JIMMA UNIVERSITY

COLLEGE OF SOCIAL SCIENCES AND HUMANITIES

DEPARTMENT OF GEOGRAPHY AND ENVIRONMENTAL STUDIES

DETERMINANTS OF RURAL HOUSEHOLDS' FOOD SECURITY IN BANJA WOREDA, AWI ZONE, AMHARA REGIONAL STATE, ETHIOPIA

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A **THESIS** SUBMITTED TO THE DEPARTMENT OF GEOGRAPHY AND ENVIRONMENTAL STUDIES IN PARTIAL FULFILLMENT OF THE DEGREE OF MA ART IN GEOGRAPHY AND ENVIRONMENTAL STUDIES

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The thesis entitled "Determinants of rural households' food security in Banja Woreda; Awl zone." By Taddele Shiferaw is approved for the degree of Master of Arts in Geography and Environmental studies.

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Declaration

I undersigned and declare that the thesis entitled ‘Determinants of rural households’ food security in Banjia Woreda, Awl zone is my own work. I have duly acknowledged and referenced all materials used in this work. I understand that non-adherence to the principles of academic honesty and integrity misrepresentation/ fabrication of any idea /data/source will constitute sufficient ground for disciplinary action by the University.

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This thesis entitled Determinants on the determinants of rural households’ food security in Banja Woreda has been submitted for examination with my approval as a research advisor.

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ABSTRACTION

Food security gap is a growing concern at regional, national and local levels of Ethiopia. This study was conduct on the determinants of rural households' food security in Banja Woreda, Awi Zone. The objective of this study was to investigate the determinants of rural households' food security of Banjia Woreda, Awi Zone. In order to achieve this objective, demographic and socio-economic data were collect from 150 randomly selected farm households in the selected two Kebeles of Banja Woreda namely Janguta-kuwancha and Asera-Basa. Systematic sampling method was employ to select the sampling units. Cross-sectional household survey was conduct to collect the primary data from the sampled farmers in the study areas through administering a structured questionnaire to rural households to gather qualitative and quantitative data pertaining to household demographic characteristics and related issues about the farm household in a specific period. And also a secondary data were conduct from books, journals, and internet sources. The data analysis techniques involved both description and Binary logistic regression. The results of the study revealed that 37.3% of rural households in the study area were food secure and 37.3% were food insecure. The Household Food Insecurity Access Scale (HFIAS) shows that HH cannot cover the required daily food from the production generated from their agriculture as well as other activities. Households with large family size, households who cannot read and write and old household heads are more likely to be food insecure than their counter parties. Similarly low land size, poor, a few number of livestock, low access to credit service; high-interest rates as well as the short-term and fixed repayment periods are significantly associated with food insecurity. Finally, promoting income-generating activities, enhancing the micro-financing efficiency, initiating family planning activity, strength of farm and on-farm diversification enhance food security. These food insecure households could not cover the required daily food from the income generated of their major activity of subsistence agriculture and non-farm activities both in quality and quantity. The government should give Proper attention to increase food production and productivity through better access to credit service and improve agricultural technology inputs such as livestock management practices, improved crop varieties practices, and diversification of farm products with value addition.

***Key words**: Agricultural technologies, Determinants, Economic resources, Food security, Institutional factors*

List of Abbreviation

FAO	Food and Agriculture Organization
FDRE FSS	the Federal Democratic Republic of Ethiopia Food Security Strategy
IFRC	the International Federation of Red Cross and Red Crescent Societies
UNICEF	the United Nations International Children' Emergency Fund
WHO	World Health Organization
GDP	Gross Domestic Product
GNP	Gross National Product
ICRA	the International Conference on Robotics and Automation
MRA	Minimum Recommended Allowance
HIV/AIDS	Human Immuno Virus/Acquired Immuno Deficiency Syndrome
PSNP	Productive Safety Net Programme
SPSS	the Statistical Package for Social Science
PPS	Proportional Size
AIC	American Institute Conservation
DFID	Department for International Development
BWARDO	BanjaWoreda Agriculture and Rural Development office
HFIAS	Household Food Insecurity Access Scale
HH	Household
a.s.l	above sea level
km	kilometer
ha	hectare
EHRD	Ethiopia Humanitarian Requirements Document
WFP	World Food Program
SSA	Sub Saharan Africa
CSA	Central Statistics Authority
FGD	focus group discussion
OFI	of farm income

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CHAPTER ONE

1 INTRODUCTION

1.1. Background of the Study

Food security is a growing concern worldwide. According to the 2010 state of food insecurity report of the United Nation's food and Agriculture Organization (FAO), nearly one billion people are estimated to under nourished, of which developing nations account for 98%.

In particular, since the 2008 food price crisis, food security has a key issue for many poor countries. Ethiopia is among the poorest and most food insecure countries of the world where 44% of its population live below the national poverty and 46% of its population get below the minimum levels of dietary energy consumption compared with other sub-Saharan and developing countries (World Bank, 2005). In terms of food security problem, Ethiopia is one of the top four African countries that constitute more than one third of their populations are under nutritioned in 2014. As a result, About 33 million or 35% of the populations are food insecure, which is far below the SSA average of 23.5% (FAO, 2014). Amhara region, which represents more than 27% of the national population, is one of the regions of Ethiopia suffered from food shortage every year. Most of the region's areas are incorporated under safety net program in order to rehabilitate the farmers' living standard and alleviate their food insecurity problems. However, the region is still characterized by the persistence of food security problems and the need for better intervention. According to the Household Consumption & Expenditure survey (HCES) carried out in 2011, the proportions of households who are food insecure are about 42.5% in Amhara region, much higher than the national average, which is only 33.6 %. The region ranked the highest in the country in terms of food poverty. Food insecurity is relatively higher in rural areas, with about 44.6% and 28% of household's food insecure in rural and urban areas, respectively (MoFED; 2012). These all implies that food insecurity is still the persistent problem in the region even after the country has shown economic progress.

Most small-scale farmers in Ethiopia derive their livelihoods depend on by mixed agriculture. Their Cultivation is depending on rain-fed, small-scale and using traditional methods. These farmers use limited farm inputs to improve productivity. Hence, production per household

remains low. Population growth is faster than improvements in agricultural production. Poverty and food insecurity is a reality in rural Ethiopia (World Bank, 2015).

The total food production by the farmers today is not even sufficient to feed the agricultural population. Most farmers lack access to sufficient and nutritious food even in the presence of shocks.Although production and food availability at the national level have increased substantially during the last two decades (Gregory, 2013).

