivity and production. Even during the best productive year, the *woreda* fails to feed its population, because of a certain number of people are unable to meet their annual food requirement due to lack of access to produce or due to occurrence of natural and manmade disasters.

Despite the growth of crop production in Menz Keya Gebreal *woreda* the number of food insecure and relief-assisted population in the *woreda* has been extremely up and down. In addition, some parts of the *woreda* are prone to frost, so scientific development options can be used to combat unfavorable environmental condition and ensure food security.

According to Menz Keya Gebreal *woreda*, the study *woreda* agriculture office the number of people who need permanent food assistance and relief assistance has not shown radical change rather the number of people who require relief assistance and food security assistance increasing from time to time. According to the *woreda* agriculture office crop assessment report in crop production year 2015 and 2017 production year 14,709 (25.2%) and 5,933 (10.2%) number of people were affected and become dependent on relief/food assistance because of the El Niño occurrence /WADO annual report, 2018/19/. Based on eye witness information from different part of the people including government officials, in the study *woreda*, there has not been organized and scientific research to identify causes of food insecurity and indicate possible solutions of food security improvement.

The output of this study is expected to bridge the information gap that is crucial to improve food security status of the households and creates an enabling situation to intervene based on the level of food security. The study also recommended particular recommendation of development

interventions for food insecure households. It also recognized the importance of considering, does the present food secure households become food secure in the future and recommended intervention mechanism to continue being food secure in the future.

1.3. Research Objectives

1.3.1. General Objective

The overall objective of this study was to investigate food security situation, and determine critical challenges in achieving food security in Menz Keya Gebreal *woreda*.

1.3.2. Specific objectives

- ❖ To determine the status of household food security
- ❖ To identify household food security determinant factors
- ❖ To investigate main challenges of food security achievement endeavor

1.4. Research Questions

This research intended to answer the following questions

- ❖ What is the current status of food security at household level?
- ❖ How can we overcome food security challenges facing the rural households in the study *woreda*?
- ❖ Why different food security determinants factors affect food achievement in the study *woreda*?

1.5. Significance of the Study

Food security analysis is enabling us to identify the food secure and insecure households within communities and explain to predict how the different segments of population would be affected by unexpected adverse events. Such an identification mechanism could be used to design appropriate pre and post shock institutional assistance strategies. Aid agencies and development organizations continue to face challenges of needs assessment and targeting interventions since there is a lack of mechanisms that can be used to differentiate food secure from food insecure or at-risk households. Therefore it becomes important to identify the food insecure sections of the society and predict how their situation be when they face an adverse shock.

Once the insecure or at risk households are identified and we know what resources they lack, interventions can be designed to provide the households with those resources, thus enabling them to get out of hunger trap. Moreover, a deeper understanding of the characteristics of food insecure groups would provide an empirical basis for social policy, thereby strengthening both the analytical and operational content of Ethiopian poverty reduction program in general and the

study area in particular. This study therefore provided an approach on what can be done to help the current food insecure to be food secure and to reduce the likelihood of the vulnerable from falling into food insecurity in the future. Consequently, such studies are away from doubt important for the success of efforts to be made in the area to ensure food security. Policy makers and planners will also draw lessons on designing effective strategies to reduce not only current food inadequacy faced by households but also to reduce exposure to future food insecurity.

1.6. Scope of the Study

The study has limited spatial scope *i.e.* Menz Keya Gebreal *woreda*. The *woreda* was selected purposively. The study conducted in smallholder farmers. I assumed that all members in a household with a per adult equivalent calorie consumption less than the calorie intake cut-off are undernourished. Conversely, all household members within a household with per adult equivalent calorie consumption above the cutoff are considered to be consuming sufficient calories. Various studies of Ethiopian household livelihood and coping strategies have found that household members may not fully share risk factors for under nutrition, and an individual in a household that is defined as not being undernourished, may be in fact undernourished (Dercon and Krishnan, 2000). The study was used cross sectional research design which studies current difference among the study population.

1.7. Limitation of the Study

In this study food security estimation was made using the model developed to estimate food security using cross-sectional data. This may cast doubt on the entire dynamism of the analysis. The number of respondents was relatively small from the total farming households in the *woreda* in general and in selected *kebeles* in particular.

Unwillingness of respondents to give precise information was a challenge encountered during data collection. Outbreak of corona virus in the world and in our country during the beginning of data collection in March, 2020 impose difficulty in consulting advisor, friends, in approaching the respondents and in June, 2020 because of occurrence security problem in Ethiopia and switching of internet access it was difficult to run the thesis as planned.

1.8. Ethical Consideration

The protection of human subjects through the application of appropriate ethical principles is important in all research study.

“...The research process creates tension between the aims of research to make generalizations for the good of others, and the rights of participants to maintain privacy. Ethics pertains to doing well and avoiding harm. The process of obtaining Consent consists of the following: consent should be given freely (voluntary), subjects should understand what is being asked of them, and involved persons must be competent to consent. This means, to participate in a research study, participants need to be adequately informed about the research, comprehend the information and have a power of freedom of choice to allow them to decide whether to participate or decline. Participant’s agreement to participation in this study was obtained only after a thorough explanation of the research process.”(Orb, Eisenhauer, and Wynaden, 2000).”

According to Emanuel (2000), explained ethical requirements of biomedical research, stating seven conditions that must be complied with in order for the research to be ethically correct: social value, scientific validity, equitable selection of subjects, favorable risk/benefit ratio, informed consent, respect for subjects and independent assessment. This research has been conducted depending on the research ethics i.e. during data collection and interpretation the name of the respondents has not been listed. Before collection of respondents’ idea, data collectors informed the purpose of the study and responsible body of the study. Similarly before the beginning of focus group discussion and key informant interview participants have been oriented on the ultimate objective of the study and gave their view on structured question. Participants of key informant interview gave their idea supported by electronics media.

1.9. Organizations of the Thesis

This paper contains five chapters. The first chapter introduces the background of the study, the problem statement, and objective of the study, significance of the study, scope of the study, limitations and ethical considerations. Chapter two contains theoretical review, empirical literature, conceptual frameworks and analytical frameworks. Chapter three contains methodologies, description of the study area, research design, sampling design, sources and type of data, method of data collection and data analysis. Chapter four is the result and discussion. The last chapter is conclusion and recommendations.

CHAPTER 2: REVIEW OF RELATED THEORIES AND LITERATURE

2.1. Theoretical frameworks

Theories of Food Security most prevalent to the subject matter are a lot and cannot be assumed as full-fledged and independent theories. However, they can be taken as integral and can be complemented each other for developing mega theories and studies in the areas of food security. Food security is a concept that has evolved over time.

The most common definitions vary around that proposed by the World Bank (1986) and were summed up by Maxwell and Franken Berger as *"secure access at all times to sufficient food for a healthy life"* (1992). In their exhaustive review of the literature on household food security, they list 194 different studies on the concept and definition of food security and 172 studies on indicators (Maxwell, 1992). A review that updates this literature (Clay, 1997) provides an additional 72 references. The most commonly used definition is the one that developed by the World Bank (WB, 2009), When all people at all times have both physical and economic access to sufficient food to meet their dietary needs for a productive and healthy life. Food is here defined as any substance that people eat and drink to maintain life and growth. As a result, safe and clean water is an essential part of food commodities. The nutrition focus adds the aspects of caring practices and health services & healthy environments to this definition and concept.

“Food security exists when all people, at all times, have physical, [social] and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life” (FAO, 1996). From this definition, we can understand that food security has four main dimensions of food security, availability, access, utilization and stability. According to Food and agriculture organization of the united nations (2001) *“Food security is a situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life.”* WFP also offers the following definition: “A condition that exists when all people, at all times, and are free from hunger” (WFP, 2009).

From all these definitions it is possible to conclude that food security has the following pillars. Food security is ensured when a person, household or community, region or nation is food secure when all members at all times have physical and economic access to buy, produce, obtain or consume sufficient, safe and nutritious food to meet their dietary needs and food preferences for a healthy and active life.

1. Food Availability Decline (FAD)

The primary focus of this approach is on food supplies as a major cause of food insecurity. In 1798 Malthus had published, anonymously, *an essay on the principle of population as it affects the future improvement of society*.

According to Burger (2020) Malthus addressed the relative rates of food production and population growth, because human population grew exponentially and food production arithmetically. Malthus predicted that checks on population would come in two forms: positive checks that raise the death rate such as widespread “famine, pestilence, and war” and preventative checks that lower the birth rate including moral restraints such as birth control, postponing marriage, and celibacy.

The other scholar Dunn (2015) in 1798 Malthus had published, anonymously, *an essay on the principle of population as it affects the future improvement of society*. In it he called attention to the disparity between the rate of population growth and the slower increase in the food supply. War, famine, and disease, he pointed out, had to be the eventual alternatives to the limitation of family size. His book caused furious controversy and led him to prepare a more scholarly work.

Chowdhury (2018) his study was similar to the Malthus assumption of unchecked population growth can cause disaster for the economy. In his article he found that a highly significant negative correlation between population growth and economic development. The study added that excessive population growth can shrink the possibility of economic growth unless government come forward and take proper steps to reduce the food problems using alternatives methods like export skilled labor to abroad, promote local small industries, agricultural advancement programs, promote labor-intensive industries (because of availability of cheap labor), encourage foreign investors, institution settings and political stability.

Karl Marx looked into the relationship between population and production, although his model is somehow specific to the context of the capitalist mode of production. He analyzed modes of

production in terms of the specific economic form in which the owners of the means of production extracted unpaid surplus labor from the direct producers (Jessop, 2017). Accordingly the root causes of human poverty in general food insecurity in particular are highly associated with mode of production.

Easter Boserup (1965) has developed a theory which is essentially contra-Malthusian. Her theory demonstrates the relationship between population growth and the transformation of agriculture. Boserup sees population growth as a force favouring an adoption and diffusion of technological innovation that expands agricultural production, thereby reducing vulnerability to food insecurity and hunger. She argues that the positive effect of population concentration is by making financially feasible investments in infrastructure (water and irrigation, energy, transport, and improved production technologies).

Ensuring food availability does not guarantee food security at a household level. Amartya Sen argues ‘food availability decline’ cannot be the cause of Bangladesh famine, because, compared to previous years, levels of rice production and food grain availability were higher in 1974 in Bangladesh (Elahi, 2017).

2. Food Entitlement Decline (FED)

Starvation is the characteristic of some people not having enough food to eat. It is not the characteristic of there being not enough food to eat. While the latter can be a cause of the former, it is but one of many possible causes. Whether and how starvation relates to food supply is a matter for factual investigation. Food supply statements say things about a commodity (or a group of commodities) considered on its own. Starvation statements are about the relationship of persons to the commodity (or that commodity group). Leaving out cases in which a person may deliberately starve starvation statements translate readily into statements of ownership of food by persons. In order to understand starvation, it is, therefore, necessary to go into the structure of ownership. Ownership relations are one kind of entitlement relations. It is necessary to understand the entitlement systems within which the problem of starvation is to be analyzed. This applies more generally to poverty as such and more specifically to famines as well.

An entitlement relation applied to ownership connects one set of ownerships to another through certain rules of legitimacy (Sen, 1981).

United Nations university (1993) entitlement approach to famine defined entitlement comprises the endowment set, the entitlement-mapping (or E-mapping), and the entitlement set. Entitlement failure is derived from the three basic concepts and plays a crucial role in the analysis of famines. A person is said to suffer from the failure of food entitlement when her entitlement set does not contain enough food to enable his/ her to avoid starvation in the absence of non-entitlement transfers, such as charity. According to this study, the entitlement theory provides an organizing framework for searching the causes of famine, and claims that this framework is superior to that of the traditional FAD approach.

According to the theory formulated access to productive resources and market determine households' food security status. Access to physical infrastructures, productive assets, markets can ensure food security status of the household. In this study it was investigated the relationship between households' access to resources and its effect on food security.

3. Political Economy Explanation

Supporters of this model argue that 'many famines in the world have actually arisen from and been sustained by inflexible government policies undermining the power of particular sections of the population to command food'.

The global food crisis of 2008 and after, and the challenges that many governments faced to implement effective national policy responses to food price volatility, re-focused attention on the political economy of policy-making and implementation for food security and nutrition (FSN). The development world has become increasingly aware that technically sound policies do not necessarily produce good results. Experience shows that lack of progress in achieving FSN in practice was largely due not only to insufficient technical knowledge, policies or resources – but to the role of politics, actors, interests and institutions in shaping what actually happens on the ground.

According to FAO (2017) understanding political economy behind public policy-making and implementation is crucial to enhance the effectiveness of development agencies' policy support to countries.

Given the increasingly complex operating environments that have resulted from recent conflicts, political upheavals and sluggish and uneven global economic recovery from the global financial crisis of 2007-9, external actors will face continuing challenges over the coming years to provide policy support to improve FSN outcomes at country level.

