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COLLEGE OF DEVELOPMENT STUDIES
CENTER FOR FOOD SECURITY STUDIES
CAUSES OF SEASONAL FOOD INSECURITY AND COPING STRATEGIES AMONG
RURAL FARMERS IN WARAJARSO WOREDA, NORTH SHEWA ZONE OF OROMIA
REGION, ETHIOPIA

BY
BERHANU LEMMA

SEPTEMBER, 2021
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Adviser's Approval

Under my guidance and knowledge ***Berhanu Lemma*** has done the thesis entitled “***Causes of Seasonal Food Insecurity and Coping Strategies among Rural Farmers in Wara Jarso Woreda, North Shewa Zone Of Oromia Region, Ethiopia***”. I evaluated the thesis and certify its submission for public defense.

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Approval by Examination Board

As the member of Board of Examiners of the MSc Thesis Open Defense, we certify that we read and evaluated the thesis prepared by ***Berhanu Lemma*** entitled ‘***Causes of Seasonal Food Insecurity and Coping Strategies among Rural Farmers in Wara Jarso Woreda, North Shewa Zone Of Oromia Region, Ethiopia***. We recommended that this thesis acceptance as fulfilling the requirements for the Degree of Master of Science (MSc) in Food Security and Development.

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Abstract

The aim of this study was to investigate causes of seasonal food insecurity in Wara Jarso District, Oromia Regional state, Ethiopia. The study employed both qualitative and quantitative approach. Household surveys, key informant interview, focus group discussion and document review was used to collect data. Data was analyzed using Descriptive statistics such as frequency, mean and standard deviation. Multiple regression analysis, Independent t- test and one way ANOVA was used among econometric analysis. Food security analysis was also computed using Household Food balance model. The result revealed that causes of seasonal food insecurity are related to land holding size, possession of farm oxen, economic status, saving culture of the household and access to credit. There is low productive asset in the study area, credit access is poor, there is no access to fertilizer credit, level of economic activities are poor and job opportunities are lacking. To this regard the result of analytical tools revealed, Farmers who have large landholding, farm oxen and livestock and high off farm income have more dietary energy than farmers who do not have these property or have less; similarly farmers who have got access to credit, save their grain or cash, apply more fertilizer, access to extension services have more dietary energy than their counter parts. Any initiatives which support farmers to have enough productive resources, strengthening institutions, diversifying income opportunity, awareness creation on saving and expenditure related to socio cultural practice may mitigate seasonal of food insecurity.

Key words: Food Security, seasonal, extravagancy, dietary energy, Wara jarso

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Acronym

ATA	Agricultural Transformation Agency
CSA	Central Statistical Agency
ECHA	European Commission and Humanitarian Aid
ENHRI	Ethiopian Health and Nutrition Research Institute
FAD	Food Availability Decline
FAO	Food and Agriculture organization
FED	Food Entitlement Decline Focus Group Discussion
FGD	Focus Group Discussion
GDP	Gross Domestic Product
IFAD	International Fund for Agricultural Development
MoARD	Ministry of Agriculture and Rural development
MoFED	Ministry of Finance and Economic Development
MRA	Minimum Recommended Allowance
OSCA	Oromia credit and Saving Association
OPC	Oromia Plan Commission
UN	United Nations
UNICEF	United Nations Children's Fund
WADO	Woreda Agricultural Development Office
WB	World Bank
WFEDO	Woreda Finance and Economic Development Office

Glossary

Dabo	Labor sharing mechanism in which household mobilize large number of individuals to work on his/ her farm land mostly without reciprocation.
Gesho	Is a grain leafy vegetable from which alcohol is made
Gojjame	Early ripening Red teff used as a risk minimizing crop and harvested before regular harvesting season
Iddir	Is local institutions established for the purpose of burial matters
Kitira	A system of oxen use arrangement in which households who lack farm oxen rent in an ox or more to use its draught power.
Mahaber	Local institutions named by saint days and where people come together and celebrate monthly
Nadal	Is a local unit used to measure grain and equivalent to 25 kg
Racha	Any early ripening crop that is harvested before regular harvesting season and use to solve food shortages
Samareta	An early ripening barley before harvesting season
Tikse	A labour selling mechanism, where child/young are sent to other households in exchange of crops
Wanfel	Labor sharing mechanism among households on the basis of reciprocation with equivalent reciprocation with equivalent labor.

Chapter One: Introduction

1.1. Back ground of the Study

According to World Food Summit (1996), food security is access to enough and adequate food by all people at all times to lead healthy and active life. In this definition the phrase “at all times” indicates consistent availability and accessibility to food on sustainable basis. Agricultural communities where people depend on subsistence agriculture face food shortages seasonally. Particularly, in highland Ethiopia, where farmers depend mostly on rain-fed agriculture, there is a doubt that farmers get access to enough and adequate food throughout the year. Lack of access to adequate and enough food for healthy growth and development is referred as food insecurity (FAO, 2019).

The aim of many development programs is to reduce hunger and address accessibility to food all year round. For instance, the objective of Millennium Development Goal is to minimize hunger and ensure that all people get access to enough food throughout the year (UN, 2015). In spite of many development programs target to minimize hunger and ensure food access throughout the year, food insecurity is still becoming common and a threat for many people. It is discouraging and fearful that were 690 million people in the world (8.9 % of world population) is hungry showing an increase in 60 million within five years (FAO, IFAD, UNICEF, WFP and WHO, 2020). According to FAO there is a high probability that the number will reach 840 million by 2030 if situations continue likewise. Furthermore, unfortunate emergency of Covid-19 exacerbates the situation and complicated the state of food security on the world (FAO, UNICEF, IFAD and WHO, 2021).

In Africa, more than 250 million people are hungry with 29.8% in Sub-Saharan Africa where the number of undernourished people is growing faster than in any other region of the world (FAO, 2019). The fact that hunger prevails in Sub-Saharan Africa is shortage of farm land. According to Lowder *et al.* (2016), 70%-80% of farmers hold a farmland size of less than two hectares in Sub-Saharan Africa and depend on semiannual or annual harvest for food and other household income. Stay home/lock down measures taken to reduce the spread of Covid-19 disrupts economic activities and largely worsens the food security problem particularly in the countries where people largely depend on agriculture (Savary *et al.*, 2020; Bizoza *et al.*, 2021).

There has been famine and food insecurity in Ethiopian history. Over 25 million people were affected from 1958 up to 1977, and it has been exacerbated by political instability, war, famine and economic decline from 1974 to 1991(Fikre *et al.*, 2017). Factors that cause food insecurity are structural challenges like drought and low productivity due to limited application of agricultural technologies. Macroeconomic challenges, such as increase in food prices also drive food insecurity (Fikre *et al.*, 2017; FAO, 2019).

In spite of notable economic growth from 2007- 2017 and a better work to reduce extreme poverty and hunger from 61% to 31%, prevalence of food insecurity and hunger is still a shock for the many people in Ethiopia (FAO, 2017). In spite of 7% Gross Domestic Product [GDP] growth, 25% of the population live below poverty line earning less than 1.99 USD per day; there is high prevalence of poverty as a result of which health and nutrition is deteriorated (WFP, 2020).

According to Abduselam (2017), food insecurity is a persistent and critical challenge in Ethiopia; the second most populous country in Africa. The majority of people in the country are vulnerable to shortage of food as they rely on rain fed agriculture for food and livelihoods. For instance, El Nino drought in 2015 is the largest drought in Ethiopian history, which lefts 27 million people food insecure and 18.1 million people require food assistance in 2016.About 11.8 million people face acute food insecurity in 2020, 15million people are in need of humanitarian assistance (WFP, 2020).

This study was conducted in Wara Jarso woreda of Oromia National Regional State. The majority of people in the study area depend on rain fed agriculture. According to WADO (2020) significant number of people suffer from shortage of food during summer season due to low agricultural production as a result of climate change such as shortage of rainfall, variability in raining season (sometimes it rains early and in other times rains late), land fragmentation and crop disease. For instance, the land covered with crops in 2019 was 49,856hectare with a crop yield of 1,437,040quintal. The same size of land was covered by crops in 2020, and obtained 1,278,929.5 quintal of crops showing a decrease in 158,110.5 quintal or 11%. This in turn would lead significant number of people to be food insecure before the next harvesting season is reached.

The data from WADO further shows, 0.35% of crop was lost due to excessive rain mixed with ice, 2% by crop disease, 1.3% by pests and 7.35% was lost due to land fragmentation, poor fertility of land resulted from absence of crop rotation and fallow land (WADO, 2020). This study was conducted to see the significance of those causes and investigate other related causes of seasonal food insecurity.

1.2. Problem Statement

Though the causes are different, it is common that there is a period of food shortfall in rural agricultural community; particularly for farmers who depend on subsistence agriculture and harvest only one time per year, the pre-harvesting season is known for its food insecurity and considered as hunger/lean season/food scarcity season (Fitzherbert, 2007; Mills, 2019; Cole et al, 2020; Lindtjorn & Mihiret, 2020). The study conducted in South Africa by Devereux and Smith (2019) revealed that food security fluctuates seasonally and winter period is characterized by low employment and severe seasonal food insecurity. Another study conducted by Nazru (2016) found that the causes of seasonal food insecurity are lack of job opportunities, lack of business activities due to extreme weather conditions, financial constraints to invest on food and due to infertile lands. Seasonal food insecurity is also related to poverty/wealth status of the household and status of social support (Fitzherbert et al., 2005; Cole et al., 2019).

The study conducted by Messay (2009) revealed the major causes of food insecurity in rural households of Kuyu *woreda* (adjacent to the study area), Oromia Regional State. The study indicated that factors, which affect agricultural production such as size of landholding, application of farm inputs, farming practices, post-harvest crop management, farmland fragmentation, lack of non-farm income opportunities, labour wastage and tenure insecurity affects food security status of rural households. Similarly, the study conducted by Meskerem and Degefa (2015) in North Shewa zone of Girar Jarso *Woreda* found that causes of food insecurity are related to demographic factors, Socio economic factors, Environmental factors and productive assets.

In his study conducted on causes of seasonal food insecurity in Oromia zone of Amhara regional state, Degefa (2001) found that the general causes of seasonal food insecurity are social factors, demographic factors and economic factors. Social factors include extravagancy related to social ceremonies and poor saving. Economic factors include lack of resources such as land, livestock, and farm oxen, lack of credit services, low employment and poor soil fertility.

Similarly the study conducted in Benishangul Gumuz region revealed determinants of seasonal food insecurity. The determinants of seasonal food insecurity are household size, use of irrigation, education of household head, extravagancy, participation in labour union, aggregate production and farming system (Guyu& Muluneh, 2016). The study conducted by Boum (2013) in Gambela Regional state also investigated determinants of seasonal food insecurity in Nure zone of Gambela regional state. The study revealed determinants of seasonal food insecurity in the study area are size of land owned, size of land cultivated, types and amount of crop produced, ownership of milking cows and family size. Generally speaking the causes of food insecurity are related to socioeconomic factors, demographic factors, institutional factors, environmental factors and productive assets. Though it is coined in many studies that institutional factor is one of the factor affecting food security, how it affects food security status is not described as far as the researchers read and understand.

This study was conducted in Wara Jarso *woreda*, North Shewa zone of Oromia Regional State. From researcher experience in the study area, people face food shortage mostly during summer season and in the first months of autumn season. Almost all farmers in the study area depend on rain fed subsistence agriculture and harvest once per year, only 3% of the farmers use irrigation for cultivating vegetables like onion, cabbage and potatoes (WADO, 2019). This in turn affects food availability. According to World Bank memorandum of 2004, only 14.9% of the population in the zone works non-farm activities which is less when compared to regional 24% and national 25% figures by the time (WB, 2004).

Moreover there was a crop failure due to a collection of many factors in Oromia Regional State and north Shewa in general and Wara Jarso *Woreda* in particular; Variability in raining time and amount of rain in different times affects crop production in the zone. For instance delay in raining times reduces crop production by 15% in 2016 (MoARD, 2017). Similarly the crop production is reduced by 11% in 2020 when compared to 2019 production in the *woreda* (WADO, 2020). However, there is no study conducted on food security status in the *woreda*. This study was conducted to fill the gap by studying the causes of seasonal food insecurity and coping mechanisms adopted by households to alleviate the problem in the study area.

1.3. Objectives of the Study

1.3.1. General Objectives

The general objective of the study was to investigate the causes of seasonal food insecurity in the study area and identify coping mechanisms adopted by the farmers to withstand the problem.

1.3.2. Specific Objectives

The specific objectives were to:

1. Assess the status of food security and socio economic determinants of food security
2. Analyze household productive resources and its effect on seasonal food security
3. Analyze saving culture of the community and its contribution for food security
4. To identify the coping mechanisms adopted by the household in response to seasonal food insecurity

1.4. Hypotheses

Causes of seasonal food insecurity in the study area are expected to be related to Environmental factors and socio economic factors. Environmental factors related factors are rain fall variability, crop disease, soil fertility and climate change. Social factors that were expected to be causes of seasonal food insecurity are expenditure and/ or extravagancy related to social and religious ceremonies and local alcohol consumption, lack or poor saving, family size and number of dependents in the family, unemployment, status of social support and wealth status of the community. Economic factors include lack of non-farm or off farm income, low agricultural production due low application of fertilizers land shortage and land degradation.

Lack or shortage of productive assets such as land, oxen or livestock also causes seasonal food insecurity. Farmers have coping mechanism to overcome the problem. Decreasing meal size, frequency of meal, migration to other area, sending children to relatives, selling labour in exchange of cash or grain are among coping mechanisms practiced in the study area.

1.5. Scope and Limitation of the Study

The study was conducted in Wara jarso *woreda* in North Shewa of Oromia National Regional state. The specific focus of the study was to investigate causes of seasonal food insecurity among rural farmers and coping strategies they use to withstand the problem.

It is less likely that the study conducted in three *kebeles* can represent the whole *woreda*. However, it opens a door for other researchers and academicians to further investigate the issues related to food security and identify causes of seasonal food insecurity in other areas of the *woreda*. Moreover, most studies conducted on food security issue are not time framed; they focus on food security status in general which may mislead about the status of food security in the *woreda*. There are less related literatures on seasonal food insecurity.

1.6. Validity and reliability of data and techniques

A great effort was made to ensure the validity and reliability of the study. In order to keep the validity of the data collected, questionnaire was translated in to the language that the respondents communicate with and understand, Afan oromo. Pretest was conducted with five households to check the validity of questionnaire.

I myself and two well trained teachers have collected quantitative data. I myself collected qualitative data from selected key informants.

With respect to validity of data and technique, all tools were carefully applied to achieve intended objectives. Characteristic that cannot be measured or observed will be collected using indicators. The questionnaire was designed to measure all relevant information related to food security which would in turn help to investigate causes of seasonal food insecurity in the study area.

1.7. Ethical Consideration

In this research, thorough attention was given to meet basic ethical principles. To secure approval of the research participants and concerned administrative structures in the study area during data collection, an introductory letter from Addis Ababa University was used. It was used to gain approval from concerned body and to make clear that the research was purely academic and used exclusively for academic purpose and kept confidential.

A letter of cooperation was also obtained from Wara jarso *Woreda* administration and from respective *kebeles* to make a good rapport. The community's cultures and socio-economic way of life was carefully treated and respected, all the respondents were well informed about the purposes of this study before starting actual data collection.

Taking Addis Ababa University anti plagiarism in to consideration, a good effort is made to avoid copy paste, give a credit was given for authors whose works are referred and sources are clearly stated, referenced and cited in the text accordingly.

1.8. Significance of the study

The focus of this study was causes of seasonal food insecurity in Wara Jarso *Woreda*. It further identifies socio-economic characteristics of rural farmers, productive assets, status of local institutions and social support, sociocultural practices and extravagancy related to it and saving pattern of the household as well as coping mechanism employed by farmers in the study area. Since this study is new for the study area, it may be used as an alarm for *woreda* level government structures to have further understanding about the status of the community as a whole and work as per their promise and to the best of their skill to serve and change the life of the community they are governing. Besides, the finding of this study may help the community to get experience and awareness on how expenditure related to sociocultural and religious practices in one way and poor saving habit in other way and job diversification affects the food security status and makes a difference among the farmers themselves, and practice up to it.

More over the finding of this study helps policy makers to revise the policies on agricultural sectors (irrigation, livestock sectors, fertilizer provision and prices related policies, extension service provision) and practice non-farm activities such as apiculture to earn better income. More over the finding of this study may create an opportunity for government to look into the problem of the *woreda* and enhance job opportunities, job diversification and strengthen financial institutions to promote credit services. Furthermore, the finding of this study may open the door for other researchers and academicians to further investigate the issues related to food security and identify causes of seasonal food insecurity in other areas of the *woreda*.

1.9. Organization of the Thesis

This thesis is organized into five chapters. The first chapter include background of the study, the research problem, the research objectives, research hypothesis, significance of the study, scope and limitation of the study and ethical consideration . Chapter two deals with the literature review of the thesis; it presents conceptual frameworks, theoretical models and empirical evidences in Ethiopian context. Chapter three discuss about methods of data collection and analysis of the study; it includes research methods and designs, data collection tools, source of data, sampling technique and methods of data analysis of the study. Chapter four deals with data presentation, analysis and interpretation of the findings. Chapter five presents the conclusions and recommendations of the study

Chapter Two: Review of Related Literature

2.1. The Concepts of food security

Food security is a multifaceted concept which can be defined and interpreted in different ways. In one way, it implies the availability of food at global and national level, in other ways it is concerned with adequate nutrition and wellbeing of individuals (FAO, 2003).The concept of food security is emerged during the conference of Food and Agricultural Organization in 1943, the time when it was considered as an era of abundance of food. It has been redefined several times since then. The definition given during that time was “a secure, adequate and suitable supply of food for everyone” which was later taken up at an international level.

By 1950 a bilateral agencies were established by donor countries such as USA and Canada because of which their agricultural surplus is transported overseas to countries where there is scarcity of food. In 1960, there was a general realization that food aid could really increases countries progress to self-sufficiency whereby a concept of food for development is emerged and in 1963 it is institutionalized and named as World Food Program (WFP).