Population pressure has become a factor in accelerating food insecurity in situations where: all accessible land is fully under cultivation; failure to improve upon the old methods of cultivation; and opportunity for alternatives employment is absent (Brehanu, 2001).In Ethiopian case population growth is increasing at the rapid rate now it is estimated at over 80 million (WHO, 2008). At current rates, the population is estimated to grow to 118 million by 2025, and to 170 million by 2050, however, food production shows little increase (Ararso et al., 2009). So in Ethiopian case since much of the Ethiopians livelihood is depending on agriculture and until people shift from agriculture to other sectors of the economy for their livelihood, population pressure on agricultural land can be cause of food insecurity in Ethiopia (Vadala, 2009).

A study made in southern Ethiopia by Dagnew, E. (1997) indicates that "the livelihood of rural people in general and household food security in particular are dependent on the ownership of key productive factors including farm, animals, breeding cattle, family labor, farm implements, and small livestock. He argues that the level of ownership of particular productive assets such as draught, oxen, breeding cattle and farmland size determine the seasonal or annual production and income of rural households". More land size holding means more cultivation and more possibility of production which in turn increases farm income and improves food security (Tesfaye, 2003). According to Adugna (2008) conducted his study in Boloso Sore district wolayita zone, shortage of oxen, lack of farm input and land shortage are the most influential causes of food insecurity. Similarly according to Amsalu et al.,(2012) study done in shashemene district oromia region showed that total cultivated land , total annual farm income per adult equivalent, total off farm income, and livestock size have positive and significant relationship with food security.

According to the study conducted by McBriarty (2011), in all his study areas of rural Ethiopia, it is not socially acceptable for women to plough. This is a major constraint to preparing fields for planting on time for the season. Single women therefore had to resort to begging neighbors and waiting until everyone else has finished their ploughing, otherwise they must pay someone to do it for them. Tsegaye (2009) reviewed that Socio-cultural events such as eating habit and food preference, cultural ceremonies and festivals also influence the food security status of the given communities and way of saving or expenditure, also directly or indirectly affects the food security situation of that particular community.

1.2. Statement of the Problem

Though Ethiopia has abundant natural resources, most of its socioeconomic indicators are extremely low. In Ethiopia food shortage has aggravated the already poor economy of the country. Both chronic and transitory problems of food insecurity are widespread and severe in mainly in the rural areas of the country (Federal Democratic Republic of Ethiopia2002).

The majority (90%) of the poor in the country are relied on agriculture, mainly on crop and livestock production for their livelihoods (CSA, 2009). Despite the importance and potential in economic growth, agriculture in Ethiopia has performed poorly. The low productivity of agriculture in Ethiopia makes the farmers subsistent with little surplus which lead them to be low in their income; then to prevalence and persistence of poverty. Despite reduction in food poverty, the scale of food insecurity and malnutrition in Ethiopia remains serious (WFP, 2011). According to Bogale and Shimelis, (2009); Zegeye and Hussien, (2011), Ethiopia receives more food aid than other countries in the world.

However, a lot of studies conducted so far in the field give more emphasis to the rural area of the country. According to (WFP and CSA, 2014), 72.9% of the populations of Ethiopia lived on less than US$2 per day, 27.50% consumed inadequate calories, and 23.6% of children under five are underweight and 40% of HHs were food insecure and undernourished.

Ethiopian agriculture appears to be locked into a downward spiral of low and declining productivity, caused by an adverse combination of agro climatic, demographic, economic and institutional constraints, trends and shocks (Mekonnen, 2000). Rapid population growth (almost 3% per annum) is associated with steadily falling landholdings and per capita food production.

Between 1960 and 1990 the population doubled from 23 to 48 million, while per capita landholding shrunk from 0.28 to 0.10 hectare, and per capita food output collapsed by 41% from 240 to 142 kg .As landholdings have declined, farmers allocate smaller proportions of their fields to non-cereal crops, which provide essential dietary diversity and cash incomes. Cereal yields have virtually stagnated, rising by only 0.5% per annum between 1980 and 1996 - from 1.19 to 1.26 tons per hectare - not fast enough to compensate for falling farm sizes (Befekadu and Berhanu 2000:160).

Teshome (2010) measures the proportion of household who are food insecure in nine district of the Amhara region. Similar analysis have been undertaken by Arega B. (2012), Lay Gaint using sample survey units and indicated that around 80% of the sampled households were food insecure. Food insecurity assessments in the Region have traditionally focused on rural areas. Nevertheless, the rural increase of food price has put challenges on and increases food insecurity in urban areas. This further driven by rising unemployment and cost of living, low asset ownership, high dependency ratio.

The extent of food insecurity problem differs from place to place and in accordance to the social position and actual life conditions. Therefore, this study was attempts to fill this specific gap by studying determinants of rural house hold food security in Banja woreda. So that research undertaking in area of determinants food security was essential since the results may give spot light to development planners in order to combat its problem at the rural level.

1.3. Objectives of the Study

1.3.1 General objective

The general objective of this study was to investigate the determinant factors of rural households' food security of Banja Woreda, Awi Zone.

1.3.2. The specific objectives

In line with the above general objective, this study focused on the following specific objectives:

- To examine the relationships between socio demographic variables and food security.
- To analyze the current status of food security among the rural house hold in the study area,
- To examine the factors that influence households' food security status in the study area.

1.4. Significance of the study

The findings of this study would provide determinants food security in the rural household. Identifying and understanding factors that affect food security, afford information for policy makers, planners, governmental and nongovernmental organizations which are working in the areas of food security program in order to modify and re-plan food security program interventions and take measurements on causes of food security determinants. In addition, it indicates gaps to be filled by further studies.

1.5. Delimitation of the Study

The study focus on identifying factors that are expected to influence households' food security in rural parts of Banja Woreda , where it comprises 26 rural kebeles. From thus, the 26 rural kebeles two crop producing rural kebeles were the target population .This study would concentrate on factors that influence food security status of rural households' for the reasons of that identify the overall economic production, to describe food security situation, determinants food security in the woreda and to enhance food security.

1.6. Limitations of the study

The study focus on identifying the factors that were expected to influence households' food security in rural parts of Banja Woreda. Due to lack of database, the study cannot incorporate some of the important influencing factors such as climate and weather (rainfall, temperature); topography; natural and objectives of the paper, significance, scope and limitations of the paper. The second chapter deals with literatures reviewed from various sources. The third chapter provides about the research methodology with background information about the Woreda and the study Kebeles, the type of research design used the sampling techniques, the data collection methods and also data analysis. Chapter four consists of the major research findings and discussions and chapter five consists of conclusion and recommendations.disasters and ecological conditions.

The paper did not make a comparative analysis of food security problem between urban and rural kebeles; due to urban and rural woredas administration difference. The study is concerned about food security faced by rural part households' in Banja woreda.

In determining the available calorie by the household head, the study used cereal products only and it did not include other products which may be consumed by the households in the year

under study. This means the aggregate production (yield) consists of cereal output of the household.