Applying political economy analysis (PEA) to policy support in food security and nutrition can be of value when facing these challenges. However, PEA should not be seen as a way to impose technical policy options proposed by an external actor. Instead, it can be useful to identify potential entry points to support reform efforts against the odds. Above all, it can and should be a vehicle to change how development agencies work at country level. It should enable them to be a more aware and effective partners, and play a role of catalyst and neutral facilitator in the nationally led policy reform processes.

This brief is intended to support policy practitioners and other stakeholders in working in a more politically informed way towards a coherent set of policies across the most relevant sectors that together lead to sustainable food and agriculture and better food security and nutrition outcomes.

According to political economy explanation the most determining factor in achieving food security is a political economy a country implements. It is also related to designing and implementing appropriate policy by the whole community at the grassroots level starting from planning. In the short run, policies that focus on mitigating the immediate impact of high food prices on vulnerable groups, and that facilitate access to adequate, quality food through emergency measures such as food assistance and cash transfers will be most effective. In the longer run, scaling up agricultural productivity and investment, promoting rural development, and continuing to tackle the root causes of poverty can promote economic resilience and help build sustainable food security (Asian development Bank, 2013). At the same time, policies should be crafted to promote sustainable agricultural production and environmental protection. So in my study area I will investigate the designing and implementation of policies to enhance food security status of the people. The study will investigate the relationship between policy and food security situation.

4. Food insecurity as a disaster

The supporters of this model argue that food insecurity is considered as disaster. Food insecurity results from the interaction of multiple environmental and socio-economic factors: natural hazards, the level of technology, and insufficient redistribution or trade systems are examples (Garschagen et.al, 2015). For disaster to happen there must be vulnerable people whose livelihood cannot withstand certain kinds of hazards. By vulnerability we mean the characteristics of a person or group in terms of their capacity to anticipate, cope with, resist and recover from the impact of a natural hazard. It involves a combination of factors that determine the degree to which someone's life and livelihood is put at risk by a discrete and identifiable event in nature or in society. Vulnerability in this context entails two important components:

- The first addresses the **pre-crisis condition** which is the incapability to cope with or withstand external shocks. The question here is why 'incapable'?
- The other dimension is the **post-crisis situation** whereby a household fails to readily recover from the effect of the shock.

Pressure and Release (PAR) is one of the two disaster models advanced by Blaikie et al. (1994) aimed at showing how vulnerable people are affected by natural hazards. According to Twig (2001) the model consists of two main components. One is 'vulnerability' on the human/social side, and the other is a natural event, which is termed 'hazard'. The basis for the PAR idea is that a disaster is the intersection of two opposing forces: the processes generating vulnerability on one side, and physical exposure to a hazard on the other. The 'release' idea is incorporated to conceptualize the reduction of disaster. The model developed by Blaikie et al. (1994) presents a number of human and natural factors in the cause and effect chain, whereby the variables to be involved alter according to type of disaster under question. The social related components of a disaster are represented by vulnerability which is, in turn, produced by interaction between three factors: '**root causes**' of a disaster, '**dynamic pressure**', and the resultant 'unsafe conditions'. Dynamic pressures channel root causes into unsafe conditions that become subjected to faster rate of change.

5. Food insecurity as vulnerable livelihood

Robert Chambers and Gordon Conway(1992), proposed the following composite definition of a sustainable rural livelihood, which is applied most commonly at the household level: *A livelihood comprises the capabilities, assets (stores, resources, claims and access) and activities required for a means of living; a livelihood is sustainable when it copes with and recover from stress and shocks, maintain or enhance its capabilities and assets, and provide sustainable livelihood opportunities for the next generation; and which contributes net benefits to other livelihoods at the local and global levels and in the short and long term.*

USAID (2009), states that Vulnerability refers to a household's susceptibility to a future acute loss and its capacity to maintain its livelihood and food security over time. Vulnerability is defined as: *"the household's susceptibility to shocks and stresses that affect the household's ability to generate sufficient income to earn a livelihood and achieve a threshold level of nutritional requirements for a healthy life both now and in the future."* Vulnerability is a day-to-day reality for many households.

Consequently, household's vulnerability context is influenced by factors both outside of and within its control. Those factors outside of its control include stresses and shocks as well as external structures and processes. Structures and processes include factors like the public and private sectors, civil society, laws, policies, culture, and social institutions that affect how households accumulate and utilize assets. Stresses include long-term trends or recurring events that put ongoing pressure on the household's livelihood and food security. In other words, shocks are unanticipated (often dramatic) adverse events that undermine the household's livelihood and food security. Stresses and shocks emanate from a variety of sources in the economic, natural, health, political, and social environments including food insecurity.

Resilience refers to the household's capacity to recover from stresses and shocks. Resilient households tend to absorb stresses and shocks without serious modifications reverting relatively quickly to their previous state after the effects have passed. Sensitivity refers to the magnitude of change set in motion by the stress or shock. As a result the more sensitive the household is, the greater the adverse impact of a stress or shock on its livelihood and food security.

2.2. Empirical Related Literature

“Food security is achieved, if adequate food (quantity, quality, safety, socio-cultural acceptability) is available and accessible for and satisfactorily used and utilized by all individuals at all times to live a healthy and active life. “This definition combines and emphasizes several aspects, i.e., ‘Availability’, ‘Accessibility’, and ‘Use and Utilization’ of food. Then at the 2009 World Summit on Food Security, the last official revision, which added the fourth dimension of stability to the concept of food security (FAO, 2009). More recently it has been suggested that sustainability be added as a fifth dimension to encompass the long-term time dimension (Berry et al., 2015). In much of the food security literature, a distinction is made between chronic food insecurity is the inability to meet food needs on an ongoing basis – and transitory food insecurity when the inability to meet food needs is of a temporary nature (Maxwell and Franken Berger 1992).

According to a review conducted in Ethiopia by Tamiru (2020) household food insecurity is a critical variable for understanding the nutritional status of children in low income countries; as low income is associated with poor diet, food insecurity and poor child health. According to Yenesew (2015) the reviewed literature confirmed that natural disasters such as drought and climate change, shortage of farm land, lack of functional multi-party democratic systems, land reform policy, lack of appropriate policies and institutions, lack of rural infrastructures (schools, roads, markets and health), population growth and lack of education are the major causes of food insecurity in rural Ethiopia. According to Abduselam (2017) the 2015 El Niño drought is one of the strongest droughts that have been recorded in Ethiopian history were more than 27 million people became food insecure and total population of 18.1 million people required food assistance in 2016. As indicated by Africa Food Security and Hunger Multiple Indicator Scorecard, Ethiopia ranked first in having the highest number of people in state of undernourishment which was 32.1 million people in 2014. World Food Program found long-term effects of chronic malnutrition cost Ethiopia approximately 16.5 percent of its GDP in each year. The number of food insecure people in the country increasing from time to time; which was estimated to 2.9 million in 2014 and 4.5 million in August, 2015 and by the end of the same year this figure had more than doubled to 10.2 million food insecure people. Drought and land degradation, population pressure, instability and armed conflict are major sources of food security problems in Ethiopia.

According Birara E, et al. (2015) chronic and acute food insecurity is prevalent. About 10% of Ethiopia's citizens were chronically food insecure and this figure rises to more than 15% during frequent drought years; 2.7 million People require emergency food assistance in 2014 and 238,761 children require treatment for severe and acute malnutrition in 2014. Population pressure, drought, shortage of farmland, deterioration of food production capacity, plant and animal disease, frost attack, shortage of cash income, poor farming technologies; and pre and post-harvest crop loss are major causes of food insecurity. Sale of wood or charcoal, small scale trading, institutional and societal income transfer systems, limiting size and frequency of meal were major coping strategies.

A study conducted in Becho *woreda*, central oromia region, Ethiopia high fertilizer price, shortage of farm land, erratic rainfall pattern, water logging, poor soil fertility, lack of oxen, lack of grazing land, crop disease and insect pests, lack of improved seed supply, and lack of farm machineries were identified in constraining food production and food security (Furgasa & Degefa, 2016). According to a study conducted in Bule-hora *woreda*, Borana zone, Oromia, Ethiopian cultivate land size, livestock holding and improved seed, sex of household head, Soil fertility status and non-farm income are determinant factors of food security (Ahmed, 2015).

According to a study conducted in Dibatie *woreda*, western Ethiopia, the results show that variables such as education level of household head, utilization of formal credit, cultivated land size, access to training, farm experience, household size and distance to nearest market were found significant influence on households' food security status (Adem, 2020). According to a study conducted in Girar Jarso *woreda*, Oromia region, it was found that only 5 % of the households meet the minimum recommended dietary energy, 2100 Kcal, whereas 11 % of the households obtained up to 67 % of the minimum recommended dietary energy (Meskerem and Degefa, 2015).

A study conducted in south Wollo zone Teleyayen watershed it was found that 20.9% of the sampled households and 79.1% were food secure and food insecure respectively (Alem-meta A. and Singh, 2018). Accordingly it was found that age of household head, family size, number of agricultural labor force, off-farm income, relief support/food aid, farming experience, and agro-ecological zone were key determinant causes of rural household food insecurity. A study conducted in 2008 by Amhara National Regional State Disaster Prevention Food Security Coordination Office (2011) it was found that the distribution of the poor and very poor was the

highest in Gidan (100%) followed by Ebinata (85%) and Bugena (82%). On the other hand, in Simada and Kobo, people seemed that the poor and very poor occupied 60%. Gender-based discrimination, lack of protection of basic human rights, violence, lack of access to productive resources, education and training, basic health services, and employment are widespread in the Study Area, too. The average holding size of farmland in these areas was estimated to be 0.93 ha/farm household and is smaller than that of 1.10 ha in ANRS. The distribution of soils with shallow effective depth due to natural and accelerated erosion in the past is one of the most serious agronomic constraints in the Study Area.

According to Ayele (2019) a study conducted in Mojaena Wodera *woreda*, North shoa Zone, Amhara region, Ethiopia age, marital status, farm land size, land fertility, annual yield, improved seed use, having oxen and family size of household head were identified as a major determinant factors of household food security. Moreover, the descriptive analysis of the study revealed that only 37.6% of the sample households were food secure and 62.4% of households were food insecure.

According to FAO (2013) the local project to Ethiopia planned to improve the nutrition and food security status of vulnerable communities in four *woredas*, namely Lalo Mama and Gera-Keya in North Shewa and Enderta and Hintalo Wajerat in southern Tigray, the former Gera Keya *woreda* (splited into Menz Gera Midr *woreda* and Menz Keya Gebreal *woreda*), the study area, the problem of food insecurity was chronic and the project applied a bottom-up, participatory community action planning process, in line with Ethiopia's decentralization process, to ensure those locally appropriate micro-projects can be identified and implemented to improve the nutrition and food security situations of the rural poor. People need to know that they were invited to get involved voluntarily and actively in planning and implementing projects to improve their lives, particularly regarding nutrition and food security. It was designed particularly to ensure the participation of female headed households, male headed households without oxen and landless young people as these were found to be among the most malnourished and poorest households in the four *woredas*.

2.3. Conceptual Framework

The most commonly used definition of food security is the one that developed by the World Bank (WB, 2009), When all people at all times have both physical and economic access to sufficient food to meet their dietary needs for a productive and healthy life.

Natural resources are one of the components that can determine availability in the study district. The presence of sustainably conserved natural resources (land, water, vegetation, air, etc.) for rural households plays an important role in ensuring food security.

Access is one of the factors that determine the food security status of the rural households in the selected *woreda*. Access can be divided into two categories: economic and social factors. Economic factors include access to production resources, land and credit, purchasing power, infrastructure, markets, and communication options. When we come to social factors, access to education includes training and awareness-raising options, legal frameworks, and a sense of ownership to natural resources.

When we look at each item in detail, since most of the rural households in the study *woreda* food security status depends on agriculture; whether or having access to fertile land for each household or alternative land has potential to determine food security. Another product of access to productive resources is access to credit, which is crucial to ensuring food security. Loans are essential to support agriculture in technology and to market competitive agriculture. In order to ensure food security, in addition to what the farmer own produce, food can be supplied from other surplus areas by purchasing. As a result, those with better purchasing power can easily verify their food security. The presence or absence of infrastructure plays an important role in ensuring food security in the selected district. Whether or not infrastructure is expanded and a well-informed market plays an important role in ensuring food security. One of the social factors is that a farmer who has the access to education can improve knowledge and skills which is a precondition to use technology and can ensure food security. The presence or absence of alternative social support for residents in need of social assistance plays a key role in ensuring food security. Access to a variety of resources is crucial to ensuring food security, for example, whether or not there is a legal framework that provides access to land and credit for non-landowners who need access to credit but are unable to access it.

The third pillar of food security is utilization, and we will look at demographics and other factors that contribute to utilization. In terms of ensuring food security for rural households, the number of households, the presence or absence of a productive family member, and whether or not they are in a productive age group, households head literacy status and level of education, and gender have an important role to play in. Access to health services, such as nutrition awareness and access to health care, plays a role in ensuring and ensuring food security. Access to safe drinking water plays a role in ensuring food security. Experience and choice for a variety of foods in the selected district is contributing to food security. Certain foods have a better choice in terms of experience, not in terms of nutrients. Others which have high potential in ensuring food security are less preferable. Another approach of coping strategy in terms of utilization is, and during the months of food insecurity, from July to September, consuming less than the required kilo calorie of food per person per day or preferring certain foods based on supply, rather than their nutritional value, is contributing to food insecurity. In general concepts of food security in the study *woreda* could be summarized as follows.