The era of an abundance of food has ended in mid-1970 during when food supply and prices began to fluctuate and the world faced food crisis and the term food security is began to be used on the regular basis. It was used at FAO’s world food conference in 1974 in Rome as the adequate supply of world basic food stuffs at all times for consistent consumption and to overcome Fluctuation in food prices and production (UN, 1975). The main focus of that time

was guaranteeing the availability of food and keeping the stability of food prices through increasing food production and using food surplus. Since 1974 Rome conference, the whole concept of food security has been updated, redefined, severally increased and diversified with an advancement to cope up with the growing occurrence of hunger, famine and malnutrition in the most parts of the world (Maxwell, 1996).

The focus of the earliest definitions was on enough availability of food at global, national or regional levels. The core idea was therefore the entire supply of food in the world market to meet the requirements for it (Maxwell and Smith, 1992). However, the availability of food security at global level does not guarantee the food security at household or individual level. The best scenario is 2009 hunger situation according to WFP annual report (WFP, 2010) during when over one billion people suffered from hunger in spite of enough availability of food at global level.

It was in 1980 during green revolution that the concept of food security is shifted to the question of access, and received wider attention. Sen argues increasing food supplies alone do not bring food security; ensuring access should be included in components of food security. Food insecurity happens not because there is not enough food, but because people do not have access to available food (Sen, 1981). Gradually the concept of food security is shifted from global and national level to household and individual level.

There are about two hundred definitions of food security (Smith et al., 1993) showing different views and approaches to a continuous occurrence of hunger, famine and malnutrition. World Bank defined food security as “access of all people at all times to enough food for an active and healthy life” (WB, 1986). The definition includes another component of food security, the ‘all time’ aspects that signifies consistent access to food without shortfalls. FAO defines food insecurity as uncertain access to enough and adequate food to lead healthy and active life. Food security exists when all people at all times get enough amount of food (Degefa, 2002).

A more comprehensive and widely accepted definition is the one given by World Food Summit in 1996: Food security exist when “all people at all times have physical and economic access to sufficient, safe and nutritious food to meet dietary requirements and food preferences to lead

active and healthy life”. Based on the definition of food security given by World food summit (1996), FAO (2005) has developed four pillars of food security:

Food Availability: refers to the physical existence of food at global, national, household and individual level. It is determined by domestic production, commercial imports, and food aid. Food availability is largely a function of macroeconomic factors (Anderson et al, 2015).

Food access: refers to the households ability to obtain foods, either through own production or through purchase. It is determined by level of household income, possession of assets to produce or purchase foods needed to maintain their consumption and market price (Anderson et al). Job diversification increases the likelihood of accessing the food from market(

Food utilization: refers to proper consumption of nutritious food. It is determined by proper food processing, food preservation techniques, storage techniques, adequate knowledge of nutrition; and adequate health and sanitation services (Anderson et al).

Food stability: The food security status of today should not compromise with the future food security status of the household. Food stability may be disturbed by adverse weather conditions, political instability, unemployment, rising food prices, lack of nonfarm and off farm income(FAO, 2008). Food insecurity can be categorized as chronic, seasonal or cyclic and transitory based on causes, its effect and time of occurrence. All types of food insecurity are persistent in Ethiopia (Devereux, 2000). Chronic food insecurity is long-term lack of adequate food due to household inability to acquire food either from the market or their own food production system (FAO, 2005). Transitory food insecurity is sudden and temporary but extreme shortage of food availability and access (Barett and Sahn, 2001).

Seasonal or cyclical food insecurity, which is the focus of this study, is a regular period of food shortfalls particularly during pre-harvest season which is considered as “hungry season” (Devereux et al, 2008). Seasonal food insecurity is predictable as it occurs on the regular basis during which food availability is declined from the stock and food price increases. It is common in highland Ethiopia where household depend on rain-fed agriculture; People face shortage of food during summer/rainy season on regular basis.

2.2 Theoretical frameworks

This study is aiming at investigating the causes of seasonal food insecurity. Hence, relevant theoretical frameworks and models are reviewed to better understand the causes of food

insecurity in the area under study. Accordingly, sustainable livelihood framework was reviewed in order to understand the causes of seasonal food insecurity as livelihood components have implication on food production in general and food security in particular. Among the food security models, food availability decline and food entitlement decline was used in the study.

2.2.1. Sustainable livelihood frameworks

A livelihood comprises capabilities, assets and activities required for a means of living. Sustainable livelihoods approach is a way of thinking about the objectives, scope, and priorities for development activities. It deals with the livelihood of people and importance of policies and institutions. It relates factors which hinders or enhances the livelihood options. It relates people and enabling environment that influences the outcome of livelihood strategies. It helps people to drive their livelihood based on their skills, social networks, access to physical and financial resources, and ability to influence core institutions (Department for International Development [DFID], 1999; Serrate, 2017). Ownership of Capital assets helps diversify livelihood strategies and generate wellbeing and determines food security (Fischer *et al.*, 2019). DFID categorize sustainable livelihood frame works as:

A) Human capital: Human capital includes skills, ability, education, health and capability of individuals to work different jobs to get more income and draw different livelihoods (Ellis, 2000; Degefa, 2010). Educated individual know how to earn income, better chance to be employed in different jobs, better knowledge to apply farm technologies and better knowledge of saving. Poor health or lack of education is a core dimension of poverty (Serrate, 2017). To this regard, Lack of education and shortage of schools, lack of health information and services and lack of well qualified and skilled man power on the area of education and health affects the study woreda (WFEDO, 2020).

B)Physical capital: includes investment goods, constructed roads which link the farmers with the market, irrigation, shelter and livestock from which household drives livelihood (Ellis, 2000).Market linkage increases the likelihood of household to get access to food, to be involved in off farm activities and earn better income. Vehicles, constructions, technologies, farm inputs such as fertilizer, seeds, pesticides and tools and equipment of production, water supply and sanitation, energy, communications and traditional technologies comprises physical capital(Serrat,2017). In the study area, there is no irrigation, only 3% of farmers use it, roads which links the rural farmers to nearest small cities and within *kebele* is poor. Traditional farming practices

and low application of fertilizer, poor water supply affects the crop production and income obtained in study *woreda* (WFEDO, 2020).

C) Financial capital: Finance is a source of many livelihoods. A household with better financial source have a chance of working on others land and yield high income, better chance to buy and apply enough fertilizer. This in turn would increase crop yield and ensures food security. Possession of money, saving culture, access to loan, remittances and credit services enable the household to choose different livelihood options (Ellis, 2000; Degefa, 2002; Serrat, 2017).

D) Natural capital: Involves land, water and trees, biodiversity, wild life, and environmental services comprises natural capital (serrate, 2017). Land plays a great role in determining availability of food and ensuring food security. Water enhances the likelihood of using irrigation and increases harvesting times and so crop yield which in turn contributes for food security status of the household. Possession of land positively affects agricultural production in general and food security in particular (Messay, 2009). Tree is becoming source of livelihood for the household. For instance, eucalyptus tree is becoming source of cash and used as a livelihood option for rural highland Ethiopia. The size of land in the study kebele is small with average size of 1.73 hectare per household and the majority of household holds less than 1.5 hectare. More over number of farm oxen in Wara Jarso *woreda* in general and in the study area in particular is low; about 64% of farmers in the *woreda* possess one ox (WFEDO, 2020).

E) Social capital: Includes social networks, social organizations and institutions up on which household draw livelihoods (Ellis, 2000; Degefa 2005). It also includes synergy and relationship of trust, religious, cultural and local institutions. Social capital enhances the likelihood of getting credit access and support during times of need. The likelihood of burrowing food in times of food shortage is high for the family who knows and has a trust from neighbors (Martin et al., 2004). Social capital creates a mutual benefit among the community. It addresses two pillars of food security; availability and accessibility (Mako *et al.*, 2020). There are local institutions which link people together in the study area. But the role these institutions in contributing for food security are found low. The majority of these institutions are a source of expenditure. Only *Iddir* is found to help in the times of food shortage (FGD result with leaders of social institutions, 2021).

2.2.2. Food Availability Decline (FAD) Model

Food availability decline model is developed by Malthus in 1978. According to Malthus, food gets declined as population increases. As population increase the demand for food increases, number of consumers increase and result in decline of food. At household level, increase in family size exerts a pressure on the household and resulted in decline of food available for the household. For the rural farmers where people depend on subsistence agriculture, food in the stock gets declined just before the main harvest season. The source of food for the household during lean season is market (Kibrom and Qaim, 2017); lean season is characterized by food shortage (Mills, et al, 2019) Food availability is the function of microeconomic factor; hence not all household are able to buy enough food and satisfy their needs (Anderson et al, 2017). Possession of land, labor and ability to buy and apply fertilizer affects crop yield and so food availability.

2.2.3. Food Entitlement Decline (FED) Model

FED model is developed by Amartya Sen in 1981. According to Sen, food availability at global or national level does not guarantee food security at household level. People become food insecure not because there is not enough food to eat, but there is no access to food to eat. It is determined by household command over economy (Sen, 1981).

The capability of accessing food is determined by level of household income, possession of assets to produce or purchase foods needed to maintain their consumption and market price. Households who participate in various income earning activities are able to produce cash and boost their purchasing power (Anderson et al, 2015). The price of food increases during summer season as crops in the stock gets declined. Poor farmers cannot buy and feed their children given, shortage of income and increase in food price.

2. 3. Empirical literature reviews

Poor agricultural sector due to land fragmentation, poor land fertility, economic constraints and depending only on small scale rain fed agriculture affects crop production throughout Africa (Apanovich and Mazur, 2018) .In sub-Saharan Africa, the source of livelihood for the majority of people is agriculture (Davis et al., 2016). Possession of land is crucial for such population. But, the average farm size in Africa is less than two hectare and this is a major constraint

affecting crop production (Lowder et al., 2014). Food insecurity is largely caused due to economic inability of the household to get enough and nutritious food (Fanzo *et al*, 2020).

As the land fertility is getting deteriorated and decreased in size over time, application of fertilizer becomes a vital solution to enhance crop production. However, in Sub Saharan Africa farmers get low yield due to low application of fertilizer as a result of financial constraint and low credit to farm inputs. Farmers sell their crops in such cases to buy fertilizer and both circumstances affect food availability (Adjognon et al., 2016). Moreover poor postharvest management and poor food storage are a significant contributing factor for seasonal food shortage (Brander et al., 2020). Type of crop cultivated, amount of crop yield size of land cultivated are also among determinants of seasonal food security (Apanovich and Mazur, 2018).

2.3.1. Determinants of Food Security in Ethiopia

Though, about 72% of Ethiopian population depends on agriculture, the sector is weak and deteriorated; traditional farming system, depending on rain-fed agriculture where only 3.3% of the land is irrigated, very low application of fertilizer where 28kg per hectare is applied, land degradation shortage of improved seed varieties, depending only on fertilizer as agricultural input and lack of agricultural machineries where only 3.7% of the farmers access it mostly affect crop production which could in turn leads to food insecurity. Besides, poor infrastructure, low financial support, lack of alternative income opportunities and low level of education contributed for the food insecurity problems in Ethiopia (FAO, 2015). Similarly, Persistent drought, rainfall variability, poor resource base, poor utilization of technologies, alarmingly increasing population size and poor rural infrastructure and policy are among the bottlenecks for food security in Ethiopia (MoARD, 2007). Despite the investment on Agriculture, infrastructure, education and health areas, 87% of the population are poor in multi dimensions; suffer from food insecurity, insufficient access to education, health and lack of employment. Locus infestation and emergency of Covid-19 exacerbates the food security situation (WFP, 2020.)

Though agriculture is a backbone of Ethiopian economy, it is dominated by smallholder farmers. Lack of skill, poor technology adopted by farmers, recurrent drought, famine, soil degradation, poor technology and poor agricultural trade make the smallholder farmers to suffer more. Natural and manmade factors such as failed institutions, poor rural infrastructures such schools, health, roads, and markets as well as weak and inappropriate policies, lack of multiparty system,

population growth, and lack of education worsen the situation and puts the country to depend on food aid for many years(Yenezew, 2015).

Causes of food insecurity are also identified as lack of nonfarm activities, low income, low production, market fluctuation and fragmentation, traditional farming, low education, population growth, poor governance, interstate and intra state military conflicts(Asefa, 2003; Woldeamanuel, 2009; Abduselam, 2017; Tsegaye, 2018). Besides, poor soil and land management practices, poor soil fertility, poor extension services, lack of cash income, labour wastage, hail storms, crop disease, poor social support and poor local institutions are among the main causes of food insecurity in Ethiopia (Tilaye, 2010; Hussein, 2013).

Moreover, the sum of erratic rainfall and persistent drought together with deteriorating farmland worsen household food security problem. The overall food security is getting worse following small rain; in addition, damage to crop production in the eastern part of the country due to locust invasion contributes for low crop production. Besides, abrupt occurrence of shocks such as drought, erratic rainfall, earth quake, landslide, flood and epidemics exposes about 12 million people to destruction of asset and livelihood (European Commission and Humanitarian Aid [ECHA], 2014). Furthermore, shortage of farmland, recurrent drought, shortage of rainfall, land degradation and climate change are some of the causes of food insecurity in the country (Asefa and Singh 2018; Kalkidan *et al.*, 2017).

Other causes of food insecurity are increase in fertilizer price, shortage of farmland size, rainfall variability, water logging, and poor soil fertility, lack of farm oxen, lack of grazing land, crop disease and insect pests, lack of improved seed supply, and lack of farm machineries (Furgasa and Degefa, 2018). Food insecurity in Ethiopia is also caused by labour wastage, expenditure, poor saving and poor application of fertilizer) and environmental factors (pests, weeds, land degradation, shortage of rainfall, soil management system and farming system (Gutu *et al.*, 2012; Mulgeta *et al.*, 2010).

Poor land management, misuse of land resources and traditional farming practices are among the main causes of food insecurity (Agricultural Transformation Agency [ATA], 2011). Erratic rainfall and delay in raining period is critical problem for Ethiopia where the majority of farmers

depend on rain fed agriculture and leads to crop failure (Abonesh *et al.*, 2006).This in turn causes food insecurity (Regassa *et al.*, 2006; Kalkidan *et al.*, 2017).

Furthermore, many studies conducted in different parts of Ethiopia at different times revealed that the attainment of food security is disrupted by demographic factors, socioeconomic factors, status of household productive assets/resources ownership (farmland, livestock possession, size of landholding), level of agricultural production and lack of nonfarm income (Degefa, 2001; Messay, 2009; Fikadu and Mequanent, 2010; Adugna and Wagayehu, 2011; Meskerem and Degefa, 2015).

2.4. Analytical Frameworks

After reviewing different theoretical frameworks and empirical literatures the researcher has developed the following conceptual frameworks. The causes of seasonal food insecurity as indicated in many literatures are related to socioeconomic factors, productive asset, institutional factors, demographic factors and sociocultural factors. Hence, these factors disturb food availability and accessibility of food and resulted in food insecurity.

Food Availability: Any factor which affects crop production affects food availability. Environmental factors such as crop disease, soil erosion, hailstorms and water logging reduces crop yield and resulted in food availability. Food availability can also be influenced by demographic characteristics such as education and family size. Education is a key to adopt farm technologies which in turn would help to increase yield and resulted in high food availability for the household. In other ways large family sizes is expected to increases demand for food and reduce food availability. Another factor that affects food availability is productive asset. Land possession directly affects crop production and resulted in low food availability. Farm oxen possession brings a great difference among farmers.

In Highland Ethiopia where farm oxen are a sole traction power, having more oxen boosts the crop yield. Farmers are able to timely prepare lands, rent in extra lands to gain more crop yield. In other way livestock contributes to food availability. Farmers who have more livestock sell and buy grain for the household in times of shortage of home production. Lack of livestock may reduce the likelihood of withstanding the shock related to food security. Lacking livestock exposes the household in cash deficit and poor coping mechanism. Household productive asset is

also associated to saving habit and credit access. Productive assets are used as collateral to get credit. Households who have more productive asset are likely to save for future investment and this enhances food availability and opportunity to access food. Credit in other ways affects both availability and of food. Cash credit increases purchasing ability if the household. Grain credit increases food availability. Access to credit to farm input solves the farmers' cash deficit to buy fertilizer. It also increases crop production.

Accessibility: Accessibility is determined by purchasing power, level of income, job diversification and social networks. Participating in many income earning activities, engaging in better jobs and social capital are among factors; which in turn is influenced by education. Educated households work better to engage in different income earning activities, likely to have network which and know saving. Household who are not able to earn enough income by engaging in different activities are unable to purchase food when home production is in deficit. In other ways, farmers are obliged to sell their grain for other domestic purpose by compromising with household consumption when income obtained from other activities is low; hence, both availability and accessibility is disturbed by socioeconomic factors.

Sociocultural and social factors affect both availability and accessibility to food. Expenditure related to sociocultural ceremonies use a significant amount of grain. This in turn reduces the food available for the household. In other ways Social support can be in cash or kind; hence it increases both food availability and accessibility. Accessibility to food is affected by saving pattern of the household. Households who save can use the saving to buy grain. Saving can be used as startup capital to be engaged in different business activities which could in turn boost the income for the household.

Chapter Three: Description of the Study Area and the Research Methods

3.1. Description of the Study Area

This study is conducted in Wara Jarso *Woreda*. Wara Jarso *Woreda* is one of the 14 *Woredas* of North Shewa zone of Oromia Regional State. The *Woreda*'s Capital town, Gohatsion is 73 km away from the Zonal Fitcha, and 185 km from Addis Ababa along the main road of Addis Ababa to Bahir Dar, Amhara regional state Capital. Wara Jarso is bordered by Amhara region in the north, by Kuyu *woreda* in the south, Hidabu Abote in the Southeast, Dera *woreda* in the east and West shewa in the west. Its astronomical location is 9°47'-10°11'N Latitude and 38°27'- 38°43' Longitude (OPC, 2019/2020).