1.7. Organization of the paper

This paper is organized into six chapters. The first chapter comprises the introduction of the research consisting of the background of the study, statement of the problem, research questions, research objectives of the paper, significance, definition of terms, scope and limitations of the paper. The second chapter deals with literatures reviewed from various sources. The third chapter provides about the research methodology with background information about the Woreda and the study Kebeles, the type of research design used the sampling techniques, the data collection methods and also data analysis. Chapter four consists of the major research findings and discussions and chapter five consists of conclusion and recommendations.

CHAPTER TWO

2. REVIEW OF RELATED LITRIETURE

2.1. The concept of food security

The term food security originated in international development literature in the 1960s and 1970.At that time the conventional wisdom was that food insecurity was conceived primarily as a supply issue at an aggregate level because of the significant shortfalls in food supply and high food prices in the world market in the early 1970s. However, despite the favorable supply conditions and low food prices after mid 1970s, the incidence of food insecurity remained high in many developing countries (Sijm, 1997). This anomaly of widespread food insecurity amid a world of surpluses stimulated the analysis of the nature and causes of food insecurity.

In the early 1980s, however, a paradigm shift occurred in the field of food security following Sen's (1981) claims that food insecurity is more of a demand concern, affecting the poor access to food, than a supply concern, affecting availability of food at the national level. Since then, accepted wisdom has defined food insecurity as being primarily a problem of access to food. At the same time, the unit of analysis shifted from the global and national level to the household and individual level. Overtime a large number of different definitions have been proposed. A report by Maxwell and Frankenberger's (1992) lists 194 different studies on the concepts and definition of food security and 172 studies on indicators. There are approximately 200 definitions and 450 indicators of food security (Hoddinott, 1999)

Several studies have explored the similarities among definitions of food security to identify its fundamental components. According to the World Bank report, the conventional food security is defined as "access by all people at all times to enough food for an active and healthy life" (World Bank, 1986). This indicates that the cause of food insecurity could be other factors such as a loss of endowments, unemployment, a fall in wages or unfavorable shift in the terms of trade of food in exchange for assets. This consideration enabled to move a step forward in entailing not only food availability (adequate supply of food) but also food access through home production, purchase in the market or food transfer cited **(**Alem.S. 2007**)**.

In 1996, the World Food Summit held in Rome declared and broadly set the definition of food security as "all people at all times have physical and economic access to sufficient, safe and

nutritious foods to meet their dietary needs and food preferences for an active and health life". Although there were agreements on some aspects of food security, controversies also existed. These include: relative importance of supply (food availability) versus demand (food access) variables in causing and solving food insecurity, the right indicators to measure food security, the impact of policy interventions on food security in the recent past, and the lessons or policy implications for the near future to reduce the extent of food insecurity (Alem.S. 2007**)**.

Based on temporal dimension, two types of household food insecurity can be distinguished as chronic and transitory. Chronic (permanent) food insecurity is a continuously inadequate diet resulting from lack of resources to produce or acquire food, while transitory food insecurity is a temporary decline in the household to access enough food (World Bank, 1986; Reutlinger, 1987). A household is said to be food insecure when its consumption (available food) falls below the daily standard Minimum Recommended Allowance (MRA) of caloric intake for an individual to be active and healthy. The worst form of transitory food insecurity is famine. Hence, this study is concerned with a transitory food insecurity faced by farm households of any magnitude ranging from mild to severe. In this study, the concepts of transitory food insecurity and seasonal food shortage are synonymous and will be used interchangeably.

2.2. Household Food security

The literature review on determinants of household food security for this study is structured under two sections. The first section presented some of the cases of food security problem documented in some developing countries. The second part summarized some of the previous studies conducted concerning food shortages and famines experienced in Ethiopia over the recent past decades.

2.3. Food Shortage in developing Countries

The major challenge to food security in Africa is the underdeveloped and underperforming agricultural sector that is characterized by over-reliance on primary agriculture, low fertility soils, ecological degradation, significant food crop loss both pre- and post-harvest, low levels of education, social and gender inequality, poor health status, cultural insensitivity, natural disasters, minimal value addition and product differentiation and inadequate food shortage of preservation that result in significant commodity price fluctuation (Mwaniki, 2005). All factors,

however, can be related in some fashion to two basic causes: insufficient national food availability and access to food by households and individuals.

Many factors have also contributed to this tendency including the high prevalence of HIV/AIDS; an overall decline in farm input investment including fertilizers, seeds, and technology adoption. Access to fertilizer use is constrained by market liberalization and trade policies that increase fertilizer prices relative to commodity prices, limited access to markets and infrastructure, limited development of output, input and credit markets, poverty and cash constraints that limit farmer's ability to purchase fertilizer and other inputs (Kherallah et al, 2002). Other causes include: limited access to agriculture-related technical assistance, and lack of knowledge about profitable soil fertility management practices leading to expansion into less-favorable lands. A significant amount of the food is lost through pre- and post-harvest losses. While food availability is still a problem for some countries, the root cause of food insecurity in developing countries today is believed to be the inability of people to gain access to food due to poverty (Von Braun et al, 1994). According to Bonnard, P. (1999), much of the sub-Saharan African population, particularly in rural areas, experiences some degree of hunger over the rain or "hungry" season, when food stocks dwindle and roads become muddy and impossible. Grain was short during the planting season and the problem was largely attributed to poor allocation of resources and poor rationing.

The Region of the Horn of Africa includes (Ethiopia, Djibouti, Eritrea, Kenya, Somalia, Sudan and Uganda and is the poorest region on the continent. More than 40 per cent of the population of over 160 million is living in areas prone to extreme food shortages (FAO, 2011). Poverty and food insecurity in Ethiopia are mainly caused by poor performances of agriculture; and by poor policy and non-policy factors. Dependence on undiversified livelihood and low input/output and low technological base resulted in challenge to ensure food security (Demeke, et.al, 1995). Ethiopian farmers do not produce enough food, even in good rain fall years, to meet their consumption needs. Besides policies that focus on agricultural intensification, agriculture has misguided due to fragile natural resource base and climatic uncertainty. Inflexible land tenure is also one among the variety of issues which perpetuate challenges to ensure food security (Devereux, 2000).

Sub-Saharan Africa is the poorest region in the world (Chauvin, et. al. 2012). It has the highest share of food-insecure people, with 31.7% of the population (301 million people) food insecure in 2017. In sub-Saharan Africa (SSA), production on smallholder farms is critical to the food security of the rural poor (Herrero, et al., 2010) and contributes the majority of food production at the national level. National policies and local interventions have profound impacts on the opportunities and constraints that affect smallholders. However, policy frame works that aim to improve food security and rural livelihoods in the developing world face many uncertainties and often fail (Ericksen, et. al., 2009). Nearly 240 million people in sub-Saharan Africa or one person in every four, lack adequate food for a healthy and active life, and record/high food prices and drought are pushing more people into poverty and hunger (FAO, 2010).