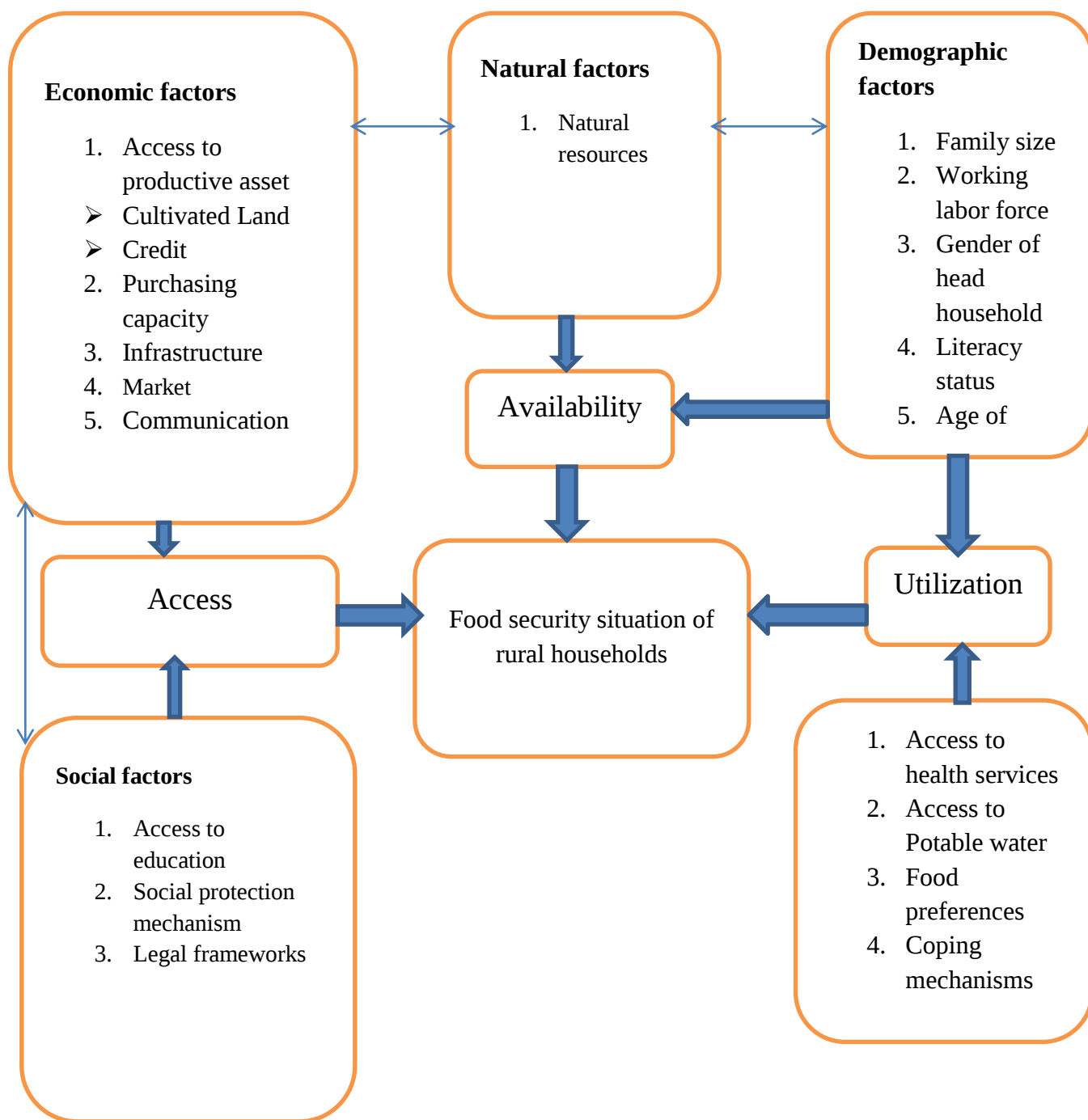


Fig.1: Conceptual framework of rural households' food security situation

Source: Researcher own understanding

CHAPTER 3: RESEARCH METHODOLOGY

3.1. Description of the Study Area

Menz Keya Gebreal *woreda* is one of the *woreda* in North Shoa, Amhara region, Ethiopia. The capital of the *woreda* is Zemero which is located North East 325 km from Addis Ababa and North West of Debre Birhan, the zonal capital. According to the *woreda* administration office it has 12 rural kebeles and 1 urban kebele. It has an area of 58,869 ha. The *woreda* is located in 39°19' 30" to 39° 22' 30" longitude and 10° 90' to 10° 13' 30" latitude.

The result of the 2007 population and housing census showed the total population of Menz Keya Gebreal *woreda* was 46,219 in the year 2007 and projected to reach 58,782 in the year 2019 (WFCO, 2018). According to this projection it is expected that about 93.7% of the population lives in rural areas residing in 12 *Kebeles* and the remaining 6.3% in Zemero town with the total density of the rural population of 0.94 persons per hectare. Women constitute 50.3% of the total population.

The major ethnic group in the *Woreda* is Amhara and 100 % of the population speaks Amharic. Orthodox Christianity is the dominant religion (99.3%) and other religions in the *Woreda* include Muslim 0.4 % and Protestant Christians 0.3 % (WFCO, 2018/19). Agriculture is the major enterprise on which the livelihood of the rural population depends on.

The topography of the area consists of, hills, valleys and cliffs that exposed the natural resource for severe degradation mainly due to erosion. The hills and cliffs are stony and rocky covered by very sparsely scattered vegetation. Generally, flat land and land with gentle slope is scarce and comprises only 46.1% of the total area. Hilly topography covers about 24.2% of the area while valley, ups and downs 29.7% of the *Woreda*, (WFCO, 2018). Regarding the soil type, vertisol and gray soil is the predominant soil type in the *Woreda*.

The dominant climatic condition of the *Woreda* ranges from *kola todega* which ranges from 1458-2829 m.a.s.l. The mean annual rainfall of the *Woreda* ranges between 400 mm and 900 mm.

Menz Keya Gebreal *Woreda* has a total area of 58,869 ha. From this area, only 28.4% is used for crop production. About 53.8 % of the *Woreda* is non-usable at present. The dominance of crop to livestock in the farming system varies based on the agro-climatic zone. All in *kola*, *woina dega* and *dega* mixed agricultural practices are important enterprises.

Farmers in the *woreda* are growing many crops including cereals, pulses, fruit and horticultural crops. Irrigation agriculture constitutes a very small fraction (8.1%) out of the total area on which crop is produced.

There are about 200,101 head of livestock and 58,814 poultry. Of the livestock population number of cattle constitutes 20.4%. The remaining heads of livestock are composed of goats (12.9%), sheep (31.3%), donkeys (5.5%) and horses (0.5 %). Bee keeping and poultry is an integral part of the animal husbandry in the study area, both are mainly practiced under traditional system, and the level of their productivity is very low (WADO, 2018).

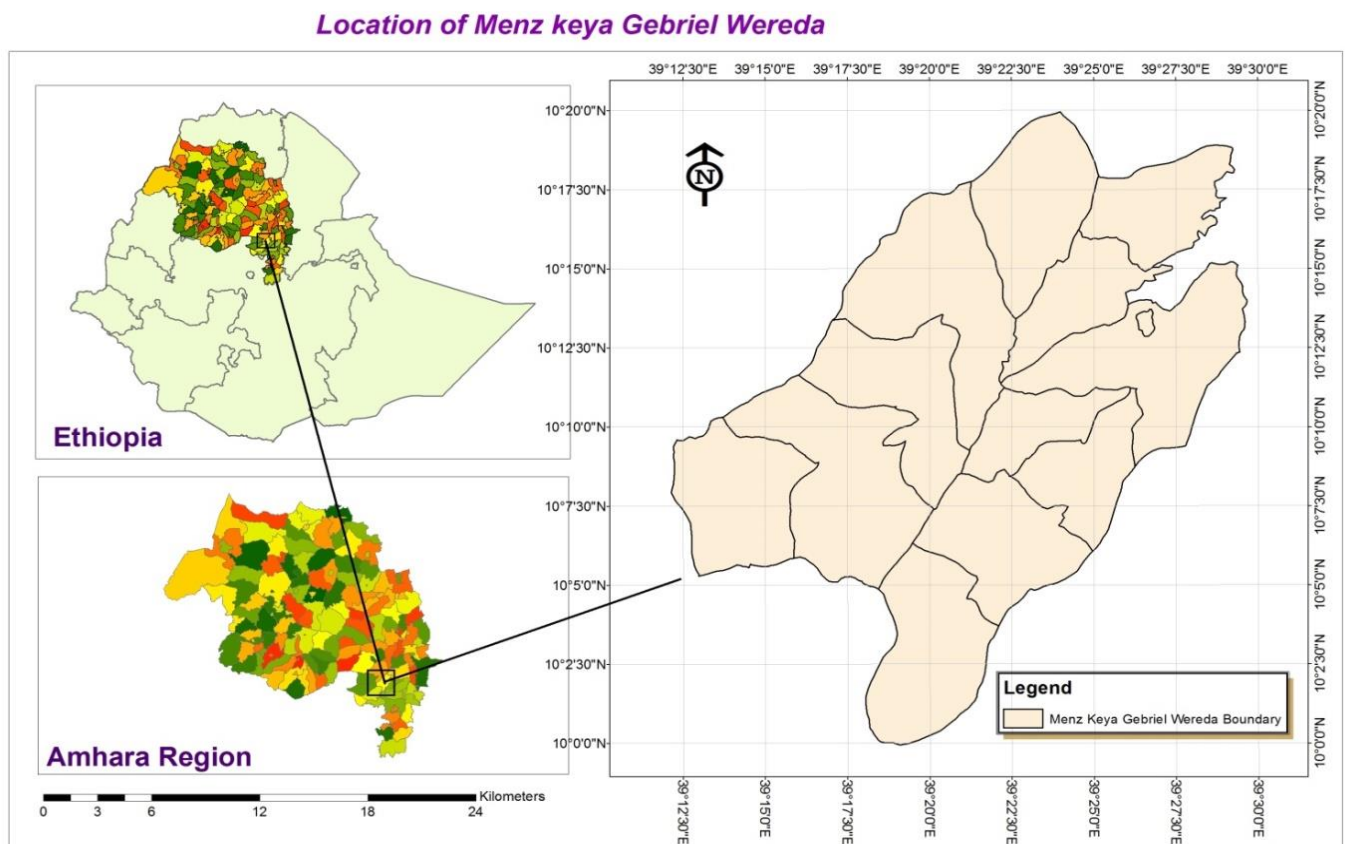


Fig. 1: Map of the study area

Source: Menz Keya Gebreal woreda agriculture office

3.2. Research Design

Cross Sectional Research Design

According to Setia (2018) Cross sectional study design is a type of observational study design and the investigator measures the outcome and the exposures in the study participants at the same time. Participants in cross sectional study are selected based on the outcome status or participants selected based on the exposure status, the participants in a cross-sectional study are just selected based on the inclusion and exclusion criteria set for the study. The study used cross-sectional design to measure differences between or from among a variety of people based on their current food security status, or phenomena rather than a process of change. So at the end of the study the difference between rural households based on their food security status have been identified.

3.3. Sampling design

3.3.1. Sampling procedures

Menz keya gebreal *woreda* is one of the 27 *woredas* of North Shoa zone, Amhara National Regional State (ANRS). According to the data obtained from the *woreda* administration office, there are 12 rural *kebeles* and one urban center, Zemero town in the *woreda*. The sample *kebeles* in the *woreda* stratified based on their existing food security status. Then purposive sampling technique has been used to select 3 rural *kebeles* from the total 12 rural *kebeles* in the *woreda*. Based on agriculture office data, among the sample *kebeles* Zelan kebele is low food insecure, Gumer is moderately food insecure and Akafe is severely food insecure. This ensured most representation stratum than the total population and results in more reliable and detailed information.

3.3.2. Sample Size Determination

According to the information obtained from Menz Keya Gebreal *Woreda* Agriculture Office (MKGWAO), the total number of farming households in the three sample *kebeles* was 1,595. Then the number of sampled households (the number of respondents for the household questionnaire survey) has been determined to be about 319 (20 % of the total households in the

three *kebeles*) households with $\pm 5\%$ precision level and 95% confidence interval according to Yamane (1967:886) sample size determination formula.

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

Where n is the sample size, N is the population size, and e is the level of precision.

The total sample size was distributed to each sample *kebele* based on the proportion of total number of households in each selected *kebele*. The three *kebeles* were selected based on their food security status. Among the three *kebeles* Zelan *kebele* is low food insecure, Gumer is moderately food insecure and Akafe is severely food insecure *kebele*. Sample households were selected by simple random sampling technique from the sampling frame households.