The *Woreda* consists of a total of 29 kebeles, 25 of which are farmers associations and the urban parts have 4 kebeles in three towns. The total surface area of Wara jarso *Woreda* is about 119836hectare. From the total land of the *Woreda* 41.6% of the land is used for rain fed agriculture (cultivated only during summer season), 3% is used for irrigation, 12.8% is covered with forest, 25.4 % is grazing land and 17.19 are covered with bush, shrubs and fallow land (OPC,2019/2020).

The agro-climatic zones of the *woreda* by their altitudinal ranges are Bada (temperate) which ranges from 2500-3500m and accounts for about 15% of total area, Bada Dare (sub-Tropical), ranging from 1500-2500m and covers 30% of the *Woreda* and Gamoji (Tropical) that ranges from 500-1500m and covers 55% of zonal area. The average annual temperature of the *woreda* ranges from 21 °c to 30°c and the average annual rain fall ranges from 800mm to 1400mm.

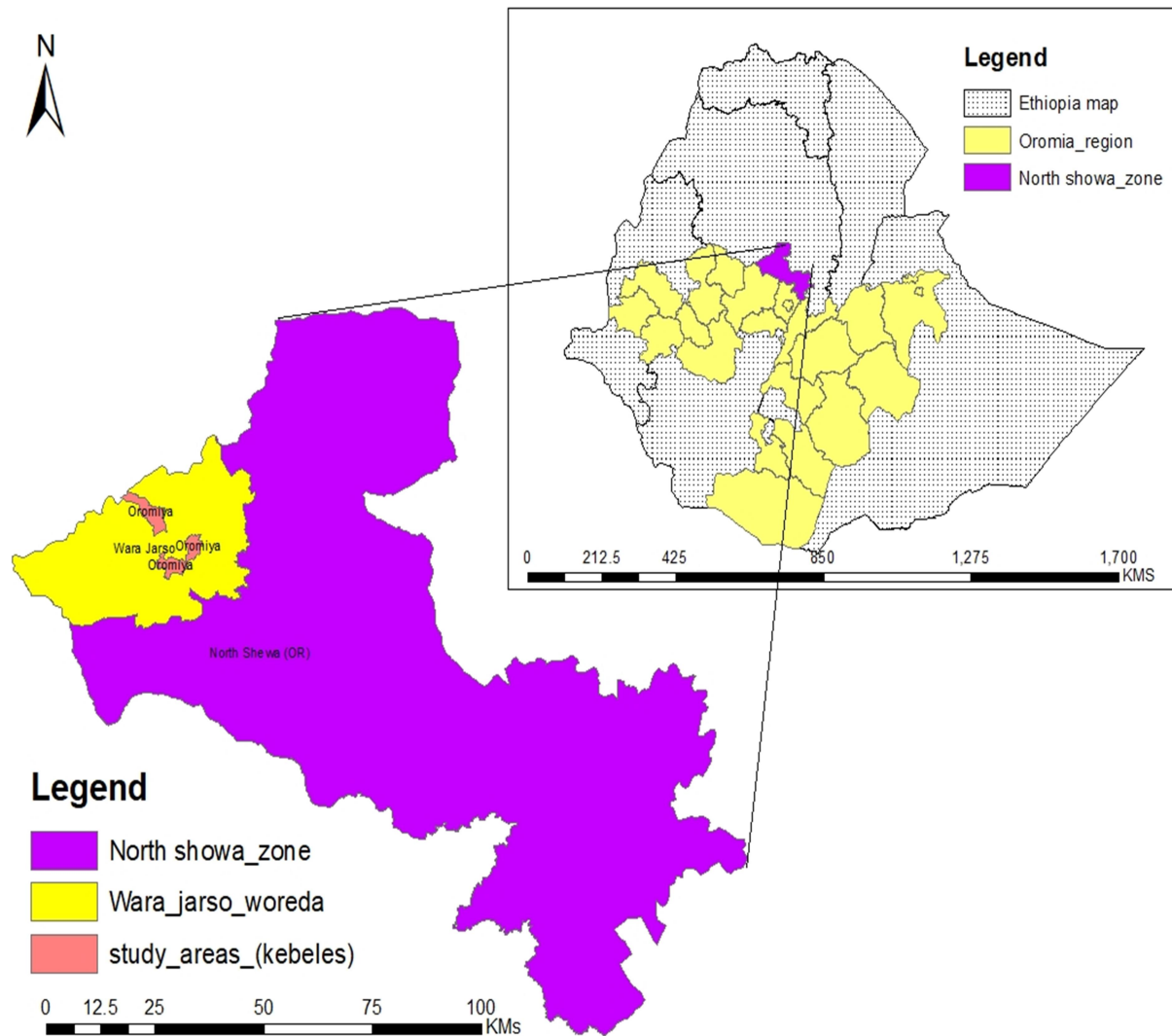


Figure: 3.1. Map of Study area (Source, Ethio GIS, 2020).

According to CSA projection (2020) estimated population in the *Woreda* is 196,532 of which 179,244 are rural dwellers and 17,288 are urban dwellers. Out of the rural population 89,807 are male and 89,436 are female and organized into 25 peasant administrations. Out of urban population, 8,543 are male and 8,745 are female (OPC, 2020). The *Woreda* is known for its mixed agriculture, crop production and livestock rearing. The major crops produced in the *Woreda* are cereals followed by pulses and oil seeds. The crops are teff, barley, wheat, horse bean, field pea, flax, Niger seed and potatoes.

The highland is relatively productive with the dominant crops such as teff, barley and pulses. Income is also earned from sale of livestock, eucalyptus and fodder including remains of

crops. The major crops cultivated in *Bada Dare* are teff, barley and oil seeds. The crop used as a source of cash income is oil seeds mostly Niger seed. The major crops in kola are maize and sorghum. Fruits and vegetables are also cultivated in kola areas. The sources of income for poorer households in the *Woreda* are labour work on other person farm, sale of firewood and charcoal (WFEDO, 2020).

3.2. Research Design and Approach

To get insight into causes of seasonal food insecurity in the area under study, rural farmers are expected to describe their food security status, views on factors that makes them to face seasonal food shortage, perception and understanding of saving, productive assets ownership, and their knowledge and capability to apply fertilizer to get more crop yield. A data collected from household is cross checked with information from key informants and across farmers themselves. Hence, cross sectional research design was employed for the study as it allows individuals or groups to describe about themselves on food security related issues.

Data was collected using mixed approach from randomly selected households and selected key informants. Farmers described their experiences for structured and semi structured questioners. Mixed research approach was used as it provides additional insight beyond the information obtained using qualitative or quantitative approach alone (Creswell, 2017).

3.3. Data Types and Sources

Both qualitative and quantitative data was collected from primary and secondary sources. Primary data was collected both qualitatively and quantitatively. Quantitative data was collected from randomly selected households using household survey. Sources of secondary data were documents, notes, best scenarios found from meeting, books, manuals etc.

Qualitative data was collected from experts of five offices and six FGDs at community level. The *woreda* offices contacted are industry and enterprise development office, agriculture office, disaster risk management and early preparedness office, Livestock resource office and rural land management offices.

The participants of focus group discussion were, women development army, leaders and committees of local institutions such as ‘*Iddir*’ and ‘*Ikub*’, and extension workers each with six participants (taking Covid -19 protocol in to consideration) and two FGD’s composed of homogenous group per selected kebele was conducted. The participants of FGD were selected

randomly. Secondary data were collected by reviewing manuals, documents and magazines found in respective offices.

3.4. Sample Size Determination and Sampling Techniques

The study was conducted in Wara Jarso *Woreda* of North Shewa zone, Oromia regional state. Wara Jarso is purposively selected due the fact that the researcher has a long term experience to the area and observed seasonal food security problems; besides, there was no prior study conducted in the *Woreda* on food security issues and the author wanted to fill this gap.

Out of 25 rural *kebeles* found in the *Woreda*, three *kebeles* were purposively selected after stratifying all *kebeles* based on accessibility, distance, security issues and in the way that represents the general socio economic as well as agro ecologies of the *Woreda*. After discussing with *Woreda* agricultural development officer, three *kebeles*, namely Wale Chilalo from dega, Jarso Tuti from weina dega and Shenhora shesheng from kola *kebeles* were selected.

Though many types of sample determination are there for quantitative approach, since population in the study area is finite, Yamane's Formula was employed to select sample for household survey. Using Yamane's formula: $n = \frac{N}{1 + N(e)^2}$ when,

n = is sample size

N = total population of the study area

e = level of precision = 0.05 (decided by the researcher).

Table: 3.1. Distribution of total household size and sample selected per study kebele

Kebeles	Total Household(N)	Male headed	Female headed	Formula to select sample(n)	Total Sample	Male sample	Female sample
Wale chilalo	400	331	69	$n = \frac{400}{1 + 400(.05)^2}$	70	58	12
Jarso Tuti	448	406	42	$n = \frac{448}{1 + 448(.05)^2}$	74	67	7
Sh/shesheng	492	415	77	$n = \frac{492}{1 + 492(.05)^2}$	77	65	12
Total	1340	1152	188		221	190	31

Finally, determined sample size for each *kebele* was randomly selected from farmers list found in the respective *kebele* administration offices. For qualitative data, key informants from stakeholder offices were selected purposively. Hence, five key informants from five offices were purposively selected and interviewed.

3.5. Tools of Data Collection

Data was collected using four data collecting tools. Household survey, key informant interview, focus group discussion and document review.

3.5.1. Household survey

Household surveys with randomly selected 221 households were conducted using structured and semi-structured questionnaires, and information on general socio economic status of the household, possession of household productive resources, crop production, cash income opportunities, farming technologies, and coping strategies to with stand food security problems were collected. Besides, household consumption, frequency of meals during typical months, frequency of meals during food shortage, crop production, annual income from off farm activities and household perception about seasonal food insecurity was collected.

3.5.2. Key informant interviews

Sectors that are expected to work with food security related issues were purposively selected and interviewed. Hence, five key informants from each sector were purposively selected and information related to timely provision of fertilizer, land management practices delivered to the community, awareness creation activities delivered to the community on saving culture, perception about causes of seasonal food insecurity are collected. Similarly, level of job opportunities, income diversification and livelihood options created for the people, credit service provision and etc. was collected through the interview. Moreover, crop production, causes of crop loss, potential resources and extent to which it is utilized and contribution to household income in the woreda was captured by the interview.

3.5.3 Focus Group Discussion (FGD)

Six FGD were administered purposively at community level and information related to farming systems such as crop rotation, use of animal dung and other land management information was collected. Besides, information related to use of technologies, farmers access to agricultural information and advice, community perception towards extravagancy related to sociocultural practices, the role of informal local institutions in addressing seasonal food shortage, saving culture in the community etc. was collected from participants.

3.5.4. Secondary data

Secondary data was collected from Agricultural development office, Finance and economic development office and Industry and enterprise development office. Information collected using secondary data was land size per household, average livestock unit per household, size of irrigated lands, farmers use of irrigation, crop production status, farmers use of technology, soil conservation measures practiced in the woreda, fertilizer provision and number of farmers use fertilizer every year, training given and number of participants on the training, number of farmers face seasonal food insecurity in summer season every year and etc. was collected.

3.6. Techniques of Data Analysis

Data was analyzed in two ways. Quantitative data collected through household surveys was first computed using statistical software called Statistical Package for Social Sciences (SPSS) version 26 and analyzed using descriptive statistics and econometric analysis. The food security status of the households was analyzed using techniques of food security analysis. Besides, qualitative data collected from key informants and FGDs was analyzed qualitatively and incorporated in quantitative data analysis.

i. Descriptive analysis

Among descriptive statistics mean, frequency, standard deviation, and descriptive were used.

ii. Food security analysis

The grain consumed by households was first converted to equivalent dietary energy per capita using the formula of Household Food Balance Model (HFBM) adapted by Degefa (1996) and modified by Messay (2011). Each grain consumed by the household was converted to equivalent calorie using food composition table from EHNRI/FAO (1997).

The formula to convert grain consumed in to equivalent dietary energy is:

$$NGA = (GP + GB + FA + GG + CC + MP + DP) - (HL + GU + GS + GV) \text{ Where,}$$

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)

PL= Post harvest losses (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)

iii. Econometric analysis

a) Independent t-test: Independent t test was employed to compare the mean dietary energy for discrete variables (variables with two options /samples).

b).One way ANOVA: was employed to compare mean dietary energy of categorical variables (variables categorized in to three and more options/samples), for instance, fertility of land as fertile, medium, poor.

c).Regression analysis: Multiple regression analysis and simple linear regression was employed analyze the significance of continuous variables. Food insecurity is a function of independent variables, and is denoted as:

$Y = (x_1 + x_2 + x_3 + x_4 + x_5 + x_6 + \dots + X_n)$, where

Y = dependent variable and $X_1, X_2, X_3, \dots$ are independent variables and X_n is error of terms.

iv. Diagnostic tests for regression analysis

Collinearity test: Association between independent and dependent variables was checked and variables that were associated with dependent variables were used in the model.

Multicollinearity test: Multicollinearity diagnostic test was used to identify the relationship between the predictors. The relationship between dependent and independent variables were checked before running regression models. Multicollinearity was checked to know the relationship between predictors or independent variables; accordingly variance of inflation factor (VIF) and tolerance was used to detect Multicollinearity problem.

VIF can be calculated for all predictors in the model using the formula $VIF = 1 / (1 - R^2_i)$ where R is level of determination and 'i' is i^{th} predictors.

As a rule of thumb, a value of VIF less than one shows no correlation between predictors and a value from 1 up to five shows a moderate correlation between predictors. A value greater than 5 shows strong correlation between predictors. In the same way, tolerance value less than 0.1 shows Collinearity among predictors (Daoud, 2009).

3.7. Description of Variables

Dependent variables: Dependent variable is seasonal Food security. It is measured by converting all grain available for the household consumption into equivalent calorie using EHNRI/ FAO (1997 and 1998) food composition table. The result obtained after conversion was compared to minimum recommended allowance (MRA) 2100kcal per day per person). A household who gains less than 2100kcal per day per person is considered as food insecure, and a household who gain more than 2100 per day per person is considered as food secured.

In order to better understand the causes of seasonal food insecurity, the following explanatory variables are assumed to determine seasonal food insecurity, after reading related literatures and from researcher experiences in the study area.

Age of the household Head: Age is a categorical variable and expected to affect food security. It is common in many areas that head of the household determines the income of the household. Household head in productive ages are expected to engage in different income earning activities than elders and young. Age of the household head is also associated to asset ownership, experience on farming activities and social networks. To this regard elders are expected to have more assets such as land than young but, lack labor ability to diversify income and /or farm activities. Middle ages are expected to have farm experience, labour and asset.

Sex of household head: this is a discrete variable where '1' is given for female and '2' for male. Meskerem (2011) in her study in Girar Jarso Woreda found that male headed households have more dietary energy than female headed households.

Family Size: Is a continuous variable measured in number of individuals. Family size exerts a pressure on household and increases demand for food. Family size is among the determinants of food security and negatively correlated (Fikadu and Mequanenet, 2010; Adugna &Wagayehu, 2011; Meskerem and Degefa, 2015; Cole et al., 2019)

Education of the household head: This is a categorical variable measured by level of education. Education influences food availability due to the assumption that educated family know how to increase production and productivity by using improved seed, fertilizer and

practicing saving habit which in turn enhances food availability (Degefa, 2002) cited in (Meskerem and Degefa, 2015; Smith & Devereux, 2019); Lack of education is among the factors which worsen the food insecurity situation in Ethiopia (Sewnet, 2015).

Application of fertilizer: It is a continuous variable measured by amount of fertilizer per hectare. Intense application of fertilizer is important to get more crop yield and so ensure the attainment of food security (Messay, 2009; Fikadu and Mequanent, 2010; Buom, 2013; Guyu and Muluneh, 2016). Though there is an increase tendency to use modern fertilizer among sub-Saharan farmers, economic constraint hinders them to apply enough fertilizer to get more yield and ensure food security (Adjognon et al, 2017).

Possession of farm oxen: This is a continuous variable measured by number of farm oxen the household own. The main source of traction power in rural farmer is oxen. Rural farmers where people depend on traditional plough, lack and or shortage of draft power limit crop cultivation and are a critical cause of food insecurity. Farmers who have no ox or only one ox are unable to prepare farm land timely and properly, and obliged to rent out their land or rent in an ox. In both circumstances, farmers loss some of his production and these brings a significance impact on household food supply. On the other hand, farmers who have enough oxen have a chance to prepare land for planting timely and properly, have a chance to rent in lands and produce enough grain for the household (Mastewal, 2010). Possession of oxen positively affects agricultural production and food security, lack of which reduces agricultural production and causes food insecurity (Messay, 2009; Fikadu and Beyene, 2010).

Livestock ownership: is a continuous variable measured in tropical livestock unit (TLU). Livestock resource is an alternative livelihood options for rural households. Farmers who have many livestock are capable of coping with crop failure. Household with shortage of livestock are most likely to face seasonal food insecurity in rural farmers.

Land size: This is a continuous variable measured in hectare per head. For countries like Ethiopia where 72% of the population relay on agriculture for livelihood and agriculture accounts for 37% of GDP, possession of land plays a great role to get more crop yield and ensure food security. As the population growth increases alarmingly people face scarcity of land for agriculture in developing countries (FAO, 2019; Sewnet, 2015).

In Sab-Saharan Africa average farm land size is less than two hectares and land holding is decreased over time in Ethiopia. The small scale farmers depend on semi or annual harvest for food and other income (Lowder et al, 2016).

Size of land cultivated: This is a continuous variables measured in hectare per head. It is not only size of land which affects seasonal food insecurity; rather size of cultivated land directly affects food security. As size of cultivated land increases it is expected that more crop production is gained and the likelihood of the farmers to have recommended dietary energy increases (Buom, 2013).

Fallowing land: Is a continuous variable measured in hectare. Fallowing land increases soil fertility; this in turn would increase productivity of land. Absence of fallow land reduces crop production and causes seasonal food insecurity among farmers (Degefa, 2001).

Soil fertility: Is a categorical variable to measure status of soil. Fertile soil give high crop yield and poor fertile land gives low crop yield and it requires high application of fertilizer otherwise, which in both circumstances affect the household. Land fertility affects food security status. Poorly fertile land reduces agricultural production, while fertile land increases land productivity and ensures food availability (Meskerem and Degefa, 2015).