Study by Alarcon et al (1993) for smallholder farm households in west highland of Guatemala found that lack of access to credit and cash crop production displace food crops and household consumption of own production is reduced. Thus the household's vulnerability to food insecurity tends to increase. Mucavele (2001) suggested that the main factors that affect food security in urban Maputo, Mozambique are poverty, low family income, low availability of general alimentation at the family level, family crisis, high unemployment levels and low levels of schooling and training and the absence of a social security system to alleviate the rural shocks.

2.4. Food security status in Ethiopia

As stated above, the situation in Ethiopia is not much different from the conditions in other developing regions. The food security situation in Ethiopia has been extremely unstable due to the combination of environmental, socio-political and developmental instabilities. Lack of food in the household imposes inordinate strains on the daily burdens of its members. Coping mechanisms have been eroded in many households due to significant depletion of assets and displacement (Haile et al, 2005a). More than 41% of Ethiopian people lives below poverty line and above 31 million were undernourished.

Using the threshold 2,550 (Kcal) per adult equivalent per day, 40% of Ethiopian households, out of which the majority reside in rural areas of the country, were food insecure and undernourished. Food insecurity is an enduring, critical challenge in Ethiopia which is Africa's second populous country after Nigeria, where over 80 percent of Ethiopian live in rural areas and

heavily depend on rain-fed agriculture that extremely vulnerable to weather changes (Andersson, et. al., 2009).

Although food insecurity as problem at national level was first felt in Ethiopia in 1960s, it only started "influencing" policy in the 1980s when food self-sufficiency became one of the objectives of the Ten-Year Perspective Plan that took place after the 1983/84 drought and famine, which claimed millions of lives (Haile et al, 2005b). Since then proper "transitory food insecurity" has received little considerations despite its prevalence even in "normal years" as well as in "high potential" and "surplus areas". The National Policy on Disaster Prevention and Management of 1992/93 emphasized the need to give priority to disaster prevention programs in all development endeavors.

The Federal Food Security Strategy (FDRE FSS, 1996 updated in 2002) rested on three pillars: increasing supply and availability of food, improving access and entitlement to food and strengthening emergency response capabilities. The New Coalition for Food and Livelihood Security in Ethiopia adopted in 2004 aimed at improving access to long-term food and livelihood security for chronically and seasonally food insecure citizens through its various food security programs.

Wilma.L. (2003) used a logistic regression model to predict seasonal household food insecurity. According to their findings, the probability of a household being seasonally food insecure decreased, when the household has a vehicle, has many types of appliances, their toilet facility is water-sealed, has more bed rooms, the mother is employed and the educational attainment of the mother is high. Ramakrishna et al (2002) made an assessment on food insecurity situation in North Wello Zone of Ethiopia. A food balance sheet was constructed and food security causation was examined using a binary logistic regression model. Accordingly, cereal production, educational status of the household head, fertilizer consumption, household size, land size, and livestock were found to be the most determining factors of household food security. Along with food availability and entitlement factors, the study suggested that attitudinal variables also influence food insecurity.

According to Negash (2000) study in Meket, Habru and GubalaftoWoredas of North Wello Zone, 30%, 21% and 40% of the sample households, respectively, were unable to satisfy the

food demand of their family for more than five months in a year. Based on an empirical study in Northern Shewa, Amare (1999) argued that the seasonality of agriculture introduced fluctuations in the income, expenditure, and nutritional patterns of peasant households. He further stated, the coincidence of diminishing grain supplies and increasing grain prices was a liability for the economic status and food security of households.

A study by Kidane et al (2005) reported the causes of household food insecurity in Koredegaga peasant association, Oromia Zone. The study showed the determinants of households' food insecurity using a logistic regression procedure. As a result, farm land size, ox ownership, fertilizer application, education level of household heads, household size, and per capita production were found to be significant predictors. The analysis of partial effects revealed that an introduction to fertilizer use and an improvement in the educational level of household head resulted in higher changes in the probably of food security. Simulations conducted on the basis of the reference category of farmers, representing food secure households, revealed that both educational levels of household heads and fertilizer applications by farmers have relatively high potential to more than double the number of food secure households.

World Food Programme stated (2009) that the common factors that cause household food-insecurity in rural areas of the country are: household size, age of household, sex of household head, marital status of household, education level of household, dependency ratio, access to credit, ownership of saving account, total income per adult equivalent, expenditure level, asset possession, access to social services, owner of home garden, access to subsidized food, sources of food, availability of food commodities, and supply of food commodities. Shiferaw et al. (2003) found technological adoption, farming system, farm size, and land quality are supply-side factors and Household size, per capita aggregate production, and access to market are demand-side factors affecting food security. Teshome (2010) compare the food security situations of the nine districts in Amhara region and the result showed that all the nine districts sample households were vulnerable to food shortage. The study also showed food coverage, landholding, and extension service are the major determinants of sample households. With respect to Amhara region, there are studies by According to Negash (2000), Ramakrishna et al (2002) , Kidane et al (2005), World Food Programme stated (2009), Teshome(2010), Shiferaw

et al. (2003) and Arega, 2012; which showed, as stated above, a mix of factors affecting households' food security in the region.

2.5. Conceptual Framework of the Study

Conceptual framework is interconnected/or interrelated parts/ or sets of ideas regarding the particular phenomenon and shows how parts are functioning (Svinicki, 2010). It lays out the key factors, constructs, variables, and relationships among them. Conceptual framework contributes to better research and helps researchers to clarify their thoughts (Miles and Huberman, 1994).

Therefore, the conceptual frame work for this study has developed based on the review of related literatures and previous research outputs with the current study. Accordingly, the conceptual framework for this study has outlined as indicated in Figure 3 that shows the key predictors and outcome variables and their relationships. The interactions among (dependent and independent) variables affect the rural households' food well-being and livelihood statuses. As indicated in the Figure 3, independent variables used in this study are summarized and grouped in to demographic characteristics (age, sex, education, and household size), in to economic resources (ownership/farm land size in Ha, livestock size in TLU, and of farm participation), Technological adoption (Fertilizer application, Improved seed usage, Irrigation system) and Institutional factors (credit, extension, and input supply services).

To align the conceptual framework with the research objectives, use of more fertilizer, having large farm size, possession of many livestock, of farm participation, Improved seed usage, extension service, literacy etc can positively affect food security, while large number household size, poor Fertilizer application, dependent attitude on food aid can negatively affect food security.