Table 3.1 Sample size

Name of Sample kebeles	Number of farming Households			Number of sample farming households			Percentage of sample farming households
	Male	Female	Total	Male	Female	Total	
Gumer	476	174	650	95	35	130	20
Zelan	340	90	430	68	18	86	20
Akafe	365	150	515	73	30	103	20
Total	1,181	414	1,595	236	83	319	20

Source: Researcher own data adapted from Menz Keya Gebreal woreda agriculture office

3.4. Data type, Sources and Tools

Tools and Techniques of Data Collection

This research was employed questionnaire interview, key informant interview, focus group discussion and secondary sources of data.

Questionnaire Interview

Questionnaire-based survey was administered to sample farming households by using a questionnaire survey after obtaining the consent of the respondents as a research ethics. The questionnaire was translated in to *Amharic* for the purpose of simplicity and ease of communication between the enumerators and the respondents. With this technique data related to demography, socioeconomic, biophysical, farming practices and productivity, technology selection and utilization was collected. In order to maintain the quality of data, scientific principles and guidelines during questionnaire designing, data collection, data filling, encoding, data entry and processing were applied. Data collectors were oriented on issues related to data collection procedures and ethics. Pilot study was undertaken for pre-testing the questionnaire in order to estimate the time needed to complete and implement it. The questionnaire was edited in the light of the results of the pilot study. Computer-based data cleaning was carried to check for the completeness, consistency and accuracy of data and to identify errors that may occur during data collection or coding process.

Key Informant Interview (KII)

Key informant interviews were undertaken with people who know what is going on in the community. The purpose of key informant interviews was to collect information from a wide range of people including community leaders, professionals, or residents who have firsthand knowledge about the community. Accordingly one leader, two experts and one program coordinator were interviewed based on structured questions assisted by electronics media. These community experts including, leaders and food security experts with their particular knowledge and understanding, have been provided insight on the nature and determinants of food security, coping mechanism, the endeavor to achieve food security and the historical background of food security and aid and development interventions.

Focus Group Discussion (FGD)

A focus group is a group discussion of approximately six to twelve people who share similar characteristics or common interests. A good size for a focus group is between six and twelve participants per session (American Statistical Association, 1997). A facilitator guides the group based on a predetermined set of topics. The facilitator creates an environment that encourages participants to share their perceptions and points of view.

Group participants were selected because of common characteristics that relate to the focus group topic. The group were formed from Productive Safety Set Program beneficiary and non-Productive Safety Net Program beneficiary, women headed household, male headed household, landless household and land owner household with six members in each group or kebele a total of three groups in the three *kebeles*.

Secondary Sources

There are many potential sources of secondary data. Information used by Menz Keya Gebreal *woreda* different government sectors for planning, monitoring or evaluation that has previously been collected by *woreda* administration, agricultural development, finance and economic coordination offices and different development partners for their own purposes were used to analyze the result. Secondary data that can be used in this research was to support the primary data collected. This enables findings and lessons from a project or program to be triangulated (meaning they can be compared with other interventions to see if findings support or contradict each other).

3.5. Data Analysis methods

Analysis of Data

In this study, data was analyzed using both the qualitative and quantitative method. The quantitative data, that were collected from questionnaire survey and secondary data sources, were analyzed using latest version of STATA software and excel in order to describing key findings, conditions, states and circumstances obtained from the data. Measure of central tendencies (mean), and measures of dispersion standard deviation, correlation and regression was major descriptive techniques that were used to summarize and compare the data. The correlation in between variables can be analyzed using the formula

$$\ln Y = \ln [Y/1-Y] = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \dots + \beta_n X_n + e$$

Where $\ln$ = natural logarithm, Y = probability of being food secure, $1-Y$ = probability of being food insecure, β_n = coefficients of explanatory variables, X_n = predictor variables, and e = error term. It is also possible to analyze by using STATA command.

Measurement of household food security is usually indirect and based on food balance sheets and national income distribution and consumer expenditure data (Faridi, 2010).

In the study *woreda* the study used a simple equation originally adapted by Degefa (1996) from FAO Regional Food Balance Model (HFBM) and modified by Mesay (2011) and henceforth used by different researchers in Ethiopia. HFBM is employed to compute the net quantity of per capita food available. The net available food per household, as reported from household recall, was converted into dietary energy equivalent using EHNRI/FAO (1998)'s food Composition table for use in case of Ethiopia. Then, the medically recommended level of calorie per adult equivalent (2100kcal/day/person for Ethiopia) is used as a cut-off point for food insecure and food secure households or individuals. The following simple equation of HFBM is modified and used by Messay (2011) for household food security analysis.

$$NGA = (GP + GB + FA + GG + CC + MP + DP) - (HL + GU + GS + GV)$$

Where,

NGA= Net grain available (quintal/household/year)

GP= Total grain production (quintal/household/year)

GB= Total grain bought (quintal/household/year)

FA= Quantity of food aid obtained (quintal/household/year)

GG= Total grain obtained through gift or remittance (quintal/household/year)

MP= Meat, meat based products and poultry (kilogram/household/year)

DP= Dairy and dairy based products ((kilogram/household/year)

HL=Post harvest losses due to grain pests, disasters, thieves, etc. (quintal/household/year)

GU= Quantity of grain reserved for seed (quintal/household/year)

GS= Amount of grain sold (quintal/household/year)

GV= Grain given to others within a year (quintal/household/year).

The above measure was calculated as the percentage of households in a population group who do not consume sufficient dietary energy. It was measured by determining whether a household acquires sufficient food over the reference period to meet the dietary energy requirements of all

of its members. If the estimated total energy in the food that the household acquires daily is lower than the sum of its members' daily requirements, the household is classified as food energy deficient (food insecure).

This study was conducted based on the data that were collected through a farm household survey from 319 sample farm household heads drawn through simple random sampling technique. The sampling frame for this study was obtained from selected sample kebele agricultural development office.

The data used for this study were derived from both primary and secondary sources. Primary data were collected through household questionnaire, focus group discussions, and key informant interview while secondary data were collected from relevant local authority reports, books, and journals. Questionnaire data, which is gathered from respondents, was quantitatively analyzed, summarized, and presented in tables, graphs, and percentages. The questions included in the survey questionnaire were both close-ended and open-ended types. The questionnaire was administered during April 2020. Secondary data were also collected from books, journals, and internet sources. The data were also analyzed using descriptive and inferential statistics South Texas Art Therapy Association (STATA) version 14. Descriptive statistics were used to show the effects of continuous and descriptive variables of the study on sample household food security, while inferential statistics like binary logistic regression was used to know the association between dependent and independent variables upon determinants of food security in rural farm households. Household dietary quantity was measured by daily calorie availability per adult equivalent (kilocalorie, kcal) and percentage of households that are food energy-deficient. When the study estimates the available dietary energy the standards of HFBM is employed to compute the net quantity of per capita food.

The status of food security of the rural households in comparison with food security pillars was analyzed. Among the pillars of food security the succeeded and the missed pillars was determined and the total level of food security of the household was analyzed. The correlation between farmer's access to productive assets like land and loan with food security achievement and determinants of food security was analyzed.

CHAPTER 4: RESULTS AND DISCUSSIONS

4.1 Introduction

This chapter will present a discussion of the final results and the process through which the results were obtained. First, background information of respondents will be presented. Finally, analyses of data were discussed, which included a descriptive analysis, regression analysis and correlation analysis through STATA version 14.

4.2 Descriptive statistics Analysis

This section basically analyzed preliminary data for generating descriptive statistics whereby frequencies and percentages were used to present quantitative data in the form of tables for demographic description of respondents.

4.2.1 Demographical description of respondents and their organization

Demographic information described both individual and organization profile. Individual profile section included aspects of level of education, Sex and age, income sources and resources they own.

Three hundred nineteen questionnaires were distributed to the respondents and hundreds of them were collected with a response rate of 100%. The demographic characteristics include: sex, level of education and age. This aspect of the analysis deals with the personal data of respondents to the questionnaires given to them. The demographic profile of the respondents which is considered crucial for this study is presented as follows.

Table 4.1 Sex of Sample households

Sex	Frequency	Percent
Male	265	83.1
Female	54	16.9
Total	319	100.00

Source: Researcher survey, 2020

Households participated in data survey are from 21 to 86 years of age. Among the respondents 9.1% are youths, 82.4% are adults while the remaining 8.5% are in the retire age.

Table 4.2 Number of sample households' classified in age

Age of household head	Frequency	Percent	Cumulative
21-29	29	9.1	9.1
30-40	115	36.0	45.1
41-50	110	34.5	79.6
51-60	38	11.9	91.5
61-70	20	6.3	97.8
71-86	7	2.2	100.00
Total	319	100	

Source: Researcher survey, 2020

Based on the survey data collected in Menz Keya Gebreal woreda 75.24% of the households are undertaking mixed agricultural development.

Table 4.3 Income sources of sample households

Sources of income of the households	Frequency	Percent	Cumulative
Crop production	65	20.4	20.4
Livestock production	3	0.9	21.3
Mixed agriculture	240	75.2	96.5
Off-farm	11	3.5	100
Total	319	100.00	

Source: Researcher survey, 2020

Based on the survey results among the total sample households 25.7% are possessing 3,212 different livestock which is 47% of the total livestock's. The results of Table 4.4 show that livestock development plays an important role in ensuring food security for rural households in Menz Kaya Gabreal and similar *woredas*.

Table 4.4 Number of livestock owned by sample households

Food security status	Number of households	Number of livestock possessed						
		Cattle	Goat	Sheep	Donkey	Hen	Horse/mule	Total
Food secure	82	401	116	1801	125	714	55	3,212
Proportion in %	25.7	37.4	38.7	53.3	34.2	44.2	55.6	47
Food insecure	237	672	184	1581	241	901	44	3,623
Proportion in %	74.3	62.6	61.3	46.7	65.8	55.8	44.4	53
	319	1073	300	3382	366	1615	99	6,835

Source: Researcher field survey, 2020

In the woreda cereals crops accounts 87.15% and pulses 9.72% are the major crops produced whereas spices, oil crops, vegetables are insignificant. Among the sample households 74 (23.2%) are assisted by productive safety net program for 6 months of the year.

Table 4.5 Major crops produced by sample households

Types of crops produced	Frequency	Percent	Cumulative
Cereals	278	87.15	87.15
Pulses	31	9.72	96.87
Roots crops	1	0.31	97.18
Fruits and vegetables	5	1.57	98.75
None	4	1.25	100.00
Total	319	100.00	

Source: Researcher survey, 2020

Measure of food security status of the households

Measurement of household food security is usually indirect and based on food balance sheets and national income distribution and consumer expenditure data (Faridi, 2010). The requirements employed are those for basal metabolic function (a state of complete rest) and light activity, such as sitting and standing. There is some debate about what is the correct energy requirement. Energy requirement depends on age, sex, body weight, activity and lots of other factors.

In determining food security status of a household total amount of crop production, grain loss due poor post-harvest management, amount of seed reserved, and grain bought and grain sold could be considered. In estimating seed reserved and post-harvest loss due to poor handling was calculated according to Meskerem and Degefa (2015:125) citing Mesay (2001) and Degefa (2002) revealed that, farmers reserve 5 percent of their total food produced for seed while post-harvest loss are estimated as 10 percent of the total yield of a household produced. The single most important method of estimating food security status was net dietary energy available measured in kilocalorie. As a result after data collection from sample respondents, the researcher converted available food grain into kilogram and multiplied by the conversion factors of major grains, they were changed into kilocalories. This was done after calculating the balance between lost and gained using the simple household food balance model. The converted results were then divided by the number of household members as adult equivalent and the number of days in the recall period.

Consequently, the results were compared with the minimum requirements per day per adult equivalent unit. According to Mesay (2011) the medically recommended level of calorie per adult equivalent (2100kcal/day/person for Ethiopia) is used as a cut-off point for food insecure and food secure households or individuals. So those households who are at and above 2100kcal are food secure. On the other hand, those households who are below 2100kcal are categorized as food insecure.

After categorizing households as food secure and food insecure, the next step was to identify variables which have association in determining food security. The dependent variable, food security is dichotomous in nature (food secure and food insecure households), the binary logistic regression model was used. Hence food security status was expressed a binary variable (0=food insecure households and 1=food secure households). During conversion of grains from kilo

gram into kilo calories, common cultural foods 100gm energy conversion factor considered as follows.

The amount of energy available per adult equivalent per day

The food energy available for a household was compared with the minimum energy required for a household. According to the survey conducted, 160 or 50.2% of rural household heads who participated in this study reported that their food security was ensured, while the other 159 or 49.8% said that their food security was not ensured. As described in table 4.6, based on the data collected and converted into kilo calories the percentage of food secure and food insecure households are 25.7% and 74.3% respectively. The result is in line with a study conducted in south Wollo zone, Ethiopia it was found that 20.9 and 79.1% of the sample households were food secure and food insecure, respectively (Alem-meta and Singh, 2018). The average available dietary energy of food secure and food insecure households were 3499.64 kcal and 903.3 kcal respectively. The mean average dietary energy of total sample households were 1570.69 kcal and the standard deviation was 1412.33 kcal. The independent t test value of total sampled household was 24.13 which is a significance mean difference between food secure and food insecure rural households at p value <0.01.