Off farm income: Is a continuous variable measured in amount of birr the household gains annually. Employment in off farm activities play a great role in reducing food security problems and reducing poverty; It is also used as a risk minimization mechanisms in times of shock such as drought, crop failure and shortage of rainfall as it brings additional income for the household (FAO, 2015). Household who have off farm or non-farm income have better saving opportunity, do not sell their crops in exchange of other household expenses and are relatively food secured(Brunei et al., 2014). Agriculture is the main source of livelihood for many rural farmers in Sub Saharan Africa. Income from non-farm activities in Sub Saharan Africa is only 44% with 24% in Ethiopia in 2004 (Davis et al, 2017).

The study conducted by Messay (2009) has also revealed the reason why farmers fail to apply enough fertilizer to get more yield. Accordingly lack of nonfarm income hinders the farmers to apply enough kg of fertilizer per hectare of land. This reduces crop yield and eventually leads to food insecurity. Similarly Degefa (2001) found that lack or shortage of income from off farm or non-farm activities is a serious problem affecting food security status. Lack of cash income

reduces capacity of the household to purchase food and apply modern input and is considered as critical factor causing seasonal food insecurity.

Job diversification: Is a continuous variable measured by a number of activities per head. Lack of job, lack of alternative business activities and lack of cash income brings seasonal food insecurity (Degefa, 2002; Mark & Kantour, 2006; Sarker, 2018; Smith & Devereux, 2019; Cole et al., 2020). Off farm income increases the purchasing ability of the household; this in turn decreases the chance of being food insecure (Smith & Devereux, 2019).

Access to credit: Is a discrete variable which takes a value of 1 if households have access to credit and 2 otherwise. Access to cash credit increases the households purchasing ability and increases the likelihood of being food secure. Access to grain credit increases food availability for the household which in turn would increase calorie consumption. Households who have access to credit are more likely to be food secure (Temesgen et al., 2017). The Low credit facility from financial institutions and high interest rate on borrowing from private lenders leads farmers to face seasonal food insecurity (Maisy et al., 2012; Sarker, 2018).

Households that are able to get credit access have opportunity to participate in other income earning activities, establish small business. This reduces the likelihood of facing seasonal food insecurity (Islam et al, 2014).

Access to social support: Is a continuous variable which takes a value of 1 if household have access to social support and 2 if not. Social support is a relationship where community themselves support each other in times of food shortage or other incidents. People support each other in kind or in cash in the time of incidents and accidents and failure of crops; this reduces the likelihood of being food secured. Enhancing social support for the groups, who seek it, would reduce food insecurity (Zamasiya, 2013).

Membership in local institutions: Is a continuous variable which takes a value of 1 if household is a member in local institutions or not. Membership in local institution such as *Iddir* increases the likelihood of getting credit (Temesgen et al., 2017). It addresses poor farmers in times of shock and helps to overcome food security problems (Chimdesa et al, 2019).

Expenditure related to socio cultural practices: Expenditure related to social or religious ceremonies is among the causes of seasonal food insecurity. People held social and religious ceremonies just after the harvesting month. A sizeable portion of grain is utilized for ceremonies. This in turn causes shortage of grain available for the household and eventually leads the

household to face seasonal food shortage; this is due to the fact that most expenses for ceremonies are found by selling crops which in turn decreases the amount of food available for the household(Degefa, 2001).

Saving habit: This is a discrete variables which takes a value of 1 if household has saving account and or save traditionally and 0 if not. In his study in Oromia Zone of Amhara region, Degefa (2001) found that poor saving is among causes of seasonal food insecurity; Households who save cash or grain can use from the deposit during scarcity of food and reduce seasonal food insecurity. Similarly in their study on village saving and loan to decrease malnutrition in Mozambique, Brunie et al. (2014) found that village saving increases food sufficiency for the household. Households who save in cash or kind use their investment during food shortage. The likelihood of households to be food unsecure is less for those who saves grain or cash (Mountain, 2017).

Alcohol consumption: Alcohol consumption affects the household in two ways. Consumers spend their time compromising working times; consumers either sell crops or livestock as well as use cash obtained from off farm activities. In their study on Food insecurity and its predictors among lactating mothers in North Shoa Zone, Central Ethiopia Samuel et al.(2020) found that mothers whose household head consumes alcohol are found to be food insecure than mothers whose household head do not to consume alcohol.

Environmental factors: Increase in crop production reduces the likelihood of being food insecure. crop failure and low productivity caused by climate related factors such as climate variability, rainfall pattern and drought, edaphic factors such as land degradation (soil erosion, water logging, poor soil fertility)and biological factors such as crop disease, pests and weeds results in seasonal food shortage (Degefa, 2001). Oromia Regional national State in general and North Shewa and Wara Jarso *Woreda* in particular has faced crop failure due to rain variability, early stop and come late (MoFED, 2017).In their study conducted in Bangladesh, Islam et al. (2014) found that, crop failure due climate variability such as drought, rainfall variability, and poor soil fertility is a cause of seasonal food insecurity in Bangladesh. This study also assumes crop failure is among the factors that causes seasonal food insecurity in the study area. Climate changes are the major constraints that affect crop production. Hill storm, erratic rainfall, recurrent drought and crop disease such as rust, frost largely hinders farmers to get high crop

yield. Besides, animal disease reduces the income obtained from livestock which eventually disturbs household income and food security status of the household (Zeng et al., 2016).

Crop Diversification: Crop diversification is among the tools to ensure food security. It helps to reduce loss of crops caused by climate change and ensures food availability (Ijaz et al., 2019).

Visit extension/extension service: Communication on agriculture related issues help farmers to get knowledge on application of farm input, best farming practices and conservation mechanisms.

Application of other farm inputs (pesticides, herbicides, compost): application of farm input increase crop production. According to FAO (2019), the fact that agricultural sector is deteriorating in Ethiopia is dependent only on fertilizer as a farm input. Other farm inputs such as pesticides, herbicides, and modern seed, compost plays a significant role in increasing crop yield and result in food availability.

Table: 3.2. Description of explanatory variables their measurement and expected sign.

S.No	Code	Definition	Type	Measurement	Expected result
1	SEHH	Sex of household Head	Discrete	1 for female and 2 if male	-/+
2	AHH	Age of household head	categorical	Categorized based on contents	-/+
3	EDUHH.	Educational status of household head	Categorical	Educational level he/she attended	-/+
4	FAMSZ	Family size	Continuous	Total Number of individuals in the household	-/+
5	NUMLSTOCK	Number of live stock	Continuous	Number in Tropical livestock Unit (TLU)	+
6	NFOXEN	Number of farm oxen	Continuous	Number	+
7	LHOLD	Land holding	Continuous	Size in hectare	+

		size			
8	LCULVTD	Size of land cultivated	Continuous	Size in hectare	+
9	OFRMINC	Off farm income	Continuous	Money earned in birr	+
10	FERTILEZER	Use of fertilizer	Continuous	Amount per hectare in kg	+
11	OTHFRMIPT	Other farm input	Discrete	1.Yes 2.NO	+
12	SOILFRT	Soil fertility	Categorical	1.Fertile 2. moderate 3.poor	+
13	JOB DV	Job diversification	continuous	Number of activities farmers engaged in	+
14	ACREDIT	Access to credit	Discrete	1. Yes 2. 2.No	+
15	ASOSUPPORT	Access to social support	Discrete	1.Yes 2.No	+
16	MELI	Membership in local institutions	Discrete	1.Yes 2.No	+
17	EXPENDSOC	Expenditure related to sociocultural and religious practices	Discrete	1.Yes 2.No	+
18	SAHABIT	Saving habit	Discrete	1.Yes 2.No	+
19	ALCOHOL	Alcohol consumption	categorical	1.Always 2.sometimes 3.rarely or never	+
20	CROPSTATUS	Crop production status	categorical	1.Increased 2.The same	+

				3.Decreased	
21	CRODIVERS	Crop diversification	categorical	1. Every year 2. Some times in years 3. Rarely or never	+
22	FOLAND	Fallow land	continuous	Size in hectare	
23	EXSERV	extension service	Discrete	1.Yes 2. NO	+

Chapter Four: Results and Discussions

4.1. Demographic and Socioeconomic Characteristics of the Study Households

4.1.1. Demographic characteristics

Demographic characteristics considered for this study are age of the household head, sex of the household head, educational status of the household head and family size. From total farmer households in the study *woreda*, 18154 households are male headed households and 1508 are female headed households. Lack of infrastructures and materials on education, lack of sufficient qualified education experts and shortage of schools are among some constraints facing the *woreda* according to *woreda* plan commission. Lack of health facilities, hospitals, emergency of animal disease and shortage of medicine is also constraints hindering economic growth in the *woreda*.

Table 4.1 below shows demographic characteristics of households. From total sampled households, 14% of households were female headed and 86% of households were male headed. Table 4.1 below also the age of the household head; the age of the household head falls between 22 and 72 years old with the mean of 45.6 and standard deviation of 11.19; it is categorized in to three groups for the ease of analysis based on Ethiopian age category. Hence, 0-14 is considered as child and not considered in this study; 15-24 years old early working age, 25-54 years old are prime working age, and 55-64 years old are mature working age and above 65 are elderly. Accordingly, early working group is accounted for 1.8%, prime working age accounts for 70.1%, mature working age accounts 22.2% and elderly age accounts for 5.9% of household head in the study population (Table 4.1).

Education of the household head is also considered in this study. Survey result for educational status of the household head shows, the majority (48.4%) of the household head are illiterate, 33% of the household head attended adult literacy up to grade 4 and 14% of the household head attended junior secondary school (grade 5-8). The number of household head who attended secondary education and tertiary education (Vocational, college and university) is very low. Accordingly 2.7% of household attended senior secondary education (grade 9-10) and only 0.9% of household heads attended both grade 11-12/preparatory and college and above (Table 4.1). The survey result also reveals the size of family in the household. As it can be seen from table 4.1 below, the minimum household size is 1, the maximum household size is 9 and the mean value is 5 with the standard deviation of 1.56. Family size is categorized in to three groups, 1-3 members, 4-5 members and 6-9 members. Hence, 13.6% of the household has a family size of 1-3, 68.8% of the households have a family size of 4-6 and 17.6% of households have a family size of 7-9 (Table 4.1).

Table 4.1: Demographic characteristics of respondents

Characteristics	Description	No. of Hhlds	% of Hhlds	Mean	Std. Deviation
Sex	Female	31	14	1.86	0.348
	Male	190	86		
Age	15-24yrs old	4	1.8	45.63	11.19
	25-54yrs old	155	70.1		
	55-64yrs old	49	22.2		
	>65yrs old	13	5.9		
Family size	1-3	30	13.6	5	1.56
	4-6	152	68.8		
	7-9	39	17.6		
Education	Attended no school	107	48.4	0.77	0.955
	Attended primary school	73	33		
	Attended grade 5-8	31	14		
	Attended grade 9-10	6	2.7		

	Attended 11-12/preparatory	2	.9		
	College and above	2	.9		

4.1.2. Socio economic characteristics

Table 4.2 presents socio economic characteristics of respondents. Membership in local institutions is one of socioeconomic characteristics considered for the study. As it can be seen from table 4.2, 60.2% of the households' are member in local institutions and 39.8 are not. The table also shows households access to credit from local institutions. Accordingly 56.6% of households can get access to credit and 43.4 do not get access credit from local institutions (Table 4.2). The table also presents, households access to credit from private lenders or financial institutions. The result reveals only 35.3 percent of the household get access to credit and 64.7% of the household do not get access to credit from private or financial institutions (Table 4.2). The above result indicates that farmers get access to credit from local institutions than from private lenders or financial institutions.

Access to social support is also captured in the survey. The result shows, 34.4 households get access to social support and the majority (65.6%) of households does not get access to social support (Table 4.2). Furthermore respondents were asked to rate status of social support in the community. The majority (53.8%) of household ranked social support in the community is poor; 25.3 % of the household ranked status of social support as medium and only 20.8% of study population ranked the status of social support good (Table 4.2).

Table 4.2: socioeconomic characteristics of study households

Variables	Category	Count	Percent
Membership in local institutions	Yes	133	60.2
	No	88	39.8
Access to credit from local institutions	Yes	125	56.6
	No	96	43.4
Access to social support	Yes	76	34.4
	No	145	65.6
	Very good	46	20.8

Status of social support	Medium	56	25
	Poor	119	53.8
Access to credit from private lenders/Financial institutions	Yes	78	35.3
	No	143	64.7

Table 4.3 below shows income generating activities in the study area. The majority of households in the study area obtain income from wage employment (Responded by 64.6% of households) and the mean annual income obtained was 7239.38 birr in the study year. Other income generating activities in the study area are sale of dairy products, trade and fattening of cattle, sale of eucalyptus tree, and sale of wood and charcoal and petty trade where 35.7%, 33.5%, 32.6%, 31.2% and 20.4% of study households used to earn mean annual income of 9322.69 birr, 15873.8 birr, 12060.16 birr, 4664.18 birr and 14006.98 birr respectively in the study year (Table 4.3). Remittance is also found to be the source of income for the study households where 25% of respondents get mean annual income of 5319.40 birr in the study year (Table 4.3). Other activities are rarely practiced to bring income for the household; Accordingly sale of fruit (responded by 7.2% and functional only in kola agro ecological zone), sale of 'gesho' (Responded by 9.04% and functional only in kola agro ecological zone), sale of local alcohols and soft drinks (responded by 3.6%), income from beekeeping (responded only by 1.3%), sale of grass (responded by 4.5%), wood works (responded by 8.9%) and trade on crops (10.9%) and the mean annual income earned was 7186 birr, 3729 birr, 9400 birr, 6000 birr, 9000 birr, 12039.7 birr and 14209 birr respectively (Table 4.3).

Table 4.3: Income generating activities and mean annual income

No	Activities	Number of Hhlds	Percent	Average annual income
1	Wage employment	143	64.6	7239.38
2	Trade on crops	24	10.9	14209
3	Trade and fattening of cattle	74	33.5	15873.88
4	Sale of eucalyptus tree	72	32.6	12060.16
5	Sale of wood and charcoal	69	31.2	4664.18
6	Petty trade	45	20.4	14006.98
7	Sale of grass	10	4.5	9000

8	Wood works	20	8.9	12039.7
9	Sale of dairy products	79	35.7	9322.69
10	Sale of fruits and vegetables (Mango, papaya, lemon, avocado)	16	7.2	7186
11	Sale of Gesho	20	9.04	3720
12	Sale of local alcohols and soft drinks	8	3.6	9400
13	Beekeeping activities	3	1.3	6000
14	Remittances	56	25.3	5319.40

Source: Field survey, (2021)

4.2. Households productive resources, expenditure and saving Habit

4.2.1. Productive resources

Land resources: Out of total land size of 119836 hectare in the *woreda*, 49,856 hectare is agricultural land/ cultivated in year under study and 30,480 hectare of land is used for grazing purpose in the study year.

Livestock resources: Livestock is used as insurance during food shortage and crop failure. The total livestock found in the *woreda* is 318,184. Out of total livestock 137,883 are cattle, 34,321 are goats, 38,621 are sheep, 1,110 are horse, 230 are mules, 16,636 are donkeys and 87,371 are poultry.

Farm oxen: Oxen are the sole drafting power in the study area. In the study *woreda*, 1508 farmers are without farm oxen, 2,750 farmers have one ox, 11,820 have two oxen, 1,360 have three oxen, 1,125 have four oxen, 896 have 5 to six oxen and only 372 farmers have more than six oxen.

Table 4.4 below shows households' status of productive resources (land size, land cultivated, fallow land and farm oxen in the study *kebeles*. Accordingly, 10.4% of the household holds less than 1 hectare of land, the majority (40.7%) of household holds 1- 1.5 hectare, 23.5% of households hold over 1.5 hectare up to 2 hectare and 25.5% holds above 2 hectare of land (Table 4.4). The mean land holding in the study area is 1.77 hectare and the standard deviation is 0.86 hectare (Table 4.4). Similarly, the majority of households (39%) cultivated 1- 1.5 hectare of

land, 22.6% of households cultivated 1.5-2 hectare of land and only 6.2% of study population cultivated over 2 hectare of land in the study year and the mean land cultivated by study population 1.37 hectare and standard deviation is 0.64 hectare (Table 4.4). Besides, households were asked if they have practice of fallowing land to keep land fertility. The survey result shows, the majority of households (56.6%) of the household do not fallow their land at all, 37.6% of the household fallow 0.25 – 0.5 hectare of their land and only 5.9% of the household fallows greater than 0.5 -1 hectare in the study years. The mean of fallow land in the study area is 0.18 and standard deviation is 0.25 (Table 4.4).

Possession of Pasture land is also considered in the survey. Pasture land has dual purpose. It increases land productivity by increasing soil fertility in one way and help livestock to give more production as it is the source of fodder. Farmers who produce more fodder are likely to get more income from livestock. The Pasture land in the study area is very low. 37.5% of the households have no Pasture land and keep their livestock on homestead garden, 28.5% of the household holds have a Pasture land of less than 0.25 hectare, 52.5% of % of the household possess less than 0.5 hectare and only 10% of the household have more than 0.5 hectare (Table 4.4).

Households were also asked to rank the status of their land fertility in terms of its productivity. Accordingly, only 20.8% of households respond their land is fertile, 22.2% of the household responded their land fertility is medium and the majority of household (57%) of households respond their land fertility is poor. The result indicated that poor land fertility is one of the constraints affecting crop production and food availability (Table 4.4).

Another productive resource as it can be seen from table 4.4 is farm oxen. Households who have more farm oxen tend to prepare their land timely, have opportunity to rent in land and produce more crops. Besides, farmers who have more farm oxen have the opportunity to rent it out and bring grain or cash income for the household. As it can be seen from table 4.4 the majority (37.56%) of households possesses one ox and 17.19% of households have no ox. In the same way 33.48% of households possess two oxen and only 11.76% of study households have more than two oxen (Table 4.4).