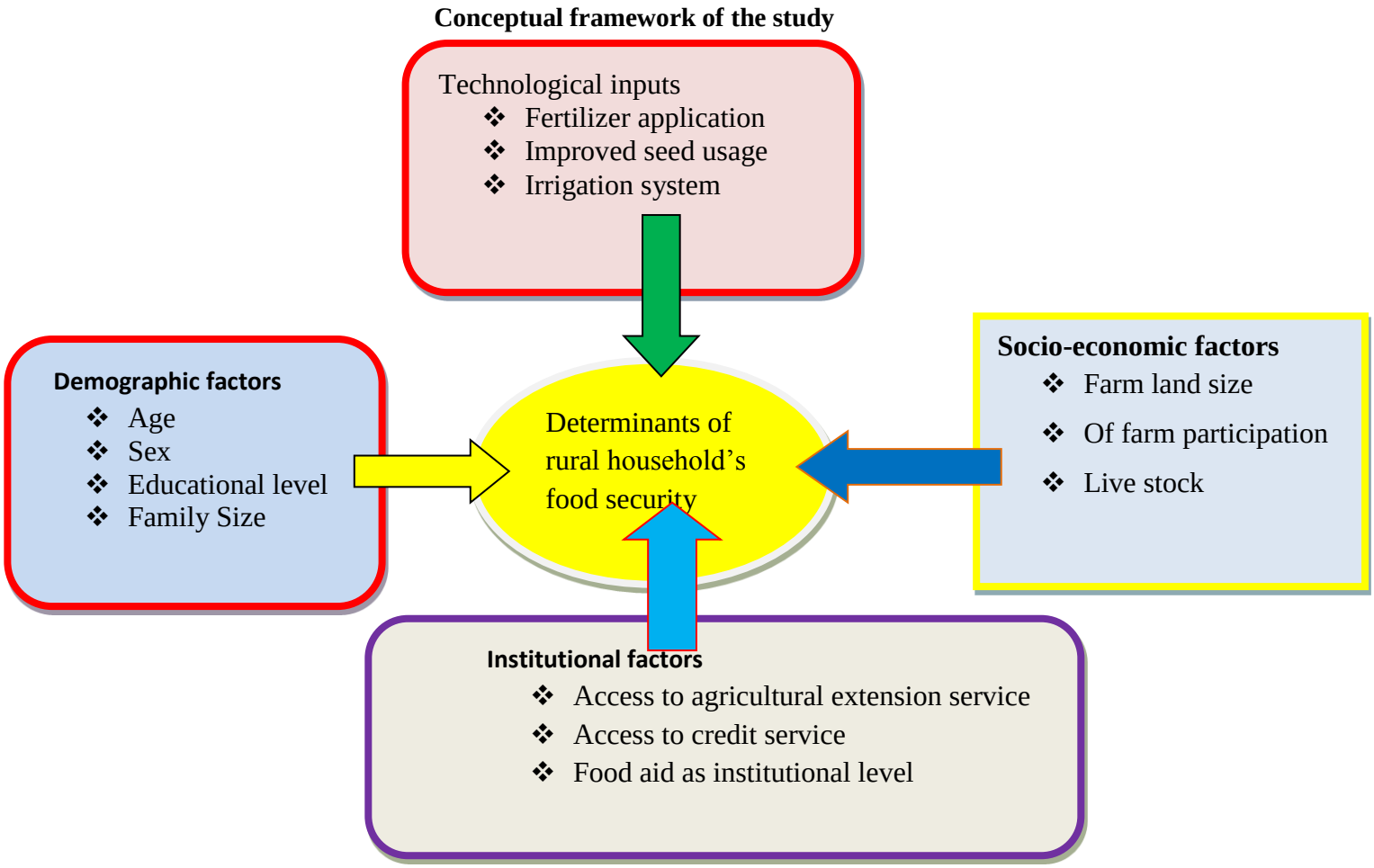

Figure : -*Conceptual frame work of household food security*

Source: develop by the Authors

CHAPTER THREE

3. Research Methodology

3.1. Description of the Study Area

3.1.1 Physical characteristics

I. Geographical location

Banja is one of the 105 Woredas in the Amhara Region of Ethiopia. It was named after a significant mountain located in the woreda. Banja is Part of the AgewAwi Zone, Injibara town is the capital of this district.It is located 120 km south of regional capital city to Bahir Dar and about 447 km north west of Addis Ababa along the main road from Addis Ababa to Bahir Dar. Banja is bordered on the south by Ankesha, on the west by Guangua, on the north by Faggeta Lekoma, and on the east by the MirabGojjam Zone. The geographical location of this woreda is lies 10°53′N-11°03′N latitude and 35°57′E-37°54′E longitude. Kosober is the town of Banja woreda. Towns in Banja include Injibara, Kessa ,Kosober.