Table 4.6 Net available energy of sample households per person per day

Net available energy per person per day in kcal	Frequency	Percent	Cumulative
<985.863	150	47.0	47.0
1019.501-2076.164	87	27.3	74.3
2153.511-2988.39	36	11.3	85.6
3004.11-10338.21	46	14.4	100.00
	319	100.00	

Source: Researcher survey result, 2020

4.3. Determinants of Food Security

Many factors are contributing to trap Ethiopia in the current state of food insecurity. These include age of household head, family size, and number of agricultural labor force, off-farm income, relief support/food aid, farming experience, and agro-ecological zone (Alem-meta and Singh, 2018). These factors impede the achievement of food security and sustainable economic development.

Model specification

This section presents binary logistic regression results of one dependent variable, the status of food security and the explanatory independent variables like socio economic, cultural and physical determinants of food security status in the study area. As analyzed the dependent variable, food security status is a dichotomous (food secure and food insecure) explained by independent variables. The dependent variable is assumed to be linear as a function of the independent variables, the predictors. One dependent variable, food security status and 13 independent variables were selected for analysis. So, binary logistic regression model was selected to analyses the most significant factors.

Therefore, the model can be described:

$$\ln Y = \ln [Y/1-Y] = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \dots + \beta_n X_n + e$$

Where $\ln$ = natural logarithm, Y = probability of being food secure, $1-Y$ = probability of being food insecure, β_n = coefficients of explanatory variables, X_n = predictor variables, and e = error term.

The binary logistic regression model revealed that 8 variables are statistically significant whereas the other 5 variables are not significant in explaining food security. The result confirmed that the size of a household and age of head of household have negative association whereas sex of the head of household, number of agricultural labor force, use of fertilizer, use of improved seed, nutrition awareness of the head of household, access of primary health service, access to agricultural inputs credit, access to financial loan, cultivated land owned by a household, status of literacy and level of education have positive relation in explaining the dependent variable, food security.

Therefore the size of a household, number of agricultural labor force, use of fertilizer, use of improved seed, nutrition awareness of the head of household, cultivated land owned by a

household greater than 0.51ha, status of literacy and level of education up to grade 10 are significant variables.

Table 4.7 Results of binary logistic regression of continuous variables

Variables	Coef.	Std.Err.	Z	P> z	[95% Conf. Interval]	
Age of HHS	-.0136337	.0132448	-1.03	0.303	-.0395929	.0123256
Household size	-.7091356	.1248256	-5.68	0.000	-.9537893	-.4644818
Number of working household members	.5271181	.1646697	3.20	0.001	.2043715	.8498647
Use of fertilizer	.1136544	.0515778	2.20	0.028	.0125637	.214745
Use of improved seed	.627473	.1508415	4.16	0.000	.331829	.9231169

Table 4.8 Binary logistic regression results of binary variables

Variables	Coef.	Std.Err.	Z	P> z	[95% Conf. Interval]	
Gender /female	.0358047	.6888311	0.05	0.959	-1.314279	1.385889
Literacy status/educated	4.100662	1.490631	3.88	0.001	2.011101	8.361304
Level of education 1-4	2.533334	.828743	2.84	0.01	1.334241	4.81006
Level of education 5-8	.4467106	.3798097	1.18	0.004	-.2977029	1.191124
Level of education 9-10	.93683	.538505	1.74	0.015	-.1186204	1.99228
Level of education 11-12	.6441924	1.525657	0.42	0.644	-2.346041	3.634426
Nutrition awareness/aware/	1.357881	.4231148	3.21	0.001	.5285917	2.187171
Health service access/have access	.8428756	.6988093	1.21	0.228	-.5267654	2.212517
Agricultural input credit access/have access	.2626944	.6389567	0.41	0.681	-.9896377	1.515027
Land size owned ≤0.5 ha	3.666667	1.812607	2.63	0.53	1.391497	9.661858
Land size owned 0.51-1ha	1.935954	.8127669	2.38	0.017	.34296	3.528948
Land size owned >1 ha	2.350574	.7975604	2.95	0.03	.7873846	3.913764
Landless	.6447643	.9503609	0.68	0.497	-1.217909	2.507438
Financial loan access	.8411591	.6940291	1.21	0.226	-.5191129	2.201431

4.3.1. Continuous variables

Age of the head of household

The mean age of sample households head is 43.62 years, ranging from 21 to 86 with a standard deviation of 11.31. The result of regression analysis for household head age was found to be not statistically significant at 5% level of significance. It is negatively associated with food security status of rural households. The negative association with food security can be explained when the age of the farmer increases the less likely to be food secure. Insignificance of age might be access of labor force by rent.

Table 4.9 Sample households' age and their food security status

Age of household head	Food security status			
	Food secure		Food insecure	
	Number	Percent	Number	Percent
21-29	5	1.6	24	7.5
30-40	40	12.5	75	23.5
41-50	29	9.1	81	25.4
51-60	6	1.9	32	10.0
61-70	1	0.3	19	6.0
71-86	1	0.3	6	1.9
Total	82	25.7	237	74.3

Source: Researcher survey result, 2020

Household size

The mean household size of sample households is 5.11, ranging from 1 to 11 with a standard deviation of 1.96. The result of regression analysis for household size was found to be statistically significant at 1% level of significance. It is negatively associated with food security status of rural households. The negative association with food security can be explained by when the size of the household increases by one unit the less likely to be food secure. When one unit changes in household size the probability to be food insecure will increase by 51%. This result is in line with Alem Meta A. and Singh (2018) an increase in family size by one member decreases the chances of household food security by 42.8%.

Table 4.10 Sample households' size and their food security status

Household size	Food security status			
	Food secure		Food insecure	
	Number	Percent	Number	Percent
1	5	1.6	2	0.6
2	7	2.2	15	4.7
3	19	6.0	28	8.8
4	11	3.4	36	11.3
5	15	4.7	41	12.9
6	17	5.3	45	14.1
7	7	2.2	40	12.5
8	1	0.3	15	4.7
9	0	0	11	3.4
10	0	0	3	0.9
11	0	0	1	0.3
Total	82	25.7	237	74.3

Source: Researcher survey result, 2020

Working labor force availability

The mean working household size of sample households is 2.79, ranging from 0 to 7 with a standard deviation of 1.21. The result of regression analysis for working household size was found to be statistically significant at 1% level of significance. It has positive association with food security status of rural households. When there is one unit change in working household size the probability to be food secure will increase by 69%. This can be explained by when there is availability of labor force in a household it contributes for successful agricultural production.

This result is similar with a study conducted by Alem Meta A. and Singh (2018) working agricultural labor force has a positive correlation with food security status of the rural households. This indicated that households with a large number of the agricultural labor force were more likely food secure than their counterparts.

Table 4.11 Sample households' agricultural working labor force and their food security status

Working household size	Food security status			
	Food secure		Food insecure	
	Number	Percent	Number	Percent
0	1	0.3	2	0.6
1	7	2.2	20	6.3
2	30	9.4	90	28.2
3	21	6.6	70	21.9
4	19	6.0	35	11.0
5	2	0.6	11	3.4
6	2	0.6	6	1.9
7	0	0	3	0.9
	82	25.7	237	74.3

Source: researcher survey result, 2020

Utilization of fertilizer

The mean fertilizer utilization is 3.92 quintal per household, ranging from 0 to 20 quintal per household with a standard deviation of 2.82. The result of regression analysis for fertilizer utilization was found to be statistically significant at $p < 5\%$ level of significance. It is positively associated with food security status of rural households. The positive association with food security can be explained by when the amount of fertilizer utilization per household increases by one quintal the probability to be food secure will increase by 12%. When the utilization of fertilizer increases, productivity and production increase which contributes to achievement of food security. This study is in line with Muzari (2017), which justify that agricultural growth can come from expansion of cultivated land, increased productivity or diversification into higher value products, reduction of wastage and post-harvest losses. Smallholders dominate agriculture in sub-Saharan Africa, the idea of private commercial agriculture is gaining traction as a result of opportunities for economies of scale associated with mechanization and marketing. There may also be possibilities to identify smallholders with an orientation towards commercial agriculture that would help them increase their labor and land productivity.

Table 4.12 Sample households' fertilizer utilization and their food security status

Amount of fertilizer used per household	Food security status			
	Food secure		Food insecure	
	Number	Percent	Number	Percent
0-1.5	5	1.6	51	16
2-3	26	8.2	87	27.3
3.5-4.5	22	6.9	28	8.8
4.6-6	17	5.3	37	11.6
6.5-8	6	1.9	21	6.6
8.5-9.5	2	0.6	2	0.6
10-11	3	0.9	4	1.3
12-20	1	0.3	7	2.2
	82	25.7	237	74.3

Source: Researcher survey result, 2020

Utilization of improved seed

The mean improved seed utilization of sample households is 0.94 quintal per household, ranging from 0 to 5 quintal per household with a standard deviation of 0.98. The result of regression analysis for household size was found to be statistically significant at $p < 1\%$ level of significance. It is positively associated with food security status of rural households. The positive association with food security can be explained by when the amount of improved seed utilization increases by one quintal the probability to food secure will increase by 87%. This can be explained by the use of improved seed can increase productivity and production which creates favorable conditions to food security achievement. This result is in line with Degye et.al. (2015) they underlined that in order to boost agricultural production and productivity, a concerted effort is required to generate, introduce, integrate and disseminate appropriate agricultural technology packages, which, in turn, will improve food security.

Table 4.13 Sample households' improved seed utilization and their food security status

Amount improved used household	of seed per	Food security status			
		Food secure		Food insecure	
		Number	Percent	Number	Percent
0-0.75	30	9.4	115	36.1	
1-1.54	27	8.5	82	25.7	
2-3	18	5.6	37	11.6	
4-5	7	2.2	3	0.9	
	82	25.7	237	74.3	

Source: Researcher survey result, 2020

As shown in Table 3.1, the food security situation of the 3 kebeles selected to study the *woreda's* food security situation is assumed to represent the *woreda*. As shown in Table 4.12, the results of the Zelan and Akafe kebeles are reversed. Although Zelan Kebele is considered to have a better food security situation, the study found that there is a serious problem of food security. On the other hand, Akafe Kebele has been identified as having severe food insecurity, but results show better food security situation. Gumer Kebele was also selected for the study as having moderate food insecurity, and a similar moderate level of food insecurity was found.

Looking at the food security situation in Zelan Kebele, as confirmed by focus group discussions and Key informant interview, there was a high incidence of crop disease and pest infestation in 2019 cropping season. Although the results of the survey are described above, it cannot be concluded that 83.8% of rural households in Zelan Kebele are in chronic food insecurity.

In the case of Akafe Kebele, in the previous food security category, the kebele was classified as severely food insecure due to its low crop yields, but due to the fact that the kebele is suitable for livestock development; the farmers who participated in the study did not sold their grain produced to cover other consumption costs. Farmers in the kebele have a great deal of livestock development, which has helped them to maintain their wealth. Thus, 52.6% of the farmers in the kebele who participated in this study can be ensured of food security.

Table 4.14 Food security status as per the study kebeles

Kebele administration	Food security status as per kebeles				Total sample households
	food secure	Proportion from the sample	food insecure	Proportion from the sample	
Akafe	54	52.4	49	47.6	103
Gumer	21	16.2	109	83.8	130
Zelan	7	8.1	79	91.9	86
Total	82	25.7	237	74.3	319

Table 4.15 Summary of continuous variables

Variables	Food security status						Level of significance
	Food secure(n=82)		Food insecure(n=237)		Total (n=319)		
	Mean	SD	Mean	SD	Mean	SD	
Age of the head of household	41.06	8.37	44.50	12.05	43.62	11.31	0.303
Size of the household	4.32	1.74	5.38	1.96	5.11	1.96	0.000*
Size of working household member	1.78	1.15	2.79	1.23	2.79	1.21	0.001*
Fertilizer utilization	4.39	2.41	3.76	2.94	3.92	2.82	0.028*
Improved seed utilization	1.25	1.21	0.83	0.86	0.94	0.98	0.000*

Source: Researcher survey result, 2020

* indicates significance of variables at 5% level of significance

4.2.2. Discrete variables

Gender of the head of household

The regression analysis of this study revealed that 83.1% and 16.9% are male headed and female headed households respectively. Among the total food secure respondents 90.2% are led by men/ male headed households whereas 9.8% of food secured households are led by women. The regression analysis result revealed that gender is not statistically significant at 5% level of significance. This might be due to the fact that women empowerment has shown positive impact in involving in economic and social affairs. This result is in line with Alem-meta A. and Singh (2018) gender of household head, policy support, land redistribution, farmland topography, soil fertility, and others have negative association with food security achievement. They mentioned that the empowerment of rural women in land ownership right and family planning issues because historically, they were marginalized from agricultural investment and family planning activities despite the work they do.