In the study area there is a practice of renting out the farm oxen and the system is known as; '*kitira*'. An attempt was made to see if respondents have rented out their ox or not in the study

year; the survey result shows 6.3% of the households rent out their farm oxen in the study year. The minimum renting price is 6.5 ‘Nadal’ of grain which is equivalent to 162.5 kg (*Nadal* is a local unit which is equivalent to 25 kg). So, farmers who rented out one farm oxen have an additional of 162.5kg (1.62quintal) of grain than farmers who do not rent out.

Livestock resources are used as a risk minimizing resource in time of food shortage. The contribution of livestock to household livelihood can be direct or indirect. Households get cash income by selling animals, and or their products such as meat, milk, eggs and other products. Livestock are also used as a form of savings (capital asset) and used as insurance as selling animals or products brings immediate cash and used to cover unexpected incidents or expenditures such as schools fees, medical fees and other household domestic purpose. Besides, livestock provide manure, traction power and transport services, which can be used on the household farm or exchanged on the market (for instance, rental of farm oxen for plowing. Moreover, livestock are used as a source of wealth; facilitate credit access both from financial institutions or private lender (FAO, 2011).

Livestock is converted in to equivalent Tropical livestock unit (TLU) using conversion factor from FAO (1999). The survey result shows 29.9% of households hold less than 2 TLU, the majority of households (56.7%) holds greater than two up to four TLU, 12.6% of study households hold greater than four up to six TLU and only 1.4% of households hold greater than six TLU. The maximum holding size is 8 and the minimum is zero with mean TLU holding of 2.57 (Table 4.4). The Key Informant with Livestock resource officer revealed that income obtained from the livestock is low. The key informant explained,

“There is no enough veterinary services, there are no enough medicines in the centers, most of the time farmers buy the medicine from private shops without consulting the livestock experts. It may be expired in some cases. Livestock death is one of the problems challenging the community particularly just next to summer season when the livestock disease outbreak is high. The practice of rearing improved varieties of cows is low in this area”.

The figure obtained from livestock resource office shows that there are only 3010 improved varieties of milking cows in the *woreda*.

Table 4.4: Households productive asset, mean and standard deviation

Variables	Category	Frequency	Percent	Mean	Std. Deviation
Land owned in hectare.	<1 hectare	23	10.3	1.77	0.86
	1-1.5 hectare	90	40.7		
	>1.5-2 hectare	52	23.5		
	>2 hectare	56	25.5		
Total Land Cultivated	<0.5hectare	3	1.5	1.37	0.64
	0.5-1 hectare	86	39		
	>1-1.5hectare	67	30.5		
	>1.5-2 hectare	51	22.6		
	>2hectare	14	6.3		
Fallow Land	No fallow land	125	56.6	0.18	0.25
	0.25- 0.5hectare	83	37.6		
	>0.5-1hectare	13	5.9		
Pasteur land	No Pasteur land	83	37.5		
	0.1-0.25 hectare	63	28.5		
	>0.25-0.5 hectare	53	24		
	>0.5-1 hectare	22	10		
Number of farm oxen	No ox	38	17.19	1.47	1.08
	One ox	83	37.56		
	2 oxen	74	33.48		
	More than 2 oxen	26	11.76		
Livestock in TLU	<2	66	29.9	2.57	1.6
	2-4	124	56.1		
	>4-6	28	12.6		
	>6	3	1.4		
Rented out farm oxen	Yes	17	7.6		
	No	204	92.4		
Soil fertility	Fertile	46	20.8	2.36	0.8
	Medium	49	22.2		
	Poor	126	57		

4.2.2. Use of Farm inputs and Farming Practices (Investing on Land)

Table 4.4 presents farmers use of farm inputs (fertilizer, pesticides, herbicides, modern seeds and compost on their land) and extent of crop rotation, fallowing and access to extension services. One of the major constraints which cause weak agricultural production over years in Ethiopia is dependency on fertilizer only (FAO, 2019). The survey result shows the majorities of farmers (85.5%) have used fertilizer in the study year (Table 4.5). However the amount applied is low. The mean fertilizer applied per hectare of land is 62.42kg with standard deviation of 29.67, the minimum amount of fertilizer is 10kg and the maximum amount is 155 per hectare of land.

Besides, only 17.2% of study households have used pesticides, 28.1% of study households have used modern seed, 44.3% of farmers used herbicides and only 15.8% of farmers have used animal dung or compost in the year under study (Table 4.5). Access to extension services and extent of crop rotation is also captured in this study. Accordingly, the survey result shows only 14.9% of households responded to have access to extension services. Crop rotation practice is moderate where 48% of farmers rotate crops every farming years, 43.9% rotate crops some times in farming years and 8.1% of farmers rotate crops rarely or never (Table 4.5).

Table 4.5: Household use of farm inputs and farming practices

Category	Fertilizer	Pesticides	Herbicides	Modern seed	Compost	Ext. Services
Yes	189	38	98	62	35	33
Percent	85.5	17.2	44.3	28.1	15.8	14.9
No	32	183	123	159	186	188
Percent	14.5	82.8	55.7	71.9	84.2	85.1

4.2.3. Saving Culture and Expenditure Related to Sociocultural Practices

Saving and credit institution: Saving and credit institutions facilitate credit service as well as create awareness about saving. There is only one saving and credit association in the study area, Oromia saving and credit association. There may be occurrence of food security problems in spite of good crop production. This implies food insecurity are not only caused by commonly known explanations such as low crop production, economic crises, wars and or conflicts etc.;

Socio cultural practices such as social ceremonies and alcohol consumption promotes food insecurity and have a location based unique expressions (Naswem & Ejembi, 2010).

Households were asked whether they have held ceremonies and its effect on the food availability. The survey result shows that 71.5% of the households have held at least one ceremony in the study years and 28.5 households did not (Table 4.6). As it can be seen from table 4.6 the major source of expense for holding ceremonies is sale of crops (Responded by 86.5%), income obtained from of farm activities (83.2%),and sale of livestock (responded by 45.2%). Other households burrow grain or cash (responded by 42.6%) and rent out their farm lands (responded by 19.4%); both circumstances have a long term effect on household income in general and food availability in particular. In this study the amount that each sources contributed for the expense is not assessed, the researcher simply wanted to know the sources of income for the expense.

The household who have held the ceremonies were asked whether holding ceremonies have affected the food available for the household or not. 74 % of the household who have held social ceremonies in the study years responded that they have faced shortage of food as a result of ceremonies and 26% have not (Table 4.6).

Another social factor, included here is alcohol consumption. Households were asked to rank the alcohol consumption status of the household head from the market. The survey result shows that the majority (44.3%) of the households responded that household consumes alcohol always, 38.5% of households consume alcohol sometimes and 17.2 respondents responded household head rarely or never consumes alcohol (Table 4.6).

Moreover the saving culture of the households is assessed in the survey. The survey result shows only 31.7% of households have a saving practice, both formal saving in bank account and traditional saving such as buying assets; some households buy land and others buy livestock for saving. 0.8% of respondents who have a saving culture deposit in the form of asset almost all (99.2%) of respondents save in cash. The majority, 68.3% of the households do not have saving practice (Table 4.6).

Table 4.6: Sociocultural and religious practices

Variables	Category	Number	Percent
Alcohol consumption	Most of the time	98	44.3
	Sometimes	85	38.5
	Rarely or never	38	17.2
Held Social/religious ceremonies	Yes	158	71.5
	No	63	28.5
Food shortage as a result of ceremonies	Yes	117	74
	No	41	36
Have formal saving account or save traditionally	Yes	70	31.7
	No	151	68.3

4.3. Food Security Status of Study Households

Food security status of households is determined by converting all available grain in to equivalent dietary energy per capita using Household food balance model by the formula described in chapter three of this study and comparing the average value to a minimum recommended allowance (MRA), 2100kcal. Dietary energy per capita is the measure of average food available to each person in a country and or a region and at household level (Messay, 2009). Degefa (2001), Messay (2009) and Meskerem (2011) have converted all available grain in to equivalent calorie to determine the food security status of the household. Grain mostly consumed in the study area as it is discussed by the households is used for the formula using the EHNRI (1998/1997) food composition table. Since grains are consumed in different forms, and different forms provide different calories, the average value is taken for conversion process. For instance, teff provides 166kcal when eaten in the form of enjera and 193.7Kcal when consumed in the form of porridge. Hence, the average value 179.85Kcal per 100gram is used as it is described in the table 4.7.

Table 4.7 Types of grain commonly consumed in the community and their equivalent average calorie

Crop type	Edible form	Equivalent energy in Kcal per 100gram
Teff	Enjera and porridge	179.85
Sorghum	Enjera, Nifro (boiled)	139.6
Wheat	Kolo (roasted), Nifro (boiled), bread, porridge	242.16
Pulses	Nifro (boiled) kik (split), kolo (roasted).	197.62
Maize	Nifro (boiled), bread, Bokolo eshet (roasted), porridge	200.6
Barley	Kolo (roasted), Beso, porridge	237.9

Finally the average value per hundred grams is multiplied by the total amount of grain obtained from the survey to get the total calorie of each grain. The result shows, the total calorie available for the study population as 549,324,605kcal; the mean value is 1396.376 calorie per day per capita which is only 66.5% of RMA (Table 4.8).

Table 4.8 Net grain available and its contribution to total calorie available

Crop type	Net grain available in(kg)	Equivalent dietary energy per 100gram(kcal)	Total dietary energy(kcal)	Contribution to total dietary energy (%)
Teff	93157.63	179.85	167544004.525	30.5
Sorghum	89324.27	139.6	124696685.335	22.7
Wheat	41285.55	242.16	99977078.11	18.2
Pulses	34190.33	197.62	67566926.415	12.3
Maize	26836.39	200.6	53833811.29	9.8

Barley	15008.87	237.9	35706099.325	6.5
Total	299803		549324605	100

More over a dietary energy distribution across households and a comparison was made across agro ecologies to see dietary energy difference. The result reveals only 19% of the study population meets MRA and above. Moreover, the majority (48.42%) of households' dietary energy falls between 700 up to 1400 Kcal, 10.4% of households dietary energy is less than 700kcal and 22.17% of households have a dietary energy of 1401-2099kcal(Table 4.9).

Table: 4.9. Households' dietary energy distribution

Range of dietary energy	No	%	Minimum dietary energy	Maximum dietary energy	Mean dietary energy
<700	23	10.4	402	679	522.47
700-1400	107	48.42	700	1393	1085.89
1401-2099	49	22.17	1401	2099	1664.49
2100	4	1.81	2100	2100	2100
Over 2100	38	17.19	2101	3734	2406.486
Total	221	100			

Table 4.9.1below,presents dietary energy difference between kebeles; the result shows there is difference in dietary energy per capita at (P value =0.01 and t value = 15.3). The mean dietary energy is 1757.3kcal, 1355.3 and 1107.74 kcal for Wale chilalo, Jarso tuti and Shenkora sesheng respectively (Table 4.9.1). This finding is in line with Messay (2009) on his study conducted in Kuyu District. The result indicated that kola agro ecology is relatively more food insecure than dega and woina dega agro ecologies with the mean dietary energy of 1107.75kcal and standard deviation of 564.47. Dega agro-ecology is relatively more food secure with the mean dietary energy of 1757.33 and standard deviation of 624.9. Kola agro ecology is characterized by small farmland, small livestock resources and farm oxen. The soil is prone to erosion, poor water

resources and inaccessible roads; this may contribute for the low dietary energy of kola agro ecology.

Table: 4.9.1 Mean dietary energy distribution across agro ecologies

Kebele of respondent	Mean	N	Std. Deviation	Minimum	Maximum
Jarso Tuti	1355.257	74	481.9485	675.0	3424.0
Wale Chilalo	1757.329	70	624.9331	813.0	3734.0
Shenkora Shesheng	1107.753	77	564.4757	402.0	2230.0
Total	1396.376	221	617.1010	402.0	3734.0

4.3. Causes of seasonal food insecurity in wara Jarso *Woreda*

Many studies found that seasonal food insecurity is related to socio economic factors, productive asset, institutional factors, demographic factors and sociocultural and religious practices. Besides, farming practices and utilization of farm technology affects the crop production and resulted in food security disruption. To this effect, saving habit, expenditures, land resources, economic activities, household network and social support determines food security of the household. Different statistical tests were used see the significance of the factors expected to cause seasonal food insecurity and discussed hereunder.

4.3.1. Result of One way ANOVA for Demographic Factors

Degefa (2002) cited in Meskerem (2011) found that demographic characteristics of household head are found to affect the livelihood and determines type of income earning activities which in turn affects the food obtaining ability of the household. Table 4.1 below shows the mean difference between age groups. Accordingly the age of the household is found to have a significance effect on dietary energy at ($p=0.00$ and $f= 6.44$) table 4.10). Further analysis is conducted using Tukey post Hoc analysis to know which age category brings the significant mean difference. The result reveals that household belongs to mature working age (55- 64 yrs. old) have relatively more dietary energy (1651.69kcal) than the rest three categories(early working age, prime working age and elderly) which have a mean dietary energy of

508.25kcal, 1339.28kcal, 1388 kcal and 1393.158 with the standard deviation of 622.64, 93.72, 668 and 542.08 respectively (Table 4.10). This difference could happen due to three differences between the groups; difference on farm experience, productive age, and differences on land ownership. Household heads that fall between matured age groups are both productive and experienced on farm activities. The third age groups are elderly, but more experienced on farm activities and have better land access due to their age as land in Ethiopia is shared to farmers during Derg regime (1995 in Ethiopia) and elders are likely to participate at that time. This finding is in line with Alem-meta and Singh, 2018; Islam et al., 2014).

Another demographic factor considered for this study was sex of household head. This variable is used to know whether there is the mean dietary energy difference between male headed household and female headed household. Some studies found that male headed households tend to have more dietary energy than female headed households for instance; in here study conducted in Girar Jarso Woreda, Meskerem (2011) found male headed households have better dietary energy than female headed households. Others however found no significant difference between female headed and male headed households.

This study revealed there is no significant difference in terms of mean dietary energy between male headed and female headed households. The mean dietary energy is 1398.06kcal and 1385.84kcal, the standard deviation is 693.96 and 605.67 for male headed and female headed households respectively (P value= 0.09, significant level (α) = 0.05) (Table 4.10). Hence, p value is greater than α , difference is insignificant; this result may happen due to two reasons; the majority of sample respondents (86%) as it is discussed hereinbefore are male headed households. In other ways, it is becoming common in study area that females are participating equally on agricultural working like their male counter parts. This finding is in line with the finding of Alem-meta and Singh (2018).

Family size is also hypothesized to affect amount of food available for the household as consumption demand increases for large household and resulted in low dietary energy and resulted in seasonal food shortage. However, the survey result shows, there is no significant difference in terms of dietary energy between large family size and small family size. The p value is greater than alpha (p value=0.09, α =0.05) (Table 4.10). This may be due to the fact that,

the majority of members in households are not dependent; they are in productive ages. This finding is in line with Cole et al. (2019).

Another variable hypothesized to affect seasonal food security are educational level of the household head. The result of the survey shows there is a significance difference in mean dietary energy among households who are illiterate and attended different level of education($P= 0.00$ and $F=7.13$) Table 4.10). Further analysis is computed to know which level has brought a significance difference. The result of Tukey post hoc analysis reveals that there is a great significance difference between households who have not attended education and household head who attended preparatory and college and above, where the mean dietary energy is 1222.42 and 2602.20 and 2657.00 respectively (Table 4.10). This finding confirms the finding of Smith and Devereux (2019). Moreover, it was found from woreda profile that lack of quality education, scarcity of sufficient and qualified worker, lack of school infrastructures, libraries, books and reference books affects educational quality and a problem facing the woreda (WFEDO, 2020).

Table 4.10: Result of One way ANOVA for demographic characteristics

Variables	Category	N	Mean dietary energy	Std. deviation	F value	P value
Age of household head	(1). 15-24rs old	4	508.25	622.64	6.44	0.00*
	(2).25-54yrs. Old	155	1339.28	93.72		
	3).55-64 yrs. Old	49	1651.69	668		
	4).>64 yrs. Old	13	1388.00	542.08		
Sex of household head	Female	31	1385.84	693.96	2.35	0.919**
	Male	190	1398.06	605.67		
Family size	1-3	30	1549.86	839.34	0.10	0.098**
	4-6	152	1407.98	595.87		
	7-9	39	1233.0	458.03		
	Attended no school	107	1222.42	515.00	7.13	0.00*
	Primary education(0-Grade 4)	73	1476.00	645.67		

Educational status	Elementary school(Grade 5-8)	31	1559.53	648.68		
	Secondary school(grade 9-10)	6	1863.80	469.42		
	Preparatory/11-12	2	2602.20	1.70		
	College and above	2	2657.00	74.95		

Note: **Mean difference is significant at $p < 0.05$

*Mean difference is significant at $p < 0.01$

Yrs= years

4.3.2. Result of Independent t-test for Socio Economic Factors and Socio Cultural Practices

Sociocultural practices and social factors such as credit access, membership in local institutions, social support and access to extension services are expected to affect the dietary energy of the household expected to affect dietary energy are described hereunder in the table.

Membership in local institution

Informal local institutions are established by the community for mutual benefit, for the purpose of risk minimization during incidents and strengthen social interaction. Some known informal institutions in the rural area are *Mahaber*, *Sanbate*, *Iddir/Afooshaa*, *Dabo* and *Wanfala*.

Afooshaa/ Iddir: Is an informal institution established on the basis of risk sharing upon incidents and accidents and mostly for burial matters. Besides, *Iddir* provides credit service during financial constraints, shortage of food and death of livestock or damage to other household properties. Membership in *Iddir* reduce burden from the household that may happen due to incidents. It addresses poor farmers in times of shock (Chimdesa et al, 2019).

Table hereunder shows the membership of study households in *iddir* and its effect on dietary energy. The result shows, there is a significance mean difference among member and non-member of *iddir* in terms of dietary energy. Members of *iddir* have a mean dietary energy of 1725.683 and standard deviations of 561.422 and non-members have a mean dietary energy of 898.617kcal with the standard deviation of 261.58. Independent t test reveals, the mean dietary energy difference is significant at ($p = 0.00$ and t value= 14.7) (Table 4.11). Membership in local institution such as *Iddir* increases the likelihood of getting credit (Temesgen, Bamlaku

& Zerihun, 2017). The result of FGD with leaders of social organization revealed the same result. Some of the participants of FGD said,

“Members of iddir have a high probability of getting credit to both grain and cash than non-members; Members of iddir also gets support upon burial matters, tezkar ceremonies and weddings. These help poor farmers to save their home made grain for the household consumption”.