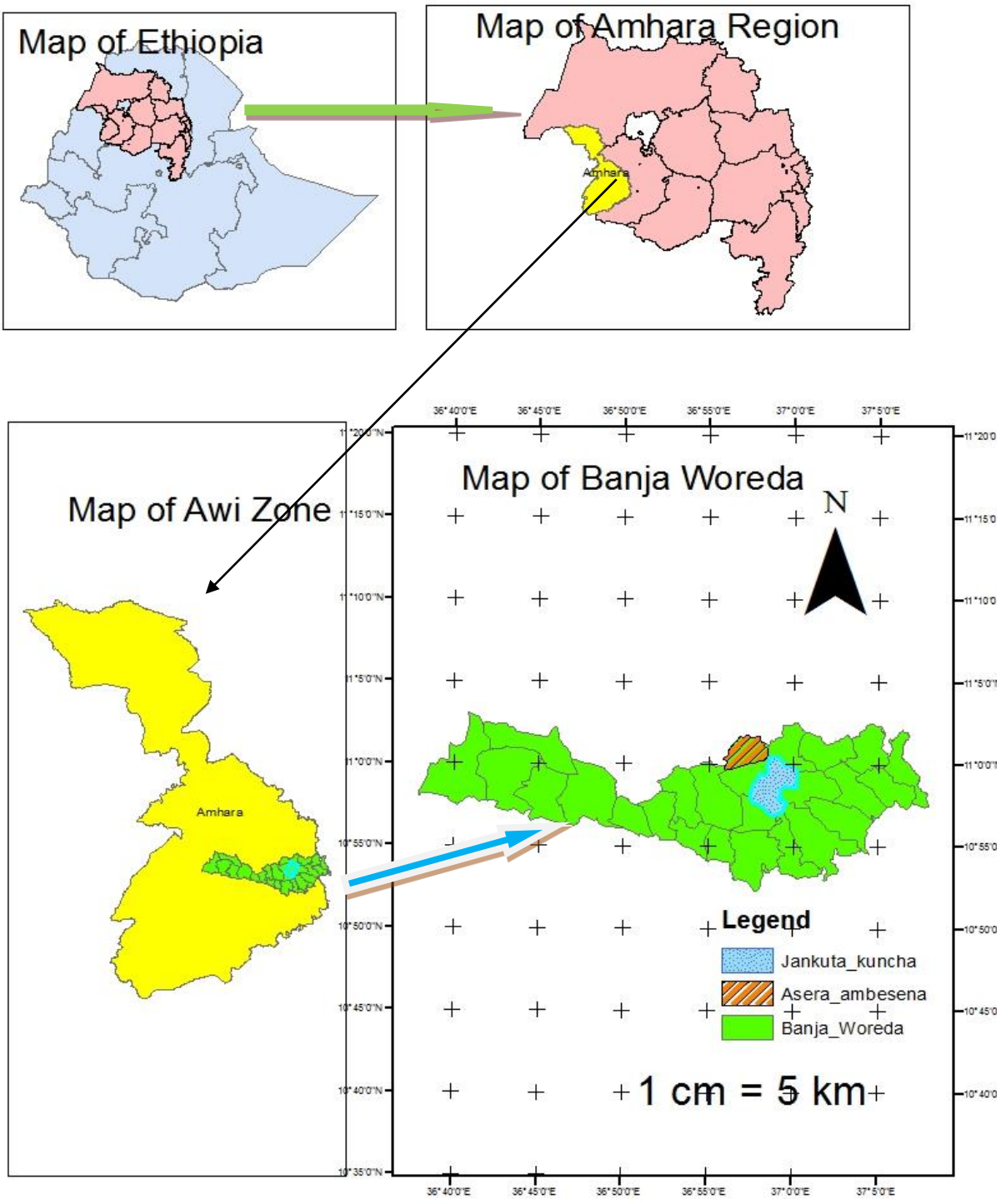

Figure : -Map of the study area

Source: Ethio GIS ,WGS 1984, Adindan_UTM_Zone_37N

II. Topography

The topography of the district is described as mountains (25%) undulated sloppy, (60%) and valley (15%). Hence, undulated sloppy area of the District takes lion share of the total topographic in the study area. The altitude ranges from 1,850 m to 2870 m a.s.l (BWARDO, 2017).

III. Climate

Climate is a major source, which can affect nearly all human activities and way of life. In Ethiopia the major factor which causes variation in climate is altitude. According to the information obtained from the district Agriculture and Rural Development office, Based on, the traditional climate zone classification, two major vertical temperature zones are found in the study district. The agro ecology of the district comprises of 'Dega' (80%) and 'WoinaDega'(20%). The mean annual temperature of the district is from 10^0c -20^0c. The altitude ranges from 1,850 m to 2870 m a.s.l. and its mean annual rain fall ranges from 1200-2000 mm (BWARDO, 2017).

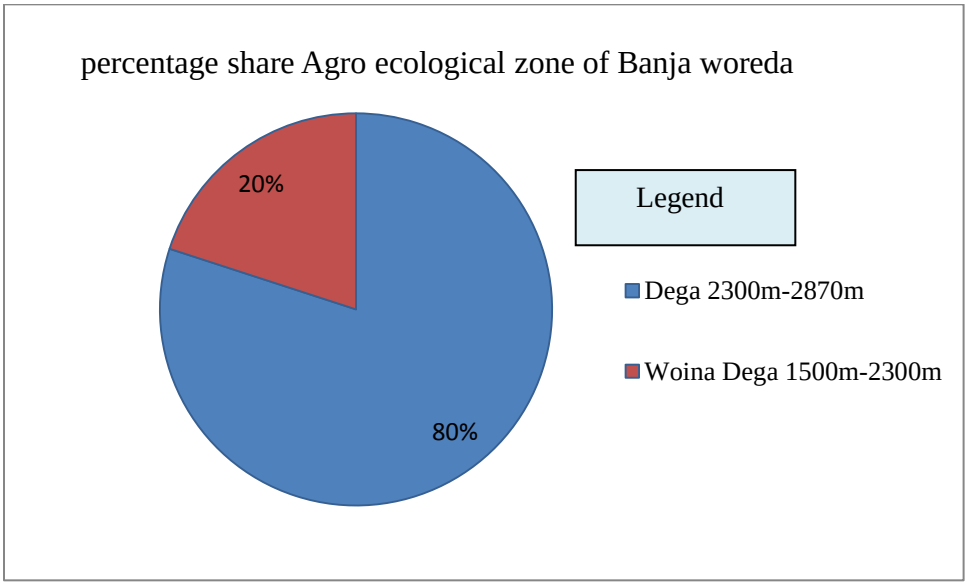

Figure :- Agro ecology zone of Banja woreda

Source: BWARDO 2017

IV. Soil

The soil type that is found the study area is red basaltic soil .The soil holds around 25-30 % of the district soil is red, 70-75% of the soil is brown. As far as the fertility of the soil is concerned 60% of the area is moderately fertile while the reaming 35% and 5% of the area is infertile and fertile respectively (BWARDO, 2017).

VI. Land use land cover

The total area of Banja district is estimated at 30,217 ha, of this the total area of 12,190 ha is used for cultivation of annual crop, 3,443.1 ha for grazing, 12,373.4 ha is used for forest and shrub land of which 732 ha is highland bamboo, 1,616 ha occupied by settlement and 594.5 ha for other land use types (BWADO, 2012).

Land holding in the district ranges from 0.25to 2 ha: many households with small land holdings face severe food deficit the growing human population and the small holding coupled with the growing number of landless people seems to have forced the landless to encroach fragile ecosystems to produce enough yields and this intervention is aggravating natural resource degradation (BWARDO 2017).

Table Land use land cover

	Land use land cover	Area in ha	percentage share
1	Land used for cultivation	12190	40.3%
2	Grazing land	3443.1	11.4%
3	Forest and shrub land	12373.4	41%
4	Land used for settlement	1616	5.3%
5	Other land use	594.5	2%
	Total	30217	100

Source: BWARDO 2017

VII. Natural vegetation

The vegetation cover of the woreda is about 12373.4hectares (63.43%) are manmade and (36.43%) are natural. Major plants available in the district are Crotonmacrostachyus (Bisana), Eucalyptusglobulus (Bahirzaf),Rhamnusprinoides (Gesho),kirkaha, koso, Asita, Gravilia, and Ficus species (BWARDO, 2017).

3.1.2 Socio-economic Characteristics

A. Demographics

Total population of the district in 2015 was estimated at 121511 out of this 60354 (49.67%) were male and 61157 (50.33%) were female (CSA, 2011). The number of farm households were 16239 out of this 13684 were male headed households and 2555 were female headed households. The two largest ethnic groups reported in Banja were the Amhara (56.58%), and the Awi (43.27%) one of the Agaw peoples; all other ethnic groups made up 0.15% of the population. Amharic was spoken as a first language by 66.19%, and 33.77% spoke Awngi; the remaining 0.36% spoke all other primary languages reported. The majority of the inhabitants practiced Ethiopian Orthodox Christianity, with 99.87% reporting that as their religion (BWARDO, 2017).