Table 4.16 The relationship between sample households' sex and food security status

Food security status of the household based on HFBM	Sex of head of household		
	Male	Female	Total
Food insecure	191	46	237
Food secure	74	8	82
Total	265	54	319

Source: Researcher survey result, 2020

Educational status

In Menz Keya Gebreal woreda the study result shows that from the total respondents 30.1% are illiterate and the remaining 69.9% are literate. Among literate households 32.3% and 67.7% are food secure and food insecure respectively while among the illiterate households 10.4% and 89.6% are food secure and food insecure respectively. The regression analysis indicates that literacy status is statistically significant at $p < 5\%$ level of significance.

This study is in line with a study conducted by Muro and Burchi (2007), any organization which stresses education's active role in developing people's capabilities, to fight food insecurity, governments, international organizations and civil society should invest more in the education sector, especially primary education for rural people. This indicates that primary education plays

an important role in protecting the rural households from food insecurity because educated farmers are able to engage in practicing newly introduced agricultural inputs and technologies.

Table 4.17 The relationship between sample households educational status and food security status

Food security status of the household based on HFBM	Literacy status of head of household		
	Illiterate	Literate	Total
Food insecure	86	151	237
Food secure	10	72	82
Total	96	223	319

Source: Researcher survey result, 2020

Level of education

The results of this study show that among literate respondent households 43% is 1-4 grades, 42.6% is 5-8 grades, 13% is 9-10 grades and 1.4% is 11-12 grades. The percentages of literate household heads are decreasing when the level of education increases. When we look at the regression results food security situation by level of education from grade 1-4 respondents 20.8% are food secure, grade 5-8 40% are food secure, grade 9-10 44.8% are food secure and from grade 11-12 33.3% are food secure. The regression results is statistically significant at $p < 1\%$ in grade 1-4, 5-8 and 9-10 $p < 5\%$ and statistically not significant at grade 11-12 at $p < 5\%$ level of significance. In the study *woreda* when the level of education increases the tendency to be food secure increased until grade 10 whereas in grade 11-12 the percentage of being food secured decreased. It is possible to conclude that promoting primary education plays a significant role in achieving food security. This study is in line with the finding Muro and Burchi (2007), that primary education plays significant role more than secondary or tertiary education for rural people contributes to the promotion of rural food security.

Table 4.18 The relationship between sample households educational level and food security status

Food security status of the household based on HFBM	Level of education of the head of household				
	1-4	5-8	9-10	11-12	Total
Food insecure	76	57	16	2	151
Food secure	20	38	13	1	72
Total	96	95	29	3	223

Source: Researcher survey result, 2020

Nutrition awareness

The results of this study revealed that 47.6% of the respondents have nutritional awareness while the remaining 52.4% don't have nutritional awareness. Among those who have nutritional awareness 39.5% and 60.5% are food secure and food insecure respectively. Among those respondents who don't have awareness about nutrition (balanced diet) 11.8% and 88.2% are food secure and food insecure respectively. The regression analysis result indicates that status of nutritional awareness is statistically significant at $p < 5\%$ level of significance.

This study is in line with Gholizadeh H.et.al (2017), food security is a key element in individuals' mental, psychological, and physical health. However, food insecurity is a serious problem, especially in the underdeveloped and developing countries. Although availability, access, utilization, and stability are noted in the food security definitions, it seems that there are factors beyond the framework, which affect food security. Food insecurity depends on the consumption behavior and its underlying factors. Moreover, the feeding pattern and habits, derived from the culture and knowledge of nutrition, also affect human health.

So the study confirmed that those households who have better understanding of consuming more nutritious foods is likely to be food secure whereas the others are likely to be food insecure. It is also possible to conclude that having sufficient amount of food ingredients doesn't guarantee to be food secure.

Table 4.19 The relationship between sample households nutrition awareness and food security status

Food security status of the household based on HFBM	Nutrition awareness of the head of household		
	No	Yes	Total
Food insecure	136	101	237
Food secure	16	66	82
Total	152	167	319

Source: Researcher survey result, 2020

Primary health service access

The study of this result revealed that 81.2% and 18.8% have access to primary health service and don't have access to primary health service respectively. Among those respondents who have access to primary health service 30.1% and 69.9% are food secure and food insecure respectively. Among those respondents who don't have access to primary health service 6.7% and 93.3% are food secure and food insecure respectively. The regression analysis result indicate that access to primary health service is not statistically significant at $P < 5\%$ level of significance. Accessing health services is a component of food security pillars. In the study *woreda* 18.8% of the respondents don't have primary health services access in their residence whereas 81.2% of the respondents have primary health services access. From the total food secured households 95.1% have primary health services access and the remaining 4.9% don't have the access.

Table 4.20 The relationship between sample households primary health service access and food security status

Food security status of the household based on HFBM	Primary health service access of the household		
	No	Yes	Total
Food insecure	56	181	237
Food secure	4	78	82
Total	60	259	319

Source: Researcher survey result, 2020

Land size owned

In the study *woreda*, according to the survey data collected 21.3% of the households own a land size ≤ 0.5 ha, 26.3% of the households own a land size 0.51-1ha, 39.2% of the households own greater than 1ha and the remaining 13.2% of the households are landless. Among households who own a land size ≤ 0.5 ha, 0.51-1ha, greater than 1ha and landless are 8.8% and 91.2%, 26.2% and 73.8%, 40% and 60% and 9.5% and 90.5% are food secure and food insecure respectively. The regression analysis result indicates that those household who own a land size 0.51-1ha and greater than 1ha are statistically significant at $p < 5\%$ level of significance. However, the regression analysis result for those households who owned a land size ≤ 0.5 ha and landless are not statistically significant at $p < 5\%$ level of significance. In the study *woreda* possessing sufficient size of land is the determinant factor in achieving food security. However, those households who possessed land less than 0.5ha and being landless is not fundamentally different in achieving food security. In addition to having sufficient amount of land improving productivity of the land using different agricultural inputs and agronomic practices is playing an important role in increasing production and productivity which is the most important precondition to food security achievement. Based on 10 years data obtained from *woreda* agriculture office with the same size of land, 16,708 ha major crops productivity increased from 16.26qt/ha in 2010 to 24.66qt/ha in 2019. It is possible to conclude that having sufficient amount and productive land helps to achieve food security. According Alem-meta A. and Singh (2018), shortage of farmland, poverty, recurrent drought and climate change, shortage of rainfall, and land degradation are determinants of food security.

Table 4.21 The relationship sample households between cultivated land owned and food security status

Food security status of the household based on HFBM	Cultivated land owned by a household in ha				
	≤ 0.5	0.51-1	> 1	Landless	Total
Food insecure	62	62	75	38	237
Food secure	6	22	50	4	82
Total	68	84	125	42	319

Source: Researcher survey results, 2020

Table 4.22 Amount of crop production and land cultivated

Production year	Total cultivated land in ha	Total production in Qt	Productivity in Qt/ha	Number of relief beneficiaries
2010	16,708	271,740	16.26	
2011	16,708	325,018	19.45	
2012	16,708	331,626	19.85	
2013	16,708	360,696	21.59	
2014	16,708	364,922	21.85	
2015	16,708	287,727	17.22	14,709
2016	16,708	368,577	22.06	14,709
2017	16,708	395,200	23.65	5933
2018	16,708	405,300	24.26	5933
2019	16,708	412,120	24.66	

Source: WADO 2018/19 crop assessment report

Agricultural inputs credit access

In the study area 83.4% of the total respondents have agricultural inputs credit access whereas only 16.6% of the respondents' don't have agricultural inputs credit access. Among those households who have agricultural inputs credit access 28.9% and 71.1% are food secure and food insecure respectively whereas among those households who don't have agricultural inputs credit access 9.4% and 90.6% are food secure and food insecure respectively. The regression analysis indicate that agricultural input credit access is not statistical significant at $P < 5\%$ level of significance. Agricultural inputs are among the productive asset which helps to achieve food security at households' level in particular and at national level in general.

Table 4.23 The relationship between sample households agricultural inputs credit access and food security status

Food security status of the household based on HFBM	agricultural inputs credit access of households		
	No	Yes	Total
Food insecure	48	189	237
Food secure	5	77	82
Total	53	266	319

Source: Researcher survey result, 2020

Financial loan access

In the study area the sample respondents' access to financial loan from micro finance institution in their locality was surveyed. Accordingly from the total respondents 85.3% have financial loan access and the remaining 14.7% don't have the access to financial loan to undertake their food security activities. Among the total households who have financial loan access 29.1% and 70.9% are food secure and food insecure respectively. Among the total households who don't have financial loan access 7.8% and 92.2% are food secure and food insecure respectively. The regression results indicate that financial loan access is not statistically significant at $p < 5\%$ level of significance. According to focus group discussion respondents, even though the financial loan access is possible the process is not with simple procedure and reasonable interest rate. Having this in practice, it is possible to conclude provisions of financial loan to the farmers play an important role in ensuring food security.

Table 4.24 The relationship between sample households' financial loan access and food security status

Food security status of the household based on HFBM		financial loan access of households within their residence from micro financial institutions		
		No	Yes	Total
Food insecure		47	190	237
Food secure		4	78	82
Total		51	268	319

Source: Researcher survey results, 2020

Table 4.25 Summary of discrete variables

Variables			Food security status				Chi-square	significance
			Food secure		Food insecure			
			Number	Percent	Number	percent		
Sex of head of household								0.959
Male			74	27.92	191	72.08		
Female			8	14.81	46	85.19		
Educational status								0.001*
Literate			72	32.29	151	67.71		
Illiterate			10	10.42	86	89.58		
Level of education								
1-4			20	20.83	76	79.17		0.01*
5-8			38	40	57	60		0.004*
9-10			13	44.83	16	55.17		0.015*
11-12			1	33.33	2	66.67		0.644
Nutrition awareness								0.001*
Yes			66	39.52	101	60.48		
No			16	10.53	136	89.47		
Primary health service access								0.228
Yes			78	30.12	181	69.88		
No			4	6.67	56	93.33		
Agricultural input credit access								0.681
Yes			77	28.95	189	71.05		
No			5	9.43	48	90.57		
Financial loan access								0.226
Yes			78	29.10	190	70.90		
No			4	7.84	47	92.16		
Land size owned by a household in ha								
≤0.5			6	8.82	62	91.18		0.53
0.51-1			22	26.19	62	73.81		0.017*
>1			50	40	75	60		0.03*
Landless			4	9.52	38	90.48		0.497

Source: Researcher survey result, 2020

* indicates significance of variables at 5% level of significance

4.4. Challenges of food security achievement

According to key informant interview and focus group discussion in Menz Keya Gebreal *woreda* the issue of food security achievement goes back to 1980s, during the Derg regime, 40 years ago. During the Derg regime there were different food security and related interventions like resettlement within the *woreda* and in different parts of the country, grain assistance in food for work program. Though the endeavor implemented in different development, aid programs and regimes change the problem of food insecurity is not avoided meaningfully. Proper understanding of the challenges of food security achievement helps to design strategies to reduce and avoid the problem from its root causes. The major challenges of food security achievement identified are mentioned as follows.

Natural resources degradation

The land suitable for cultivation and the steep slope cultivated for a long period of time without proper management of natural resources. Household's survey result shows that 87.77% of respondents their locality land is degraded.

At the same time 78.68% of the respondents thought that degradation of natural resources have an impact on their effort to achieve food security at household level and 21.32% don't feel that natural resources degradation has impact on food security achievement. According the respondents the top consequences of natural resources degradation are soil fertility loss 70.47% respondents respond, underground and surface water loss 19.69% and the remaining 9.84% responded biodiversity degradation.

According to Temesgenet.al (2017) Land degradation is the common environmental problem in Ethiopia. They found that land degradation is one of the major causes of low and declining agricultural productivity and continuing food insecurity and rural poverty. In addition, land degradation directly affected the type of plant grown on the area, reduced availability of potable water, lessened volumes of surface water, depletion of aquifers and biodiversity loss.

Table 4.26 The relationship between impact of natural resources degradation and its consequences

Status and Consequences of natural resources degradation		Number of respondents	Percent
Attitude about the status of natural resources degradation	Yes	280	87.77
	No	39	12.23
Attitude about the impacts of natural resources degradation on food security	Yes	254	79.6
	No	65	20.4
Consequences of natural resources degradation			
Loss of soil fertility		179	70.5
Loss of underground and surface water		50	19.7
Loss of biodiversity		25	9.8
		254	100

Source: Researcher survey result, 2020

Climate change

According to the survey data collected 86.21% of the respondents thought that climate change affect food security achievement efforts whereas 13.79% don't thought that climate change affects food security achievement efforts. Based on the respondents who thought that climate change has negative impact on food security achievement, 46.38% thought that erratic rainfall is the impact of climate change, 45.29% thought that occurrence of frost is the impact of climate change and 8.33% thought that shortage of rainfall is the impact of climate change.

This result is in line with Muzari (2017) recurrent droughts, plagues and related increased risks have discouraged investment in agriculture that is indispensable for raising agricultural productivity which is the foundation of food security. Moreover, Abduselam (2017) found that food insecurity is an enduring, critical challenge in Ethiopia which is Africa's second populous country in Africa. The 2015 El Niño drought was one of the strongest droughts that have been recorded in Ethiopian history were more than 27 million people became food insecure and total population of 18.1 million people required food assistance in 2016.