Access to credit from local institutions

Local institution provides credit in times of food shortage. The survey result shows there is a significance difference in a mean dietary energy between households who are able to get credit from social organization and who are not. The mean dietary energy is 1529.93 and 1222.43 for households who get access to credit and not; the mean difference is significant at ($P=0.00$ and $t=3.5$) (Table 4.11). More over the FGD held with leaders of local institution further revealed, the extent of credit service by local institutions is low; Some of the participants of FGD from the members of ‘iddir’, explained

“Credit service is given based on the potential of the burrower to return back the credit. This is measured by the asset or properties the burrower has, so that the lender develops trust on the burrower”.

The leader of ‘Gabriel iddir (Named by saint days) at Wale Chilalo kebele vividly explained his idea as “it is very difficult to get cash or crops back if it is given to households who have no enough asset”. By chance, FGD was conducted on the day when Iddir of Gabriel’ holds its meeting. The researcher has observed that more than 17000birr of Iddir property was found as an outstanding loan. This supports the fear that poor farmers who do not return back the credit and the likelihood to get credit is low.

Social support

People support each other in kind or in cash in the time of incidents and/ or accidents and failure of crops; this reduces the likely hood of being food secured. Enhancing social support for the groups, who seek it, would reduce food insecurity (Zamasiya, 2013).

The result of independent t test reveals that there is a significance mean difference between households who are able to get social support and who are not. The mean dietary energy is

1516.06kcal and 1321.53 with standard deviation of 482.68 and 678.97 respectively and significant at (p value= 0.014 and t value= 2.5) (Table 4.11).

Expenditure related to social ceremonies

Though social organizations are important in terms of supporting each other in times of incidents and accidents, enhances mutual support and creates a favorable condition for the community to interact and make a discourse on personal, development initiatives, political and social issues, which in turn contributes for food security, some institutions however are a source of extravagancy as it takes a significant amount of grain and cash.

From discussion with farmers on FGD and researcher experience in the study area, people held social ceremonies mostly wedding ceremonies just after harvesting season and in the spring season which is considered as a peak farming period and locally known as '*Arfaasaa*' (the first rain of the year). The spring is the season when farming for the next harvesting is started. People held ceremonies during this fruitful time, come together, enjoy, sing local songs and stay most of their time attending the ceremonies of relatives or others. It is a time when plenty of food is available. Only brilliant farmers give attention to this fruitful time. There is a local song explaining this situation. "*Arfaasaa qotan malee birraa maal makaratuu, Qeerrummaan horan malee, niitii fuudhan maal nyaatuu...*" its literal meaning is that if you do not saw during the spring, nothing to harvest in the autumn, if you do not possess /have wealth in the adolescent stage, there could be nothing to feed the spouse after marriage'. It seems farmers already know that time is wasted; crops are degraded to hold and attend wedding ceremonies.

The Focus group discussion with leaders of social organizations ('*Muusee for mahaber*') revealed that membership in some institutions leads the farmer to food constraint. Some of the participants vividly explained their idea as

"Some farmers are a member in more than one mahaber (Saint gebriel mahaber, saint merrys mahaber, saint Michael mahaber...), assuming participation as a kind of honor and not to left behind their friends, others become member owing it to saints or fear of God though they have no enough asset or grain to held the ceremony for the mahaber, sometimes they borrow money or grain to held the ceremony; this may impose a long term impact on the household food consumption''.

Celebration of *mahaber* takes a significant amount of food from the household. This leads to financial constraint and food shortage.

Independent t-test is employed to test whether farmers who held ceremonies and did not held in the study years have dietary energy difference. The result of independent t test reveals that there is significance mean dietary energy difference between households who held social ceremonies in the study year. The mean dietary energy is 1558.276kcal and 1331.79kcal with standard deviation of 608.16 and 614.43 respectively and the mean dietary energy is different at ($p=0.013$ and t value, $=-2.5$) (Table 4.11).The negative result indicates there is negative relationship between dietary energy and holding ceremonies. The major source of expense come from selling crops as 86.5% of respondents who held ceremonies and thought they faced food shortage as a result of it, replied. This in turn reduces the amount of food available for the household. The participants' of women FGD said,

“It is common in this area to have a warm celebration of weddings, mahaber and tezkari ceremonies where communities consider it as reciprocity and making warm celebration is considered as a dignity, sometimes people burrow grain or money to hold ceremonies”

This may eventually leads to reduction in food available for the household and resulted in seasonal food insecurity.

Access to credit from financial institutions or private lenders

Access to cash credit increases the households purchasing ability and so increases the likelihood of being food secure. Access to grain credit increases food availability for the household which in turn would increase calorie consumption.

The result of independent t test analysis shows there is a significance dietary energy mean difference between households who are able to get credit access and who are not; the mean dietary energy is 1504.84 kcal and 1321.82kcal with the standard deviation of 549.22 and 667.97 respectively and the difference is significant at ($P=0.023$, t value = 2.3) (Table 4.11).This finding confirms the result found by Suhrawardy et al. (2017) on the ‘Role of credit in food security and dietary diversity in Bangladesh’. The study revealed that access to credit increases calorie consumption per capita and dietary diversity. The finding is also consistent with the study conducted in Ethiopia by Zerihun et al.(2017) on ‘Does access to credit improve household welfare, Evidence from Ethiopia using endogenous regime switching regression’; the study revealed that households who have access to credit have greater consumption expenditure than

their counter parts. Similarly Muche (2014) has found households who have access to credit have more dietary energy than households who do not have access to credit services.

The FGD with model farmers revealed that access to credit is determined by level of asset ownership. Some of the participants of FGD said,

“There is no guarantee if I lend the grain or cash for farmers who do not have asset”.

This may complicate the opportunity for poor farmers to get access to credit in times of food shortage. More over one of FGD participant (Manager of the kebele and leader of *Iddir* explained about the credit service in the area.

“The only financial institution providing credit is Oromia Saving and credit Association (OSCA). ‘Isan immoo bona bona fudhaa nuun jedhu, ganna immoo fuudhaa nuun jedhu’, bona midhaan ni qabna, ganna midhaanis mana hin jiru, horiinis nurratti rakasa”.

Once, the money is dispensed for credit, there is no follow up for what purpose the money is allocated. Sometimes farmers consume alcohol without telling the family member that they have received the credit. Key informant from Industry and enterprise development office explained about the credit as follows;

“OSCA is a profit share company. It provides credit with interest. Though they help farmers by providing credit access, that is not their primary goal; they establish the company for commercial purpose; they do not work on livelihood strategies”

Its literal meaning is OSCA mobilize us to take the credit during the spring when we have a plenty of grain, and ask us to repay the credit during the summer season when available grain is reduced and the price of our cattle is getting low. These result indicated, it is not only lack of access to credit which disrupts food security, the time of credit provision also matters.

Table 4.11: Households socio cultural practices and its significance

Variables	Category.	N	Mean dietary energy	Std. deviation	t value	P value
Membership in local institutions	Yes	133	1725.683	561.4225	14.74	0.00*
	No	88	898.617	261.5868		
Access to credit from local institutions	Yes	125	1529.93	483.37	3.5	0.00*
	No	96	1222.43	723.13		
Social support	Yes	85	1516.064	482.685	2.5	0.014*

	No	136	1321.533	678.97		
Expenditure related to social ceremonies	Yes	158	1331.79	608.16	-2.5	0.013*
	No	63	1558.27	614.43		
Access to credit from private or financial institutions	Yes	90	1504.84	549.22	2.3	0.023*
	No	131	1321.82	667.97		
Access to extension services	Yes	33	1850.679	704.527	4.12	0.00*
	No	188	1316.605	565.943		

Note: *= Mean difference is significant at $p < 0.01$

**=Mean difference is significant at $p < 0.05$

4.3.3. Results of One Way ANOVA for Sociocultural and Technology Related Factors (Categorical Variables).

Categorical variables included in this analysis are fertility of land, crop change and alcohol consumption.

1. Land fertility

It is obvious that fertility of land is very crucial in crop production. Households were asked to tell their perception about the fertility of their land. One way ANOVA result shows there is significant mean dietary energy different between households whose land is poor, medium and fertile. The mean dietary energy available per capita is 1312.7kcal, 1373.5kcal and 1620.76 at with the standard deviation of 643.08, 473.15, 671.34 and 724.36 at the value ($p=0.017$, $f=4.2$) respectively (Table 4.12). Further analysis using Tukey post hoc analysis is employed to know which category makes the difference. Households who have fertile land have a high dietary energy and significantly different from poor fertile lands at ($p=0.013$). The key informant interview with Woreda agricultural officer also revealed, there is a land fertility problem in the area. Soil erosion specially, in kola agro ecologies is one of the constraints which causes poor soil fertility and affects crop production. Reduction in crop production eventually leads to food shortage.

2. Alcohol consumption by household head

Another categorical variable expected to affect dietary energy is alcohol consumption. The result of one way ANOVA shows that there significant mean dietary energy difference between household who consume alcohol most of the time, some times and rarely or never. The mean

dietary energy is 1241.56 kcal, 1471.89 and 1626 kcal with the standard deviation of 644.39, 487.59 and 710.69 respectively. The mean difference is significant at ($p= 0.002$ and $F=6.7$) (Table 4.12). Alcohol consumption uses cash from the household, household head may spend more time to have alcohol compromising with peak farming periods and this may result in reduction of food availability. This finding is in line with Samuel et al, 2020).

Table 4.12: Result of one way ANOVA sociocultural practices and farm practices (categorical variables)

Variables	Category	N	Mean	Std. deviation	F value	P value
Soil fertility	Fertile	46	1620.76	643.08	4.2	0.017**
	Medium	71	1373.50	473.15		
	Poor	104	1312.696	671.34		
Change to crop yield	Increased	58	1606.27	724.36	4.7	0.010**
	The same	52	1331.53	630.55		
	Decreased	111	1317.03	523.34		
Crop rotation	Every year	106	1462.20	668.106	3.63	0.028**
	Some times in years	97	1389.86	570.354		
	Rarely or never	18	1043.58	418.94		
Alcohol consumption	Always	98	1241.56	644.39	6.7	0.002*
	Some times	85	1471.89	487.59		
	Rarely or never	38	1626.57	710.69		

Note: *Mean difference is significant at $p<0.01$.

**The mean difference is significant at $P< 0.05$.

The FGD held with women army also revealed alcohol consumption is a source of extravagancy in the community. The participants of FGD explained their idea as,

“Household head specially, old males consume alcohol every week on market days, they invite each other on market day, and on every events which create opportunity for them to come together”.

4.3.4. Result of Independent t-test For Technology Utilization and Farm Practices

There is no doubt that application of farm inputs increases the crop yield and enhances food availability. The table below presents the result of application of farm inputs such as, modern seed, compost, pesticides, herbicides and fertilizer. The result of t test reveals application of pesticides has a significant effect on dietary energy; the mean of dietary energy for households who applied pesticides and who did not is 1883kcal and 1295.3kcal respectively. The mean is different at (p value= 0.00 and t value =5.12) (Table 4.13). Similarly there is a significant mean dietary energy difference between farmers who applied fertilizer and did not apply in the study years. The result shows the mean dietary energy is 1478kcal and 908.76kcal respectively. The mean is significant at (p value = 0.00 and t value =5.1) (Table 4.13).

Applications of modern seed and herbicides have also a significant effect on dietary energy. The mean dietary energy of households who applied herbicides is 1586.50 kcal and who did not apply is 1244.85kcal. The mean difference is significant at (p value=0.00 and t value= 4.09) (Table 4.13). Similarly the mean dietary energy of farmers who used modern seed is 1707.8kcal and 1274.9kcal. the mean difference is significant at (p=0.00 and t= 4.9) (Table 4.13).

The table also presents the effect of using compost on dietary energy. Though there is the mean dietary energy difference between households who used compost or not, the result of t test analysis reveals the difference is not significant. The p value is 0.595 and t value is .53 (Table 4.13). The mean difference is 1447.44kcal and 1386.75kcal for users and non-user of compost respectively. Things that should be seriously understood here is that it is not only using of these inputs which affects crop yield, but the amount applied also matters. This section focuses only on the effect of using these inputs on dietary energy. Moreover the key informant with Agricultural officer revealed farmer use of fertilizer is low. The key informant explained his idea as,

“The price of fertilizer is getting high than usual. There is no credit to fertilizer at all. This may hinder farmers to use enough fertilizer”. The key informant was asked why they increase the prize of fertilizer and stop giving credit to fertilizer. He vividly explained his idea as, *“it is not the woreda who determine the prize of fertilizer or determines whether to give credit or not. It is the decision from higher officials at zone and or regional level. There was credit to fertilizer before six years (Estimated); ‘in fact I was not in this sector’. But it was difficult to get the credit back as farmers fail to repay.”*

With regard to pesticides and herbicides, the key informant discussed, “*it is occupied by private merchants, they sell to a price that is not affordable, sometimes they bring outdated pesticides and herbicides, for instance we have identified this problem last year, only small amount is obtained from our sector we do not get from the zone or region, I do not know why it is scarce*”.

Table: 4.13. Result of independent test for use of farm input and farm practices

Variables	Category	N	Mean	Std. deviation	T value	P value
Pesticides	Yes	38	1883	639.24	5.12	0.00*
	No	183	1295.3	563.3		
Fertilizer	Yes	189	1478	593.10	5.1	0.00*
	No	32	908.76	531.47		
Herbicides	Yes	98	1586.504	697.44	4.09	0.00*
	No	123	1244.852	497.81		
Modern seed	Yes	62	1707.811	667.30	4.9	0.00*
	No	159	1274.905	552.68		
Compost	Yes	35	1447.4	554.86	.53	.595**
	No	186	1386	629.06		

Note: * significant level=0.01

**significant level=0.05

4.4.5. Result of Simple Linear Regression and Multiple Regression Analysis for Continuous Variables

Simple Linear regression

Both simple and multiple regression analysis were employed to see the effect of predictors on dependent variables and the effect of variables independently or when combined. Seven explanatory variables which measures economic status and productive resources are included for this analysis after checking for Collinearity and Multicollinearity test. The predictors are amount of fertilizer per hectare (p1), number of farm oxen (p2), size of land cultivated (p3), off farm income (p4), job diversification (p5), landholding size (p6) and Livestock size in TLU (P7). Table below presents the result stepwise simple regression and multiple regression analysis.

As a rule of thumb a correlation coefficient greater than 0.75 shows strong correlation, 0.5 up to 0.75 shows moderate correlation, 0.25-0.5 shows low correlation and a result less than 0.25 shows no correlation. As it can be seen from table 4.14 below, two variables (Job diversification and size of land cultivated) have low association with food security and value of 0.632 and 0.723

which shows moderate correlation with the dependent variable and the rest five variables have strong correlation(R greater than 0.75) with dependent variable. The result further shows, possession of farm oxen predicts the variances in the dependent variable by 62.0%, size of land cultivated predicts seasonal food security by 53.1%, off farm income predicts seasonal food security by 62.3% and job diversification predicts seasonal food security by 39.9%. Food security is largely predicted by amount of fertilizer per hectare, landholding size and number of livestock unit where the variables predict 70.8%, 73.2% and 72.9% respectively (Table 4.14).

As it can be seen from the table below an increase in one kilogram of fertilizer increases calorie per capita per day by 17, increases in one farm oxen per head increases calorie per day per capita by 451, an increase in one hectare of cultivated land per head increases calorie per day per capita by 698.78, an increase of off farm income by in one birr per head increases calorie per day per capita by 0.075, an addition of one job per head increase calorie per day per capita by 459.32, an increase of one hectare of land per head increases calorie per capita per day by 610.72 and an increase in one livestock unity per head increases calorie per day per capita by 330.065. All variables are significant at the p value of 0.00.

Table: 4.14 Result of simple linear regression

Variables	R	R ²	T value	P value	β
Amount of fertilizer in kilogram per hectare	0.842	0.708	23.06	0.00*	17.0
Number of farm oxen per head	0.787	0.620	18.89	0.00*	451.0
Size of land cultivated in hectare per head	0.729	0.531	15.76	0.00*	698.78
Off farm income in birr per head	0.789	0.623	19.01	0.00*	0.075
Job diversification/number of jobs per head	0.632	0.399	12.0	0.00*	459.32
Land holding size in hectare per head	0.855	0.732	24.43	0.00*	610.72
Number of Tropical livestock unit per head	0.854	0.729	24.25	0.00*	330.065

Note:* the result is significant at p value ≤ 0.01

R: Coefficient of correlation

R²: coefficient of determination

Multiple-linear regression

Stepwise multiple-linear regression was also employed to see the combined effect of variables. After running multiple linear regression, the model screened six most predictors and put its the model, the model Result of multiple regression analysis reveals the combined effect of predictors in determining variances in the dependent variable; hence, land holding size is the most predictor of variances in the dependent variable. It predicts 73.2% of variances in the dependent variable given other factors constant. The combined effect of land holding size and livestock possession is 84.8%. Three combined variables(Land holding size, livestock size and amount of fertilizer per hectare predicts the variances by 89.3%, four combined variables (Land holding size, livestock size, amount of fertilizer per hectare and off farm income) predicts the variances by 91.6, five combined variables (Land holding size, livestock size, amount of fertilizer per hectare and off farm income and number of farm oxen predicts the variance by 92.6% and all screened variables by the model(Land holding size, livestock size, amount of fertilizer per hectare and off farm income , number of farm oxen and size of land cultivated) predicts 92.8% of the variances in the dependent variable and the rest 7.2% of the variance is determined by other external factors (Table 4.15).