B. Economic Characteristics

The district people lead their life based on crop production and livestock rearing. Different food crop types are cultivated in the district such as wheat, Barley, maze, Cereals, and Vegetables. Individual farmer crop production is used for household consumption and local markets. Agricultural production is based on rain fed cultivation and few irrigation activities are found. The major livestock in the area include cattle, equine, poultry and sheep but the productivity of livestock is low principally due to shortage of livestock feed resources and lack of improved breeds. They are also engaged in sale of wood and other off-farm employments opportunities to cope up incidences of food shortage.

Land holding in the district ranges from 0.25to 3ha: many households with small land holdings face severe food deficit the growing human population and the small and holding coupled with the growing number of landless people seems to have forced the landless to encroach fragile

ecosystems to produce enough yields and this intervention is aggravating natural resource degradation (BWARDO, 2017).

3.2. Research Design

This study used mainly cross-sectional research design. The study use both qualitative and quantitative research methods to achieve the objectives. By using quantitative research method quantifying relationship between dependent and independent variables with respect to the determinant factor of household food security while by using qualitative research method, the study analyzed the information collected from interview and focus group discussion method.

3.3. Types and source of data

The study employed both primary and secondary sources of data collection. Primary data were collected using questionnaires, in-depth interview, observation and focus group participation. Secondary data were collected from books, articles, journals, research works, internet browsing that have relevance with the research topic.

3.4. Sampling Technique and sample sizes

Systematic random sampling was use to get information from different sizes of small farming households. This technique was preferred because it is used to assist in minimizing bias when dealing with the human population. With this technique, the sampling frame was organized into relatively homogeneous groups based on crop production. The Woreda has 26 rural Kebeles,

Using the data base of households from each Kebele Office, systematic random sample is taken from each kebele. To administrative the whole population simple random sampling technique was applied so as to obtain a representative of the entire population.

From this 26 rural Kebeles, 2 crop producing kebeles were randomly selected. These kebeles were Janguta-kuanchia and Asera-Basa. The total number of households in Janguta-kuanchia and Asera-Basa Kebeles was taken as sample frame work.

The data on the total number of households in the two Kebeles is obtained from the respective Rural Keble Administration Offices. Accordingly, out of the two rural Kebeles administrations data, the Janguta-kuanchia Kebele has 2112 households and Asera-Basa Kebele has 1488 households. The sample size used for the study is one hundred fifty (150) households were taken from the two Kebeles, using a stratified random sampling technique.

In this study Yamane (1997) formula is used to determine sample size of target population.In order to determine the required sample size at 92% confidence level of degree and with the level of precision 8 %.

$$n = N / (1 + Ne^2)$$

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

After the determination of sample size, the allocation of these sample size to each kebeles in the study area done through proportional allocation method of systematic random sampling. The proportional allocation method originally proposed by Yemane sample size selection method (1926) in this method the sampling fraction n/N was same in all strata

Ni=**nNi/N**

Where n= represents sample size, Ni represents population size of the i the strata.N represents the population size hence N= 150, Ni= Janguta-kuanchia (88), and Asera-Basa (62)

N=Total famers of the two kebels (3600), $N_{1=}$ Total famers of kebel 1(Janguta-kuanchia) 2112 , $N_{2=}$ Total famers of kebel 2 Asera-Basa 1488, n = Total sample size of the two kebels 150

Table :-shows sample size of the study area

Kebele	Ni	Formula for (ni)	Sample size for each kebele
Janguta-kuanchia	2112	= 150(2112)/3600	88
Asera- Basa	1488	=150(1488)/3600	62
Total	3600		150

Source: own survey data

3.5. Methods of Data Collection

As a source of information both primary and secondary data sources would use. The Primary data would be collected using questionnaire, in-depth interview, observation and focus group discussion that would be fit to the objective of the study.

The questions in the questionnaire were carefully translated to the local language, *Amharic* as almost all people are the native speakers of this language and Before starting the actual data collection the whole questionnaire would be pre-tested for its completeness, coherent, relevance, non-vagueness and so on requirements. So that appropriate refinements and modification in the questionnaire were make.

Interview of key informants; it was used to collect in-depth information about status and determinants of food security by prepared open-ended questions that administered to the *kebele* and district officers. Before administered the open ended questions, the respondents were informed about the objectives of the survey.

The process of primary data collection was conduct through observation, which may help the study to gather timely and reliable information on the overall farming operations in the study area considering time and budget constraints. This is due to the fact that, the quality and reliability of the information gathered from the farmers depends on their recalling capacity. For this inquiring farmers about a particular operation at the time of the real operation would be the first priority of the study.

Focus group discussion; the qualitative method of data collection was also employed which was consists of focused group discussion to supplement and collected data from sample respondents and analyzed the determinants of food security. Open ended questions are prepared and administered to 10 selected discussants.

The questionnaire was administered during March and May 2011 E.C (2019). This period was chosen mainly because it is an ideal time when farmers have completed their harvesting activities and start the natural resource development program works at the watershed level, which is carried out yearly by organized government support schedule. Hence, it is easy to interview the sample farm households and collect the required data. Before full implementation, the questionnaire was pre-tested as in the sample villages. Hence, necessary adjustments were made based on the comments obtained from pre-test responses from farmers to ensure reliability and validity of the questionnaire. The questionnaire was administered by agricultural experts and me. Secondary data were also collect from books, journals, and internet sources.

A modified form of a simple equation termed as Household Food Balance Model was used to measure the sample households' food security. It involves the measurement of the average daily food available to each person in a sample household. After data collection, the researcher has converted the households' annual available food grain supply into kilograms and then based on the conversion factors of major cereals converted into kilocalories. The converted results were then divided by the household size as adult equivalent and the number of days in the recall period. Moreover, the data were also analyzed using descriptive and inferential statistics Module of the Statistical Package for Social Sciences (SPSS-IBM) software, version 23.

3.6. Method of data analysis

The method of data processing in this study was manual and computerized system. In the data processing procedure editing, coding, classification and tabulation of the collected data were use. The Statistical Package for Social Science (SPSS) version 23 employed to processing the collected data. Data processing has two phases namely: data clean-up and data reduction.

During data clean-up the collected raw data is edited to detect anomalies, errors and omissions in responses and checking that the questions are answered accurately and uniformly. The process of assigning numerical or other symbols came next which is used to reduce responses into a limited number of categories or classes.

After this, the processes of classification or arranging large volume of raw data into classes or groups on the basis of common characteristics are applied. Data having the common characteristics are placed together and in this way the entered data divided into a number of groups. Finally, tabulation and pie charts are used to summarize the raw data and displayed in the form of tabulation for further analysis.