Table 4.27 The relationship between impact of climate change and its consequences

Status and Consequences of climate change		Number respondents	of Percent
Attitude about the impacts of climate change on food security	Yes	276	86.5
	No	43	13.5
Consequences of climate change			
Erratic rainfall		128	46.4
Occurrence of frost		125	45.3
Shortage of rainfall		23	8.3
		276	100

Source: Researcher survey result, 2020

Low agricultural productivity

Majority of the people's food security in the *woreda* depend on agriculture, modernizing/transforming the sector is foundation to achieve food security achievement. Boosting agricultural productivity helps to improve food security in particular and bring structural transformation in agricultural sector. Regarding agricultural productivity improvement and inability to achieve food security mainly relied on lack of demand driven technology development. As mentioned in natural resources management and existing situation the natural resources degradation, inaccessibility of developed technology and lack of beneficiary participation in technology development plays a significant challenge to reduce agricultural productivity and makes the study area vulnerable to food insecurity and hunger.

Based on focus group discussion, key informant interview and data collected by the survey indicate that 47.96% of the respondents thought that livestock and crop disease outbreak is the challenge to achieve food security (especially donkey disease, faba bean disease makes it out of production), 22.57% of the respondents thought that agricultural inputs price inflation, 22.26% of the respondents thought that occurrence of manmade and natural disasters and 7.21% of the respondents thought that inaccessibility of road infrastructure is the challenge to achieve food security. The common shocks experienced by households in North shoa zone of Amhara region were deaths of household member, poor soil, and high cost of food stuffs, disease and pest infestations, drought and irregular rainfall (Iyoha, 2016).

According to Muzari (2017) the rural population in sub-Saharan region has been unable to move out of poverty and food insecurity principally because they have not been able to transform their basic economic activity which is agriculture. Notably, productivity is still below sub-Saharan region's yield potentials, agricultural mechanization is weak and declining, and the size of the agri-business industry is still nascent. Productivity has remained low because of under-utilization of water resources, limited fertilizer use, limited use of soil fertility management practices, and weak services (research, extension, finance).

Table 4.28 Households' response to challenges of agricultural productivity and development

Menu of challenges	Frequency	Percent	Cumulative
Agricultural development challenges			
Crop and livestock disease outbreak	153	47.96	47.96
Inflation of agricultural input price	72	22.57	70.53
Occurrence of manmade and natural disaster	71	22.26	92.79
Inaccessibility of road infrastructure	23	7.21	100.00
Total	319	100.00	
Agricultural productivity challenges			
Unable to develop demand driven technology	153	47.96	47.96
Absence of beneficiary participation during development	74	23.20	71.96
Inaccessibility of developed technology	92	28.84	100.00
Total	319	100.00	

Source: field survey, 2020

CHAPTER 5: CONCLUSION AND RECOMMENDATIONS

CONCLUSION

This study examined food security status of rural households, determinants of food security and challenges of food security achievement of rural households in Menz Keya Gebreal woreda, Ethiopia. Accordingly, the findings obtained from the study revealed that food insecurity continues to affect the rural households of the *woreda*. The study has found that majority of the sample households, 74.3% were found to be food insecure during the period of the survey whereas 25.7% were food secure. Several determining factors were identified for the deteriorating food security situation of the study area. They include the shortage of farmland, underutilization of agricultural inputs (fertilizer and improved seed), lack of labor force in a household, large family size.

The results of this research confirmed that variables such as family size, working labor force, literacy status and level of education, land size possessed, fertilizer utilization, improved seed utilization, nutrition awareness were key determinants of food security. Especially, family size and age of the household head had a negative influence on food security of the rural households. Other variables such that gender of the household head, access to agricultural inputs credit access, primary health service, and financial loan access did not have influence on food security situation of the households.

It was found that natural resources degradation, climate change and low agricultural productivity are imposing challenge the effort to improve households' food security status. These challenges are influencing the endeavor with loss of soil fertility, loss of surface and underground water, loss of biodiversity, occurrence of frost, erratic rainfall, shortage of rainfall, animal and crop disease outbreak, inflation of agricultural inputs price, unable to develop demand driven technology, inaccessibility demanded technology and lack of end users participation during technology development.

Recommendations

The food security situation of Menz Keya Gebreal *woreda* is extremely difficult and needs an urgent remedial response. It is advisable to designing and establishing responsible institution and community based and localized strategy to reduce the negative impact of food security determinants and to maximize the positive outcome to food security.

- One of the causes of food insecurity in the study *woreda* is lack of productive asset specifically cultivated land. So the government have to design and work to create alternative productive resources to substitute the function of cultivated land for landless and for those who have very small land tenure (<0.5ha) to enable rural households achieve their food security sustainably.
- The problem of food insecurity of rural households was strongly associated with illiteracy and level of education. Promotion of adult and primary education which enables youths and adult's basic writing, reading and calculating skills will contribute for reduction of food insecurity. Moreover, promotion of human resource development, adult literacy on the issues like technical training on income generating activities, nutritional literacy, financial and life skill literacy and primary education helps to bring behavioral change and enables to achieve food security in a sustainable way.
- Natural resources rehabilitation could avoid the root causes of food insecurity. It is also better to recommend creating community based and food security oriented natural resources management which will improve productivity and sustainable development.
- Among the top determinant factors of food security, Utilization of improved seed and fertilizer play a great role in achieving food security of rural households. The government has to create alternative approaches to supply and provision of different fertilizers and improved seed to the households.
- Modernizing livestock production helps to improve food security and can reduce the problem of food insecurity. The government has to intensify the present livestock rearing practices. Overall implementation of intensive agricultural development better alternative to achieve food security in a sustainable way.

Generally, food insecurity is a multidimensional concept, which cannot be treated in isolation from other causes of poverty. Integrated food security interventions have to be designed and

implemented with the involvement of different development partners and government organizations to address the issue from its root cause.

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Annex 1 Number of farming households in the study area

Table 1 Number of farming households

S. No	Name of <i>kebeles</i>	Number of farming households		
		Male	Female	Total
1	Gumer	476	174	650
2	Siter	314	79	393
3	Zelan	340	90	430
4	Kimrdingay	633	197	830
5	Quach	696	89	785
6	Akafe	365	150	515
7	Zigba	301	91	392
8	Nidi	469	192	661
9	Kolako	859	375	1234
10	Ameja	520	91	611
11	Zeret	1034	115	1149
12	Ambat	781	203	984
	Total	6,788	1,846	8,634

Source: Menz Keya Gebreal woreda agriculture office farmer's extension organization data

Annex 2

Table 2 Common foods in Menz Keya Gebreal woreda

S. No	Types of Grain	Considered food item	Amount in kcal	Average energy of 100gm in kcal
1	Teff	Tef (75%) + wheat (25%): injera+ fermented injera + Tef (50%) + sorghum (50%): injera + unfermented injera	175+166+151+178	167.5
2	Wheat	Wheat flour + salt + water: unleavened bread+ Wheat (75%) + chickpea (25%): roasted+ Wheat (white), boiled	156+367+251	258
3	Faba bean	Broad bean (split,75%) + lentil (split,25%) + oil + shallot + salt: sauce + broad bean dried roasted/boiled	106+275.9	190.95
4	Sorghum/millet	Millet (75%) + sorghum (red) (75%):injera+ injera +boiled +unfermented injera + Sorghum (white,50%) + millet (30%)+ sorghum (red,20%): injera	172+164+204+ 171+169	176
5	Barley	Barley flour (roasted) + salt + water	193	193
6	Lentil	Lentil split	355.1	355.1

Source: EHNRI/FAO (1998)'s food Composition table for use in case of Ethiopia

Annex 3. Questionnaire prepared for individual respondents in English



Introduction:

Dear participant,

This questionnaire is prepared by Shewakena Dereje a post graduate student (Master of food security and development studies) in Addis Ababa University for partial fulfillment of master degree. The aim of this questionnaire is to collect data about “rural households’ food security situation: Evidence from North Shoa zone Menz Keya Gebreal woreda”. The information you will provide has both academic and policy relevant values. I confirm you that all data will be used for academic purpose and will be analyzed anonymously, and hence you are not exposed to any harm because of the information you give. I highly appreciate in advance to your kind cooperation in providing the necessary information.

Thank you!!

Shewakena Dereje

I. Facts

1. Kebele-----
2. Community -----
3. Sex of the head of the household
 - a. Male
 - b. Female
4. Are you a beneficiary of Productive safety net program?
 - a. Yes
 - b. No

II. Food security situation issues

1. What are the sources of income of the household?
 - b. Crop production
 - c. livestock rearing
 - d. mixed agriculture
 - e. off- farm
2. What is your annual expenditure to land use revenue, school payment in Birr?
3. What is your monthly expenditure to your home consumption in Birr?
4. What is your expenditure to your household clothes, student's educational tools in Birr?
5. What is your expenditure to agricultural inputs (fertilizer and seed) per year in Birr?
6. What is the amount of grain you reserve for seed purpose in quintal per year?
7. How many quintals seed you loss after production by pest, diseases per year (post-harvest loss)?
8. How many quintals grain you give to your friends or relatives per year?
 - Wheat -----
 - Teff -----
 - Faba bean -----
 - Lentils ---
 - -----
9. How many quintal grain you sell from your production per year in quintal?
 - a. Wheat -----
 - b. Teff -----
 - c. Faba bean -----
 - d. Lentils ---
 - e. -----
10. If there is other expenditure, mention -----how many Birr-----?
11. What is the amount of crops you produce in quintal/year?
 - a. Wheat -----
 - b. Teff -----
 - c. Faba bean -----
 - d. Lentils

- e.
- 12. What is the number of livestock you own?
 - a. Cattle
 - b. Goat
 - c. Sheep
 - d. Donkey
 - e. Hen
 - f. Horse
 - g. Mule
- 13. How many kilogram dairy product you get per year? Milk -----liter, butter----kg, cheese-----kg, honey-----kg
- 14. What is your monthly income from off-farm activities (daily labor, pity trading etc.) in Birr?
- 15. What is your monthly income from PSNP or other aid per month?
- 16. How many quintal grain or cash you get from your friends or relatives per year?
Cash ----birr, grain -----quintal
- 17. How many quintal grain you bought per year?
 - a. Wheat -----
 - b. Teff -----
 - c. Faba bean -----
 - d. Lentils ---
 - e. -----
- 18. If there other income, mention-----how many Birr-----?
- 19. Are you food secure based on your understanding?
 - a. Yes
 - b. No
- 20. Is he/she is food secure based on HFBM
 - a. Yes
 - b. No
- 21. What is the net grain available in quintal per year?
- 22. What is the net energy available per year in kilo calories?

III. Demographic issues

1. What is your literacy status?
 - b. Literate
 - c. illiterate
2. If educated, what is your level of education?
 - a. 1-4
 - b. 5-8
 - c. 9-10
 - d. 11-12
3. What is the age of the head of the household?
4. What is the household size?
5. What is the size of working force in the household?

IV. Socio-economic issues

1. Do you have the access to get nutritional training within your residence?
 - b. Yes
 - c. No
2. Do you have the access to get primary health services in your residence?
 - a. Yes
 - b. No
3. Do you have the access to get potable water access in your residence within 1 km?
 - a. Yes
 - b. No
4. Do you have the access to get agricultural inputs with a simple procedures and reasonable interest rate?
 - a. Yes
 - b. No
5. What is the size of the land you own in ha?
 - a. ≤ 0.5
 - b. 0.51-1
 - c. above 1

- d. landless
- 6. Are you renting a land for growing crops?
 - a. Yes
 - b. No If yes how much?-----ha
- 7. What is the major type of crop you produce?
 - a. Cereals
 - b. Pulses
 - c. Tubers
 - d. Vegetables and fruits
- 8. How many quintal chemical fertilizer you are using per year?
- 9. How many quintal improved seed you are using in a year?
- 10. What is the average crop productivity in quintal per hectare?
- 11. Do you have the access to get loan in your district with a simple and reasonable interest rate from the micro finance institution?
 - 2. Yes
 - 3. No

V. Climatic issues

- 1. Do you think that there is a change in natural resources coverage and amount?
 - b. Yes
 - c. No
- 2. Does the change in natural resources type and amount affect your food security?
 - a. Yes
 - b. No
- 3. If the answer for question number 2 is yes, what are the consequences of the change in natural resources coverage?
 - a. Loss of soil fertility
 - b. Loss of underground and surface water
 - c. Loss of biodiversity (plant and animals)

VI. Challenges of food security achievement

1. Does climate change affect your effort to ensure food security?
 - a. Yes
 - b. No
2. If the answer for question no. 1 is yes which climatic change affects the endeavor to achieve food security?
 - a. Erratic rainfall
 - b. Occurrence of frost
 - c. Shortage of rainfall
3. What are the major factors that affect your endeavor to achieve food security?
 - a. Animal and crop diseases outbreak
 - b. Inflation of price of agricultural inputs
 - c. Occurrence of natural and manmade disasters
 - d. Inaccessibility to road infrastructure
4. What are the factors that hinder agricultural production and productivity?
 - a. Lack of demand driven technology
 - b. Lack of participation in agricultural technology development
 - c. Inaccessibility of agricultural technology

Annex 4. Questionnaire prepared for individual respondents in Amharic



ይህ መጠይቅ በአዲስ አበባ ዩኒቨርሲቲ በሀገር ልማት ጥናት ኮሌጅ በምግብ ዋስትና ማዕከል የትምህርት ክፍል በድህረ-ምረቃ ፕሮግራም ተማሪ ሸዋቀና ደረጃ በመንዝ ቀያ ገብርኤል ወረዳ የገጠር ቤተሰቦችን የምግብ ዋስትና ሁኔታ ለማጥናት የተዘጋጀ መጠይቅ ነው። እርስዎ መጠይቁን እንዲሞሉልን ስለተመረጡ ከየተኛውም ነገር ነጻ ሆነው የእርስዎን ሃሳብ ብቻ እንዲሞሉልን እየጠየቅን የመጠይቁ ዓላማ ለጥናት የሚውል ሲሆን ስለ ትብብርዎ እናመሰግናለን።

ጥሬሃቅ

1. ቀበሌ ----- 2. ጎጥ-----

3. የቤተሰቡ መሪ ጾታ:- ሀ. ወንድ ለ. ሴት

4. የልማታዊ ሴፍቲኔት ፕሮግራም ተጠቃሚ ነዎት? ሀ. አዎ ለ. አይደለም

የምግብ ዋስትና ሁኔታ ጉዳዮች

1. የቤተሰብዎ የገቢ ምንጭ ምንድን ነው? ሀ. የሰብል ምርት ለ. የእንስሳት እርባታ

ሐ. ጥምር ግብርና መ. ከግብርና ውጪ

2. ለመሬት መጠቀሚያ ግብር፣ለት/ ቤት ክፍያ ዓመታዊ ወጪዎ ስንት ነው?