Table 4.15 Result of multiple-linear regression

Model Summary						
Model	R	R ²	Adjusted R ²	Explained (%)	Tolerance	VIF
1	0.855 ^a	0.732	0.730	73.2	0.29	3.45
2	0.921 ^b	0.848	0.846	84.8	0.367	2.73
3	0.945 ^c	0.893	0.892	89.3	0.39	2.58
4	0.957 ^d	0.916	0.915	91.6	0.34	2.92
5	0.961 ^e	0.923	0.921	92.3	0.38	2.60
6	0.964 ^f	0.928	0.926	92.8	0.48	2.09

a. Predictors: (Constant), Land owned in Hectare per head

b. Predictors: (Constant), Land owned in Hectare per head,
TLU

- c. Predictors: (Constant), Land owned in Hectare per head, TLU, amount of fertilizer Per hectare
- d. Predictors: (Constant), Land owned in Hectare per head, TLU, amount of fertilizer Per hectare, income from off farm activities
- e. Predictors: (Constant), Land owned in Hectare per head, TLU, amount of fertilizer Per hectare, income from off farm activities, Number of farm oxen per head
- f. Predictors: (Constant), Land owned in Hectare per head, TLU, amount of fertilizer Per hectare, income from off farm activities, Number of farm oxen per head, Size of Land Cultivated

4.4.6. Months of seasonal food shortage (farmers experience and perception)

The season of seasonal food insecurity is varied across households; the minimum food security months are two and the maximum food security period is six according to households' perception. Accordingly 16.4% have not faced seasonal food shortage in the study year, 6.9% of households responded they face food security problem for two months in August and September, 16.5 % of households face food shortage for six months from May to October, and the majority (60.2%) of face seasonal food shortage for four months (June to September).

4.5. Households Coping Mechanisms to Seasonal Food Insecurity (Farmers perception and experience)

Coping strategy is a response to adverse effect or shock (Devereux, 2001). It is the method used by households when faced unusual livelihood failure (Ellis, 2000). WHO (1999) categorized coping strategy as non-erosive Coping such as getting insurance, minimizing the risk, loans, reduction in dietary intake, eating cheaper foods, reduction of meals, sale of small stock and non-productive assets. Another coping category is erosive coping strategy such as disposal of productive assets, sale of large livestock, land and tools, bonded labour arrangements and Child labour. The third category is failed coping where household take a serious and complicated measures such as being destitute, dependency on charity, out-migration, Prostitution and sale of

children. It is different among region, community, social group, culture, household status gender, age, season and time it occurs as well as influenced by the people's previous experience.

The main coping strategies practiced by the households when faced food shortage is reducing frequency and size of meal (Adino *et al.*, 2018). Social network is used as coping strategy during food scarcity as it facilitates food sharing among people (Tam *et al.*, 2014). The study conducted in South Africa by Mjonono *et al.* (2009) found that households apply short term consumption strategy to solve food insecurity. Households may use both food and no- food coping strategy to overcome food shortage. These strategies are related to demographic factors, economic factors and dietary diversity (Suleiman *et al.*, 2011).

After computing the net grain available in to equivalent calories, food security status is determined; accordingly the result reveled there is a food insecurity. Households have a mechanism to with stand the problem once happened. Some strategies are like adoptive strategies and others are coping mechanisms. Households were asked to tell the mechanisms they use to alleviate the problem. Accordingly some strategies by which households with stand the problems are sell child labour known as '*tikse*' (responded by 17.7%) in the study area where children are send to other household for labour work or look after the cows, others migrate to other area for labour work(responded by 61.1%), other take labour payment in advance (responded by 46.4% respondents);it is like credit where farmers take payment in the summer season to work on farm activities in the spring, but with small payment.

Another common coping mechanism as it can be seen from table 4.16 is reducing size of meal (responded by 75% respondents), frequency of meal (74.1% of respondents), eating less preferred foods (48.4%), selling expensive crops to buy cheap grain (responded by 76% of respondents); for instance farmers sell white teff to buy sorghum or red teff, and others receive credit from private lenders. More over farmers in the study area use adoptive mechanism to with stand food insecurity problem. For instance farmers saw early ripening crops and locally called '*Gojjame*', '*racha*', '*samareta*'.

Table: 4.16. Coping strategies practiced by study households

Category	frequency	Percent
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Reduce size of meal	144	75
Reduce frequency of meal	137	71.4
Take labour payment in advance	103	46.4
Migrate to other areas for labour work	116	61.1
Take credit from private lenders	127	66.7
Take credit from microfinance	53	27.6
Sale children labour(Tiksee)	34	17.7
Engaged in off farm activities/wage employment	185	96.4
Sell expensive crops in to buy cheap	190	86
Eat less preferred food	93	48.4

Chapter Five: Conclusion and Recommendations

5.1. Conclusion

As it is coined in many studies causes of food insecurity are explained largely by demographic factors, socio economic factors, productive resources and institutional factors. This study contributes to institutional factors. Access to credit is among institutional factors which explain the food security status. However, period/seasons and purpose of credit provision, availability of enough credit associations and the interest rate of credit are not considered in many studies as far as the researcher knows. The qualitative part of this study revealed that, the time of credit provision is important to reduce food security problems. Providing credit when there is plenty of grain does not contribute or contribute less to food security of the household. High interest rate of credit hinders the poor farmers to access enough credit that may solve their food security problems; accessing credit alone does not help the poor farmers to be food secure. It is the way credit is used which changes the life of individuals; using the credit to invest on livelihood assets rather has long term impact to change the livelihood of the poor farmers.

The findings of this study reveal that the study population is food insecure in the study year where study households meet only 66.5% of MRA. In other ways, only 19% of study households meet MRA and the majority (48.2%) of households obtain a dietary energy of 700-1400Kcal. besides the food security situation is different for different agro ecologies and food insecurity manifested mostly in kola agro ecologies.

A combination of different factors brings seasonal food shortage and food insecurity in the study area. Low application of fertilizer, shortage and lack of farm oxen, shortage of land holding,

shortage of livestock and income generated from livestock and land cultivated contributes a lot for seasonal food shortage. It is obvious that productive assets such as land, livestock, and farm oxen are crucial resources for better crop production and increase household income. The result of statistical tests revealed that, households who have large size of land have better dietary energy than their counter parts. Farmers who have land are able to produce more crops, can get access to credit by using their lands as collateral, farmers may rent out their land during cash constraint and use for household domestic purpose.

Similarly having more farm oxen helps farmers to timely prepare their land, rent in or sharecrop inland from other farmers who have no or less oxen; this in turn increases crop productivity and resulted in better food availability for the household. Having livestock is another opportunity to have better dietary energy; Livestock are used as a risk minimizing resources. Farmers sell their livestock to buy grain upon shortage. Despite the favorable environment for animal rearing in the study area, income obtained from the sector is found low. Extension services are poor; no medicine for livestock and farmers loss their livestock due to animal disease specially, just next to summer season products.

Moreover, low alternative income generating activities and lack of cash income hinders farmers to buy and apply enough fertilizer. There is low job opportunity/income generating activities in the study area. Wage employment on other farm activities is relatively alternative job opportunity for households. However, it is not permanent; it is only obtained during peak agriculture period. So, farmers are obliged to sell their crops for households' domestic purpose when there is no alternative cash income and income generating activities. This brings shortage of available food for the household.

An attempt was made to see the perception of household towards social support. The survey result found that social support in the community is poor. There are no financial institutions providing credit. The only credit and saving association in the study area is Oromia Credit and saving association (OCSA). Credit access creates opportunity to engage in other business activities using it as startup capital. Lack of credit hinders farmers to buy fertilizer which in turn affects crop production and resulted in shortage of available food for the household.

Poor utilization of farm technology, lack of access to fertilizer credit and lack of access to agricultural extension services contributes a significant effect to food shortage. According to

FAO (2019) in Ethiopia one of the deteriorating effect of agricultural sector where 72% of population depend on is the fact that farmers depend only on fertilizer as a farm input, however, the amount applied is very low, and it is as low as up to 28kg per hectare despite the recommended 100kg per hectare. It is easy to infer that this is mainly the bottleneck for crop production and disrupts food availability. This Poor fertility of land, crop disease, rainfall variability, land degradation and climate change, poor farm technology and weak agricultural sector leads to low production of crops which in turn affect food availability.

Furthermore, expenditure related sociocultural and religious practices in one way and poor saving habit in other way exacerbates food security situation in the study area. People held extravagant social ceremonies and waste their time during peak agricultural period. The ceremonies take a significant amount of grain from the household; the majority of income for the ceremonies comes from selling crops and this in turn reduces food availability. In other ways the saving culture in the community is very poor; only insignificant percent of study population have a practice of saving. Household who saves cash or crop can use it during food shortage or cash constraint, saving may also create credit accessing opportunity, social interaction, farmers social networks and this further helps farmers to access information on farm technologies, business activities and farm technologies. The statistical tests revealed that households who have saving have better dietary energy than who do not have saving both in cash and kind.

5.2. Recommendations

Based on the conclusion drawn from the result of the study, the researcher suggests:

- Financial institutions and sectors to strengthen social based financial institutions in a way that addresses the large community/farmers and create a platform which helps farmers to get access to credit.
- The agricultural sectors should provide support for agricultural extension services, facilitate credit to fertilizer, provide fertilizer with affordable price and work on awareness creation on use of modern farm input and farming practices.
- Livestock resources sector should work on facilitating income generating activities from livestock; hence, preparing improved forages, facilitating market linkage for sell of dairy

products, provision of sufficient and affordable medicine timely to reduce loss of livestock due to animal disease.

- Industry enterprise and development offices, labour and social affairs offices and other stake holder offices should work on creating job opportunities and business activities; hence the sectors should organize unemployed youths on potential resources found in the *woreda*.
- Financial institutions should address rural communities, revise the time of credit provision and repayment period; hence repayment period should not be the time when farmers are nearly to finish available grain and food prices get low whereas livestock price gets high. To this regard, financial institution should also provide a follow up how farmers are using the credit as farmers may spend the money on unwanted duties and or practices in spite of its aim.
- Moreover, educational sector should invest on education, work on quality education, provide schools with necessary infrastructures, assign qualified workers on the area of education, and enhance adult literacy so that farmers can get opportunity to attend and this may boost farmers' knowledge on farming practices, use of farm technology and participate on different income earning activities.
- Furthermore, the community should reduce expenditure related to socio cultural and religious practices which leads to seasonal food shortage, adapt saving culture and enhance supporting helping each other in time of food shortage; hence, private lenders should reduce interest rate on providing credit where interest rate is 50%, strengthen local institutions and address all poor farmers.
- To this effect the government should facilitate and create a platform and establish community based financial institutions on behave of extension workers which could further helps the farmers to get all encompassing benefits (access to credit, agricultural information and technology utilization as well as other development agendas).

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Annex: I Household Questionnaire (English version)

Household questionnaire for MSc thesis, Addis Ababa University, Department of Food Security

Dear Sir,

My name is _____ I am Msc student from Addis Ababa University. Currently I am conducting my thesis on causes of seasonal food insecurity among rural farmers in WaraJarso woreda. You are among 220 randomly selected people to participate in the study. We will talk about your demographic characteristics, economic characteristics, crop production, fertilizer application, land management, livestock rising and other food security related issues. You are not obliged to participate, but your participation in this study will strongly help me to get insight in to causes of seasonal food insecurity in your woreda. Your response will be kept confidential; it will only be used for research purpose. Do you have any question? Are you volunteer to participate?

Part I: Demographic characteristics and economic activities

1. Household head.

Sex: M ☐ F ☐

Age _____

Educational level _____

2. Number of family member aged

i). 0-14 years old _____

ii) 15-64years old _____

iii) 65 and above years old _____

3. In addition to agriculture, have you got income from the following activities in the last 12 months?(November 2012- November 2012)

No	Activities	Response: 1. Yes 2. No	Av. annual income	Rank the three most important activities
A	Retail trade			
B	Wage employment			
C	Labour work			
D	Sale of charcoal			
E	Sale of wood and animal dung (kubet)			
G	Trade on crops			

H	Animal fattening			
I	Remittances			
J	Sale of eucalyptus tree			
K	Migration to other places for work			
L	Sale of dairy products (milk, butter...)			
M	Other (specify)_____			

4. How many days on average do you work on farm activities during typical months? _____, why don't you work on other days? Saint days ☐ holidays ☐ other, specify_____ -

5. Do you think that agricultural production is affected, because you missed the appropriate/peak time for harvesting or sowing? Yes ☐ No ☐

Part II: Productive resources ownership, agricultural production, use of modern technologies and sustainable land management

1. Number of livestock your household owns.

S.no	Household assets	Number	Current market price (if sold today)
1	Oxen		
2	Cows		
3	Heifers		
4	Goat		
5	Sheep		
6	Donkey		
7	Horse		
8	Chicken		

2. Have you rented out your farm ox in the last 12 months? (Qixira) Yes ☐ No ☐

3. If yes to no 2, what is the amount of money/or crops earned from renting out your oxen? _____

A). How Do you rate the quality of your lives tock in terms of bringing income for your household

4) Land ownership and land cultivation in 2012 harvesting season

Total land size owned _____ (ha)	Own cultivated in 2012 _____	Fallow _____	Pastureland _____	Crop yield in 2012(aggregated by crop types) _____
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	Land transaction	Size (ha)	Crop yield [cash/kind](aggregated by crop types)
1	Sharecropped in		
2	Rented in		
3	Share cropped out		
4	Rented out		

5. If any, why you rented out your land in the last 12 months (tick the boxes that apply)?

☐ Because of lack of farm oxen	☐ Because of lack of labour
☐ To buy food and other household expenses	☐ To repay a loan
☐ To buy fertilizer	Other specify _____
☐ To hold social ceremonies	

6. What happened to your agricultural production in 2012 harvesting period compared to production in previous years as a whole?

☐ Increased ☐ decreased ☐ the same other, specify

7. If any, is changes occurred due to the following reason?

Increased due to:	Responses 1.Yes 2.No	Decreased due to:	Responses 1.Yes 2.No
Increases in land size		Shortage of land size	
Increases in farm oxen		Shortage of farm oxen	
Increases in farm input		Reduced farm input	
Soil conservation		Land degradation	
Increase in soil fertility		Poor soil fertility	

8. Have you repeatedly cropped the same crop on the same land? Yes ☐ No ☐

9. If yes what happened on crop production of the land since you started cultivating the same crop?

☐ Decreased ☐ increased ☐ no change

10. How many times on average you plough your land for main crops such as teff?

11. Is there a decrease in the number of your land size over the last ten years due to the following reason? 1. Yes 2. No

		1.Yes 2. No			
1	I sold some of my land		4	Used for investment without compensation	
2	I shared it to my family		5	Used for investment with compensation	
3	Government have taken away from Me		6	Degraded and not functioning	
7	Other, specify				

12. Have you used the following farm inputs in 2012 farming season?

s.no	Inputs	Response 1. Yes 2 .No	Amount applied [kg/liters]	Costs in cash
1	Modern seed			
2	Fertilizer			
3	Herbicide			
4	Pesticide			
5	Others (specify)			

i) Have you contacted experts on how to apply those inputs? 1. Yes 2.No, if not why?

13. Is your crop yield reduced because of the following factors in 2012? 1 Yes 2 No

S.NO	Factors	1. Yes 2. No	S.No	Factors	1. YES 2. NO
1.	Shortage of rainfall		2.	Excessive rainfall	
3.	Hailstorm		4.	Pests	
5.	Shortage of fertilizer		6.	Lack of enough farm oxen	
7.	Lack of labour		8.	Poor soil fertility	

14. Do you use the following soil conservation mechanisms on your land? 1. Yes 2. No

	Activities				
1.	Terrace farming		2.	Crop rotation	
3.	Contour ploughing		4.	Reduce over Grazing	
5.	Windbreak		6.	Other _____	

15. Have you ever implemented the following sustainable land management (SLM) on your land?

Activities	Response 1 Yes 2. No	Land covered(ha)
Mass mobilization of stone bunds		
Spontaneous spread of stone bunds		
Other, specify _____		

16. Have you contacted experts on how and where to use SLM? Yes ☐ No ☐

17. Have you cropped the land on which SLM is implemented, in 2012 farming season? 1. Yes 2. No

18. Have your agricultural production increased since you applied SLM? 1. Yes 2. No

Part III: Social organizations, social ceremonies and access to credit

1. Have you held social ceremonies in the last 12 months? 1. Yes 2. No

If any, what are the sources of income for the ceremony (tick all that apply)	
☐ Sale of crops	☐ sale of livestock
☐ Income from off farm activities	☐ Credit
☐ Support from relatives	☐ rent out farm land

2. Have you faced food shortage because of expense for the ceremonies? 1. Yes 2. No

3. Are you a member of the following social organization in your locality? 1. Yes 2. No

	1. Yes 2. No	Services you obtained	Responses 1. Yes 2. No
Iddir		Credit service	
Ikub		Support upon incidents	
Other, specify _____		Support during crop failure	

Part IV: Food security, saving characteristics, coping strategies and Social support

1. Have you faced shortage of food in the last 12 months? 1. Yes 2. No

2. In which months did you face critical food shortage?

☐ January	☐ July
☐ February	☐ August
☐ March	☐ September
☐ April	☐ October
☐ May	☐ November
☐ June	☐ December

Have you engaged in the following activities to overcome the problem? 1. Yes 2. No

Engaged in off farm and or nonfarm activities		Received support from government or NGO	
Received support from relatives or friends		Received credit from microfinance institutes	
Received credit from private lenders		Send family members to relatives	
		Sell child's labour in exchange of money	

4. Do you or any household member have a saving account? 1. Yes 2. No

5. If yes to Q4, how much deposit do you have on your account?

6. Are there individuals in your community who provides support or credit in kind or in cash during food shortage? 1. Yes 2. No

7. Do you get access to credit if you want to? Yes ☐ No ☐

Part V: Coping strategies to shortage of foods

	Response 1. Yes 2. No
1. Have you eaten the food you do not want to eat because of shortage of food in the last 12 months?	
2. Have you reduced frequency of meal due to shortage of food in the last 12 months?	
3. Have you reduced size of meal in the last 12 months due to shortage of food?	
4. Have you sold farm ox or other livestock to buy food in the last 12 months?	
5. Have you taken payment in advance before harvesting season to work on others farm activities with low money because of food shortage	

The end!

Thank you!

Annex II. Household questionnaire (Afan Oromo version)

Gaafannoo maatii

Kutaa I. Haal maatii, diinagdee fi galii

1. Itti gaafatamaa maatii
 - i. saala _____
 - ii. Umrii _____
 - iii. Sadarkaa barumsaa _____
2. Maatii umriin isaanii
 - i. 0-14 _____
 - ii. 15-64 _____
 - iii. 65 fi isaa ol _____
3. Ji'oottan 12 darban keessatti hojii qonnaatiin alatti hojiiwwan armaan gadii kana irraa galii dabalataa argattanii beektuu?

No.	Hojiiwwan	Deebii 1. eeyyee 2. Lakkii	Galii argame giddu galeeessan	Hojiiwwan kana keessaa kan baay'ee faayidaa qaban sadi tarreessi
A.	Daldala qinxaaboo			
B.	Hojii mindaadhan			
C.	Hojii humnaa			
D.	Gurgurtaa cilee			
E.	Gurgurtaa qoraanii			
F.	Daldala midhaanii			
G.	Gabbisa loonii			
H.	Kennaa qarshii argachuu			
I.	Gurgurtaa muka baargamoo			
J.	Iddoo biraa godaananii hojjechuu			
K.	Gurgurtaa aannanii fi bu'aalee aannanii			
L.	Kanneen biroo _____			

4. Waqtii hojii muddaa ta'e keessa ji'atti hojii qonnaa guyyaa meeqa ni hojjetu? _____ guyyaan hin hojjenne yoo jiraate maaliif hin hojjenne? ☐ guyyaa qulqullootaa ☐ Sanbata/Ayyaana waan ta'eef kan biro _____

5. Guyyaa midhaan facaasuuf, haamuuf ykn dhayuuf mijataa ta'e waan hojjechuu dhiisteef oomishni waan si jalaa hir'ate sitti fakkaataa? Eeyyee ☐ Lakkii ☐

Kutaa II. Qabeenya loonii fi lafaa, oomisha midhaanii, fayyadama teeeknoloojii fi eegumsa lafaa

S.no	Household assets	Number	Osoo gurguramee meeqa ni bita?
------	------------------	--------	-----------------------------------

1	Qotiyyoota		
2	Saawwan		
3	Goromsa		
4	Hoolaa		
5	Re'ee		
6	Harree		
7	Farda		
8	Lukkuu		

2. Ji'oottan 12 darban kana keessatti qotiyyoo qonnaa qixira kennitee beektaa? ☐ Eeyyee ☐ Lakkii

3. Yoo eeyyee jette, qarshii/midhaan meeqan kennite? _____

Walumaa galatti sadarkaa beeyladdoota keessanii akkamitti ilaaltu?

4).Baay'ina lafaa (hect)_____	lafa bara 2012tti oomishame (Hect)_____	Kan lafa ba'e _____	Kan dheedichaa _____	Oomisha argame, gosa midhaaniin(2012) _____
-------------------------------	---	---------------------	----------------------	--

	Jijjiirraa lafaa	Baay'ina (hect.)	Oomisha/galii argame(2012)
1	Lafa hirtaadhan fudhattan		
2	Lafa kontiraatan fudhattan		
3	Lafa hirtaa kenname		
4	Lafa kontiraata kenname		

Midhaan bara 2012 boomishame kana keessaa irra caalatti kan nyaataaf oolu kami? _____

Midhaan nyaataaf oolu kana keessaa:

- Walumaagalatti kan argame(kan oomishame)_____kuntaalaan
- Kan gurgurame_____kuntaalaan
- Kan kennaa ykn liqiif namaa kenname_____kuntaalaan
- Kan liqii deebifame_____kuntaalaan
- Kan qisaasa'ee bade_____kuntaalaan
- Midhaan gosa kanaa yeroon itti bitte ni jiraa? 1. Eeyyee 2. Lakkii
- Kuntaala meeqa bitte? _____
- Kan sanyiif oole
- Kennaa argatteertaa? Meeqa?

5. Lafti kontiraata kennite yoo jiraate, maaliif kontiraata kennite? (Sababa kan jette hunda filadhu.)
☐ Qitiyyoo ga'aa waanan ☐ Nama ittiin qotu waan hin jijirreef

hin qabneef	
☐ Nyaata fi baasii biroof	☐ Liqii deebisuuf
☐ Xaa'oo bituuf	☐ Kan biroo
☐ Kabaja ayyaanaa, cidhaa fi kkf	

6. Baroota darbaniin walbira qabdee yoo ilaaltu oomishni kee kan bara 2012 maal ta'e?

☐ Ni hir'ate ☐ Ni dabale ☐ Garaagarummaa hin qabu

7. yoo jijjirramni jiraate sababii armaan gadii kanaafi jettee yaaddaa?

Sababoota dabaleef	1. eeyyee 2. lakkii	Sababoot hir'ateef	1.Eeyyee 2.lakkii
Lafa dabalataa qotuu		Hanqina lafaa	
Qotiyyooqonnaa dabaluu		Hanqina qotiyyoo	
Xaa'oo dabaluu		Hanqina xaa'oo	
Kunuunsa biyyee		Manca'uu lafaa fi biyyee	

8. Midhaan gosa tokko lafa tokkoratti irra deddeebidhaan facaaftee beektaa? ☐ Eeyyee ☐ lakkii

9. Deebiin gaaffi 8ffaa eeyyee yoo ta'e, oomishni laficharraa argamu maal ta'aa dhufe?

☐ Hir'achaa ☐ dabalaaa ☐ jijjiirrama hin qabu

10. Lafa tokko midhaan facaasuuf giddugaleessan yeroo meeqa ni qotta? _____

11. Waggoottan kurnan darban kanatti baay'inni lafa keetii sababoota armaan gadii kanaan hir'ateeraa? 1. Eeyyee 2. Lakkii					
1	Lafa waanan gurgureef		4	Investimantiidhaaf fudhatame(beenyadhaan)	
2	Maatii dhaaf qoodudhaan		5	Manca'ee bade	
3	Investimantiidhaaf fudhatame(beenyaaa malee)		6	Sababa biroo _____	

12. Bara oomishaa 2012tti galteewwan armaan gadii kana fayyadamteertaa? 1. Eeyyee 2. Lakkii

	Galtee	1. Eeyyee 2. Lakkii	Hamma(kg ykn Liitiriin)	Baasii
1	Sanyii filatamaa			
2	Xaa'oo			
3	Farra aramaa			
4	Farra ilbiisotaa			
5	Kanneen biro(ibsi)			

i).Galteewwan armaan olii kana fayyadamuun dura ogeessa mari'achiisteertaa? Eeyyee lakkii

Yoo hin mari'achiisne maaliif? _____

13. Bara oomisha 2012 tti sababoota armaan gadii kanaan oomishni kee hir'ateeraa?

Tart.	Sababoota	1. Eeyyee 2. Lakkii	Tart.	Sababoota	1.Eeyyee 2.lakkii
-------	-----------	------------------------	-------	-----------	----------------------

1	Hanqina roobaa		2	Baay'ina roobaa	
3	Cabbii		4	Ilbiisotaan	
5	Hanqina xaa'oo		6	Hanqina qotiyyoo qonnaa	
7	Hanqina humna nama hojjetuu		8	Hanqina gabbina biyyee	
8	Sabab biroo(ibsi)				

14. Maloota kunuunsa biyyee armaan gadii kana ni fayyadamtaa?					
Lakk	Maloota	1.Eeyyee 2.lakkii	Lakk	Maloota	1.Eeyyee 2.lakkii
1	Boo'an qotuu		4	Waljijjiiruun facaasuu	
2	Dalga qotuu		5	Dheedicha hir'isuu	
3	Muka dhaabuu		6	Kan biro	

15. Maloota eegumsa lafaa itti fufiinsa qabu armaan gadii kana fayadamtee beektaa?		
	1. eeyyee 2. lakkii	Bal'ina lafaa irratti hojjetame
Gareedhan ta'anii dallaa dhakaadhan ijaaruu		
Dhuunfadhaan dallaa dhakaadhan ijaaruu		
Kan biro		

16. Maloota armaan olii kana yeroo fayyadamtu ogeessa mari'achiistee beektaa? 1. Eeyyee 2. Lakkii

17. Erga maloota kunuunsa lafaa kana hijiirra oolchitee midhaan irratti oomishtee beektaa?

1. Eeyyee 2.Lakkii

18. Yoo deebiin gaaffii 17ffaaf eeyyee jette oomishni kee dabaleeraa? 1. Eeyyee 2. Lakkii

Kutaa III. Dhaabbilee hawaasaa, qusannoo fi tajaajila liqii

1. Ji'oottan 12 darban kana keessatti jila/sirna godhattee beektaa? 1. Eeyyee 2. lakkii

Yoo godhatteetta ta'e maddi baasii maalfaa ture(madda baasii kan ta'e mallattoo ' / irra kaa'i).	
☐ Galii Midhaan gurguruu irraa argamu	☐ Galii gurgurtaa loonii irraa argamu
☐ Galii hojii qonnaan ala argamu	☐ Liqii
☐ Deeggarsa fira irraa argamu	☐ Lafa kireessuu irraa argamu

i).Sababa sagantaa sanaaf baasii baasteen hanqinni nyaataa isin mudateeraa?

1. Eeyyee 2. Lakkii

2. Naannoo keessanitti waldaalee hawaasaa armaan gadii kana keessatti miseensummaa ni qabdaa?			
	1.Eeyyee 2.Lakkii	Tajaajila armaan gadii argattee beektaa?	1.Eeyyee 2.Lakkii
Iddirii		Liqii	
Uqqubii		Deeggarsa yeroo rakkoo	
Kan biro(ibsi)		Deeggarsa yeroo oomishni gadi bu'e	

Kutaa IV: Wabii nyaataa, qusannoo, aadaa walgargaaruu fi maloota hanqina nyaataa ittiin furan

1. Ji'oottan 12 darban keessatti hanqinni nyaataa si mudatee beekaa? 1. Eeyyee 2. Lakkii

2. Yoo si mudateera ta'e ji'oota kam keessa?			
Ji'oota	1.eeyyee 2. lakkii	Ji'oota	1.eeyyee 2.lakkii
Fulbaana		Bitootessa	
Onkololeessa		Eebla	
Sadaasa		Caamsaa	
Mudde		Waxabajjii	
Amajjii		Adoolessa	
Gurraadhala		Hagaya	

3.Hanqina nyaataa furuuf hojiiwwan armaan gadii kana raawwateetaa?			
	1.eeyyee 2.lakkii		1.eeyyee 2.Lakkii
Hojiiwwan dabalataa hojichuu		Deeggarsa mootumaa ykn miti mootummaa	
Deeggarsa fudhachuu		Liqii dhaabbilee maayikiroo fiyyinaansii irraa fudhachuuu	
Namoota dhuunfaa irraa liqii fudhachuu		Ijoollee firatti galchuu	
		Ijoollee gandatti (tiksee) galchuu	

4. Mana keessan keessaa namni dabtara qusannoo qabu jiraa? 1. Eeyyee 2. Lakkii

5. Yoo jiraate qarshii meeqa qusannoo irraa qabdu? _____

6. Hawaasa keessan keessa namni yeroo rakkoo liqii namaaf kennu ykn deeggarsa namaaf godhu ni jiraa?
1. Eeyyee 2. Lakkii

7. Amma osoo si barbaachisee qarshii liqii argachuu ni dandeessaa? 1. Eeyyee 2. Lakkii

Kutaa v: Maloota ittiin hanqina nyaataa furan

		1. Eeyyee 2. 2. lakkii
1	Ati ykn miseensi maatii kan biraa ji'oottan 12 darban keessatti, sababa hanqina nyaataan nyaata nyaachuu hin feene ntaattee beektaa	
2	Ati ykn miseensi maatii kan biraa ji'oottan 12 darban keessatti hamma nyaataa nyaachuu qabdu hir'isteertaa?	
3	Ati ykn miseensi maatii kan biraa ji'oottan 12 darban keessatti irra deddeebidhaan nyaachuu hiri'isteertaa?	
4	Ati ykn miseensi maatii kan biraa ji'oottan 12 darban keessatti midhaan bituuf jettee loon gurgurteetaa?	
5	Ati ykn miseensi maatii kan biraaji'oottan 12 darban keessatti yeroo hanqinni nyaataa si mudatu hojii humnaa gatii salphaadhan hojichuuf qarshii dursitee fudhatteetaa(osoo yeroon hojii hin ga'iin)? fkn bona midhaan haamuuf qarshii ganna fudhachuu	
6	Ati ykn miseensi maatii kan biraa ji'oottan 12 darban keessatti midhaan bituuf jecha liqii fudhateertaa	

Xumureera!

Galatoomaa!

Annex III: Guideline questions for key informant interviews and FGDs

1. Job creation and food security offices

1. What are job opportunities in this locality? How do you evaluate job opportunities to reduce seasonal food shortage in this locality?
2. Why do you think people in this locality face seasonal shortage of food? **Probe.** Low Agricultural production, shortage of rain, lack of alternative job opportunities/income, poor saving,
3. What does your office do to ensure food security for rural farmers? **Probe.** Provide Food aid, consult on saving, create job opportunities, building household asset.....

2. Agricultural development offices

1. Why do you think people in your locality face seasonal food shortage? **Probe.** Low agricultural production due to Low application of fertilizer, land degradation, climate change, shortage of rain, excessive rain, lack of alternative income
2. Do you provide fertilizer on time for the farmers? Is there a time when farmers wait for a long time to get fertilizer? Do you think farmers agricultural production is affected because of your delay? Do you give advice on how to use fertilizer?
3. Do you provide credit if farmers lack enough money to buy fertilizer? Do you need collateral for the credit? What type of collateral?
4. What are the factors that hinder farmers to apply enough fertilizer on their farm? **Probe.** Lack of income/cash to buy fertilizer, lack of asset to provide as collateral to get credit, fear of debt...
5. How do you evaluate agricultural production in this locality? Do you think it is reduced due to low application of fertilizer? Do you enhance alternative options for farmers natural fertilizer such as compost, animal dung,...etc to help farmers
6. Do you provide modern seed for the farmers? How do you provide it? For all farmers, for model farmers, to the shop so that farmers can buy.....
7. Is there irrigation in your woreda? What type of crops is cultivated using irrigation? How many times per year farmers harvest using irrigation?

3. Industry and enterprise development office

1. What does your office do to reduce unemployment? What do you think are the causes of seasonal food insecurity in this locality?
2. What type of job opportunities are there in this locality?

3. Do you establish enterprise every year? How many enterprises are established in 2020? Are there groups who are not given job so far? What hinders your office to establish enterprises?

4. Disaster risk prevention and management office

1. What are the disasters that lead to seasonal food insecurity in this locality? Is crop loss or crop reduction a problem in this locality? What are the main causes of crop loss? What brings crop loss? Probe... Crop loss due to Land slide, pests, land degradation, hailstorms, rusts, flood, drought, eaten by animals,

2. How many people were expected to be food insecure in the last 12 months? What were the causes of food insecurity? In which months do people in this locality face food shortage?

3. Do you forecast the upcoming disaster and mobilize community to prepare early before disaster happens or reduce adverse effects?

6. Rural Land management officer

1. Why do you think people in your locality face seasonal food shortage?

2. What is the land proportion to farmers in your locality? Do you think it is enough to produce enough grain for the household?

3. Do rural lands used properly in your locality? **Probe...**degraded, covered with unused bushes, converted to stone and rock.

4. How do you evaluate the fertility of land in this locality?

5. Does your office work with farmers on sustainable land management? What types of sustainable land management do you practice? **Probe...** Mass mobilization of stone bunds, spontaneous spread of stone bunds....

7. Livestock Resource office

1. How do you evaluate contribution of livestock in reducing seasonal food shortage in this locality?

2. To what extent do people in your locality use livestock or their products to reduce seasonal food insecurity? **Probe..**, cattle fattening, work on dairy products..., is there market linkage for farmers to sell dairy products?

3. What does your office mainly do to help farmers benefitted from their livestock?

4. Is there apiculture in this locality? If yes to what extent it helps to reduce seasonal food insecurity?

5. How do you rate the extension services your office is providing? Challenges, opportunities

Questionnaires for focus group discussion

A). Women groups

1. What are the causes of seasonal food insecurity in your locality? **Probe..**, Low production, small land size, lack of household asset, lack of credit, poor saving
2. Do women in your locality have group or individual saving account? Do you support each other in times of food shortage? What type of support do you provide for poor family during crop failure?
3. What do you think is the role of women in reducing seasonal food insecurity?

B). Model farmers

1. Why do you think farmers face shortage of food during summer season?
2. Do farmers in your locality help each other during shortage of food? Are there private lenders in your locality? Do you yourself lend money or grain for poor farmers? What do private lenders ask to lend money? Probe, Collateral, eyewitness...
3. What do your community support each other during crop failure? Do you get fertilizer on time before the time for cultivation is run out?
4. As model farmers, have you ever implemented sustainable land management activities on your land? What type of land management? Mass mobilization of stone bunds, spontaneous spread of stone bunds.....

C). Leaders of social organization

1. What type of organization are you leading? What does your organization work for the community? Probe... credit service; provide support during crop failure or other incidents
2. What are the criteria to be a member of your organization? Are there individuals left behind even though they want to be the member? What hinders them to be a member of your organization? Are they marginalized to get credit or support from your organization because they are not a member?
3. What types of social works does your organization do?
4. Do you provide credit services? What are your criteria to give credit?
5. Do you think social ceremonies are a source of extravagancy in your community?

6

Secondary data

1. How many youths are entered into work force in 2020? **Probe.** What type of work, permanent, temporary, wage employment, daily laborer on agriculture..., BoLSA
2. How many farmers have taken fertilizer in 2020? What proportions of the farmers have applied enough and recommended amount and type of fertilizer?

3. How many youths are involved in enterprise and started work in 2012? How many of enterprises are graduated in the last five years? How many enterprises are entered in to other jobs since they are graduated?
4. Average land size per household-----**Rural land development**
5. Average number of livestock per household-----**Agricultural development office**
6. Total land size, types of crops cultivated in the woreda, population size
7. Number of irrigation sites, if any