3. ለቤት ፍጆታዎ በወር ምን ያህል ብር ነው?

4. ለቤተሰብ ልብስ፣ለተማሪዎች የትምህርት መሳሪያዎች ወጭዎ በዓመት በብር ምን ያህል ነው?

5. ለግብርና ግብዓት (ማዳበሪያ እና ም/ዘር) በዓመት ውስጥ ወጪዎ በብር ምን ያህል ነው?

6. በአንድ ዓመት ውስጥ ለዘር የሚያስቀምጡት የእህል መጠን ምን ያህል ኩ/ል ነው?

7. በድህረ ምርት ወቅት በተባይ፣ በበሽታዎች ምን ያህል ኩንታል ምርት ያጣሉ?

8. በዓመት ለጓደኞችዎ ወይም ለዘመዶችዎ ምን ያህል ኩንታል እህል ይሰጣሉ?

ሀ. ስንዴ -----ኩ/ል ለ. ጤፍ -----ኩ/ል ሐ. ባቄላ -----ኩ/ል መ. ምስር-----ኩ/ል ሠ.-----ኩ/ል

9. በዓመት ምን ያህል ኩንታል እህል ይሸጣሉ?

ሀ. ስንዴ -----ኩ/ል ለ. ጤፍ -----ኩ/ል ሐ. ባቄላ -----ኩ/ል መ. ምስር-----ኩ/ል ሠ.-----ኩ/ል

10. ሌሎች ወጪዎች ካሉ ይጠቀስ-----ምን ያህል ብር -----

11. በአንድ አመት ውስጥ ምን ያህል ምርት ያመርታሉ?

ሀ. ስንዴ -----ኩ/ል ለ. ጤፍ -----ኩ/ል ሐ. ባቄላ -----ኩ/ል መ. ምስር-----ኩ/ል ሠ.-----ኩ/ል

12. ምን ያህል እንስሳት አለዎ? ሀ. ከብት----- ለ. ፍየል----- ሐ. በግ----- መ. አህያ----- ሠ. ዶሮ----- ረ.

ፈረስ

13. በአንድ ዓመት ውስጥ ስንት ኪሎ ግራም የወተት እና ወተት ተዋጾ ምርት ያገኛሉ? ወተት ----- ሊትር፣ ቅቤ ---- ኪ.ግ፣ አይብ ----- ኪ.ግ፣ ማር ----- ኪ.ግ.
14. ከእርሻ ውጭ ከሚከናወኑ እንቅስቃሴዎች (ዕለታዊ የጉልበት ሥራ፣የአነስተኛ ንግድ ወዘተ) ወርሃዊ ገቢዎ ምን ያህል ብር ነው?
15. ወርሃዊ ገቢዎ ከልማታዊ ሴፍቲኔት ፕሮግራም ወይ ከሌላ ዕርዳታ ምን ያህል ብር ወይም ኩ/ል ነው?
16. በዓመት ከጓደኞችዎ ወይም ከዘመዶችዎ ምን ያህል ኩንታል እህል ወይም ገንዘብ ያገኛሉ? በጥሬ ገንዘብ ---- ብር፣ እህል ----ኩንታል
- ሀ. ስንዴ -----ኩ/ል ለ. ጤፍ -----ኩ/ል ሐ. ባቄላ -----ኩ/ል መ. ምስር-----ኩ/ል ሠ.---ኩ/ል
17. በዓመት ምን ያህል ኩንታል እህል ይገዛሉ?
- ሀ. ስንዴ -----ኩ/ል ለ. ጤፍ -----ኩ/ል ሐ. ባቄላ -----ኩ/ል መ. ምስር-----ኩ/ል ሠ.-----ኩ/ል
18. ሌላ ገቢ ካለ ይጠቀስ-----ምን ያህል ብር-----
19. በእርስዎ ግንዛቤ መሰረት የምግብ ዋስትናዎ የተረጋገጠ ነው?
- ሀ. አዎ ለ. አይደለም
20. በቤተሰብ ምግብ ሚዛን ሞዴል መሰረት የምግብ ዋስትናዎ የተረጋገጠ ነውን?
- ሀ. አዎ ለ. አይደለም
21. በዓመት ምን ያህል ኩንታል የተጣራ እህል ያኖርዎታል?
22. በዓመት ምን ያህል ኪሎ ካሎሪ የተጣራ እህል ይኖርዎታል?

የስነ-ሕዝብ ጉዳዮች

1. የትምህርት ሁኔታዎ ምንድን ነው? ሀ. የተማረ ለ. ያልተማረ
2. የተማረ ከሆነ የትምህርት ደረጃዎ ምንድን ነው? ሀ. 1-4 ለ. 5-8 ሐ. 9-10 መ. 11-12
3. የቤተሰቡ መሪ ዕድሜ ስንት ነው?
4. የቤተሰቡ ብዛት ስንት ነው?
5. የሚሠራ የቤተሰብ አባል ምን ያህል ነው?

የሶሺዮ-ኢኮኖሚያዊ ጉዳዮች

1. በአካባቢዎ ውስጥ የአመጋገብ ሥልጠና ማግኘት ይችላሉ?
- ሀ. አዎ ለ. አይደለም
2. በአካባቢዎ የመጀመሪያ ደረጃ የጤና አገልግሎቶችን ማግኘት ይችላሉ?
- ሀ. አዎ ለ. አይደለም
3. በ 1 ኪ.ሜ ውስጥ የንፁህ የመጠጥ ውሃ አቅርቦት ማግኘት ይችላሉ?
- ሀ. አዎ ለ. አይደለም

4. የእርሻ ግብዓቶችን በቀላል አሠራሮች እና በተመጣጣኝ የወለድ ምጣኔ የማግኘት ዕድል አለዎት ሀ. አዎ ለ. የለኝም
5. የራስዎ ይዞታ የሆነ ምን ያህል ሄ/ር መሬት አለዎት?
ሀ. ≤ 0.5 ለ. 0.51-1 ሐ. ከ 1 በላይ መ. መሬት አልባ
6. ሰብሎችን ለማልማት መሬት ተከራይተዋል?
ሀ. አዎ ለ. የለም መልስዎ አዎ ከሆነ ምን ያህል? ----- ሄ/ር
7. እርስዎ የሚያመርቱት ዋና የሰብል አይነት ምንድን ነው?
ሀ. የብዕር ሰብሎች ለ. የጥራጥሬ ሰብሎች
ሐ. የስራስር ሰብሎች መ. አትክልቶች እና ፍራፍሬዎች
8. በአንድ ዓመት ውስጥ ስንት ኩንታል የኬሚካል ማዳበሪያ እየተጠቀሙ ነው?
9. በአንድ ዓመት ውስጥ ስንት ኩንታል የተሻሻለ ዘር እየተጠቀሙ ነው?
10. አማካይ የሰብል ምርታማነት በሄክታር ምን ያህል ነው?
11. ከማይክሮ ፋይናንስ ተቋም ቀላል እና ምክንያታዊ በሆነ የወለድ ምጣኔ በአካባቢዎ ውስጥ ብድር የማግኘት መብት አለዎት? ሀ. አዎ ለ. አይደለም

የአየር ንብረት ጉዳዮች

1. በተፈጥሮ ሀብቶች ሽፋን እና መጠን ላይ ለውጥ አለ ብለው ያስባሉ?
ሀ. አዎ ለ. አይደለም
2. የተፈጥሮ ሀብቶች አይነት እና መጠን ለውጥ በምግብ ዋስትናዎ ላይ ተጽዕኖ ያሳድራል? ሀ. አዎ ለ. አይደለም
3. ለጥያቄ ቁጥር 2 የተሰጠው መልስ አዎ ከሆነ፣ በተፈጥሮ ሀብት ሽፋን ለውጥ ላይ ምን መዘዝ አስከተለ?
ሀ. የአፈር ለምነት ማጣት ለ. የከርሰ ምድር እና የከርሰ ምድር ውሃ ማጣት
ሐ. የብዝሃ ሕይወት መጥፋት (እጽዋት እና እንስሳት)

የምግብ ዋስትና ፈተናዎች

1. የአየር ንብረት ለውጥ የምግብ ዋስትናን ለማረጋገጥ በሚያደርጉት ጥረት ላይ ተጽዕኖ ያሳርፋል? ሀ. አዎ ለ. አይደለም
2. ለጥያቄ ቁጥር 1 መልስዎ አዎ ከሆነ የምግብ ዋስትናን ለማሳካት በሚደረገው ጥረት የትኛው የአየር ሁኔታ ለውጥ ተከስቷል?
ሀ. የተመጣጠነ ዝናብ አለመኖር ለ. ውርጭ መከሰት ሐ. የዝናብ እጥረት
3. የምግብ ዋስትናን ለማሳካት በሚያደርጉት ጥረት ላይ ተጽዕኖ የሚያሳድሩ ዋና ዋና ነገሮች ምንድን ናቸው?
ሀ. የእንስሳትና የሰብል በሽታዎች ወረርሽኝ
ለ. የግብርና ግብዓቶች የዋጋ ግሽበት ሐ. የተፈጥሮ እና ሰው ስራ ስራ ስራዎች
መ. የመንገድ መሰረተ ልማት ተደራሽ አለመሆን
4. የግብርና ምርት እና ምርታማነትን የሚቀንሱ ምክንያቶች ምንድን ናቸው?

ሀ. ፍላጎትን ማዕከል ያደረገ ቴክኖሎጂ አለመቅረብ

ለ. በግብርና ቴክኖሎጂ ልማት ውስጥ የተጠቃሚው ተሳትፎ አለመኖር

ሐ. የግብርና ቴክኖሎጂ ለተጠቃሚው የተደራሽነት ችግር

Annex 5. Key informant interview questions

1. What are the sources of food security of the people?
2. What is the productivity of major crops per hectare per year?
3. What is the productivity situation of livestock and crop production?
4. What is the historical background of food security situation of Menz Keya Gebreal woreda?
5. What are the major causes of food insecurity of Menz Keya Gebreal woreda?
6. What are the efforts undertaken by the local, regional and federal government, development partners and the people to improve food security situation?
7. What are the challenges of food security achievement?

Annex 6. Secondary data collection checklist

1. Name of the woreda
2. Distance from Addis Ababa
3. Number of kebeles
 1. Rural kebeles
 2. Urban kebele
4. Area of the woreda
5. Cultivated land
6. Location of the woreda
7. Population of the woreda in 2007 population and housing census and projection
8. Base of livelihood
9. Proportion of women
10. Ethnic group in the *Woreda*
11. Religion -----
12. Topography of the area
13. Soil type
14. Head of livestock
 1. Cattle
 2. Goats
 3. Sheep
 4. Donkeys
 5. Horses
 6. Bee keeping
 7. Poultry
15. Amount of crop produced in the last ten years
16. Number of farming household in the woreda
17. Amount of fertilizer used in the last ten years

Annex 7. Focus group discussion points

1. What is the historical background of natural resources situation in the past and currently?
2. What is the historical background of food security situation in the past and currently?
3. What are the causes and challenges of agricultural productivity?
4. What are the causes and challenges of agricultural development?
5. What are the causes and challenges of food security achievement endeavor?
6. How can we improve the food security of the people?