Data analysis is the further transformation of the processed data to look for patterns and relationship between and/or among data groups by using descriptive and inferential (statistical) analysis. Specifically, descriptive statistics (mean standard deviation and charts) and inferential statistics (correlation and regression) are taken from this tool. Descriptive analysis is used to reduce the data in to a summary format by tabulation (the data arranged in a table format) and measure of central tendency (mean and standard deviation). The reason for using descriptive statistics is to compare the different factors. Descriptive statistics are used to show the effects of

continuous and descriptive variables of the study on sample household food security, while inferential statistics like binary logistic regression is used to know the association between dependent and independent variables upon determinants of food security in rural farm households.

3.7. Response Variable

To determine the response variable, household food security status (HFS), a Household Food Balance Model (HFBM), which was used by Haile et al (2005c), Shiferaw et al (2004), Ramakrishna and Assefa (2002), Nyariki et al (2001), Tolosa (1996) was adapted accordingly. The HFBM was used to quantify the net available grain food by each of the 150 sampled rural households in Banja Woreda in the period covering June2010 E.C to June 2011 E.C.

Household Food Balance Model, originally adapted by (Degefa 1996) from FAO Regional Food Balance Model and then used by different researchers in this field (Eshetu 2000; Messay 2009), was used to calculate the per capita food available.

Variables required for the HFBM model were then converted from the local grain measurement units into the corresponding kilogram grain equivalent. The HFBM model was expressed as follows:

NGA= (GP+GB+FA+GG)-(HL+GU+GS+GV) In this model, the index runs from 1, 2,…, 150 where, NGA = net grain available/year/household, GP = total grain produced/year/household, GB = total grain bought/year/household, FA =quantity of food aid obtained/year/household, GG = total grain obtained through gift or remittance/year/ household, HL = post-harvest losses/year, GU=quantity of grain reserved for seed/ year/household, GS = amount of grain sold/year/household, and GV = grain given to others within a year.

Finally, following Haile et al (2005) and others, the response variable was determined in four steps. First, net grain available for each household in kilogram was converted into equivalent total kilo calories using conversion factors.

For example, the suggested equivalence of 1kg of millet is about 3390kcal (Hoddinott,J. 1999). The kcal consumption of each household is compared with the nationally recommended minimum amount for a healthy adult person per day of 2100 kcal (Messay, 2013) to identify

food secure and food insecure households. Second, the food supply at the household level calculated in step (i) was used to calculate calories available per person per day for each household.

Third, following FDRE FSS (1996), 2,100 kilo calories per person per day was used as a measure of calories required (i.e., demand) to enable an adult to live a healthy and moderately active life. Then a comparison between the available (supply) and required (i.e., demand) grain food was made. At last, comparison between calories available and calories demanded by a household was used to determine the food security status of a household. A household whose daily per capita caloric available (supply) is less than his/her demand was regarded as food insecure, and coded as 1, while a household who did not experience a calorie deficit during the year under study was regarded as food secure and was assigned a code of 0. In view of this, the response variable, food security status of the i^{th} household, HFS_i was measured as a dichotomous variable:

HFSi = 1, $Y_i < R$ (food insecure)

0, $Y_{i \geq} R$ (food secure)

where Yi daily per capita calorie available (supply); R is the minimum recommended national standard rate of calories per person per day, which is 2,100 kilo calorie (i.e., demand) and HFS_i food security status of the i^{th} household, i =1, 2, 3… 150.

Head count ratio expressed as H= (m/n)*100, where m = number of food insecure households and n=number of households in the sample was calculated to measure the extent of undernourishment.

Model specification

Table : -Description of variables used in the logistic regression model

Variables	Variables definition and unit of measurement
Dependent variable	
Y = HHFSS, food security status	0 if a household is food secure, 1 otherwise

Independent variables

X1 = IRRIGATION	1 participated,2 did not participated
X2 = HHA, age	Household head's number of years of age
X3 = FS, family size	Number of household members (in number)
X4= farm land size	Total farm land of the households measured in hectares
X5= live stock	Total livestock owned by farm household TLU(in number)
X6= off farm	1 participated,2 did not participated
X7= access to credit service	1 if the household access credit, 2 otherwise

3.8. Ethical considerations

The aim of observing Ethical issues in research is to safeguard credibility of research and investigate to protect human right and privacy. All the research participants included in this research study would appropriately informed about the purpose of the research and their willingness and consent would secure before the commencement of distributing questionnaire and asking interview questions. Regarding the right to privacy of respondents the study would maintain the confidentiality of the identity of each participant.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1. Characteristics of the respondents

I. Age of the household (AGE):

The statistical analysis result of table 4 revealed that 42.9% of food secure households are found above 50 years. About 42.6% of food insecure households are found in the age range between 40 to 49 years is a continuous explanatory variable measured by year. This implies that, the increase in age of sample respondents has positive influence food security in the study area. Age of the household heads is one of the important factor that affect positively household heads production by increasing farmers experience on ways of plough, selection of farm plot, volume of seed rate and time of sowing, and harvesting. Thus, it is hypothesized that age of the household heads and household food security are positively correlated.

Table :- Descriptive summary of discrete variables

Variables	N	Total %	Food Secure%	Food Insecure%	Pearson Chi-square	LR	d.f
Gender							
Male	110	73.3	77	71.3			1
female	40	26.7	23	27.7	1.008[a]	1.350	
FSIZE >5.71	120	80	62.5	90.1			1
≤ 5.71	30	20	37.5	9.6	17.104[a]	16.687	
LSIZE < 1.79	80	53.3	14.3	76.6			1
≥ 1.79	70	46.7	87.7	23.4	30.388[a]	34.237	
YIELD < 706.12	82	54.7	3.6	85.1	94.140[a]	110.258	1
≥ 706.12	68	45.3	96.4	14.9			
OFFARM							
participated	65	43.3	48.2	40.4	867[a]	.865	1
didn't participate	85	56.7	51.8	59.6			
Fertilizers							
Adopter	67	44.7	71.4	28.7	25.895[a]	26.493	1
Non adopter	83	55.3	28.6	71.3			
Irrigation							
Adopter	29	19.3	86.2	13.8	36.704[a]	37.234	1
Non adopter	121	80.7	25.6	74.4			
TEC							1

non-adapter	115	76.7	64.3	84	7.657[a]	7.460	
adopter	35	23.3	35.7	16			
Food aid attitude							1
Good	104	69.3	48.2	81.9	18.745[a]	18.497	
not good	46	30.7	51.8	18.1			
TLU < 3.1	58	38.7	10.7	60.6			1
≥3.1	92	61.3	87.3	96.8	54.744[a]	52.269	
EDUC							
cannot read and/or write	83	55.3	28.6	71.3	25.895[a]	26.493	1
can read and write	67	44.7	71.4	28.7			
AGE							3
≤ 29	18	12	5.4	16			
30-39	35	23.3	23.2	23.4	13.003[a]	13.168	
40-49	56	37.32	28.6	42.6			
≥ 50	41	27.3	42.9	18.1			
Improved seed usage							
Yes	83	55.3	53	47	19.525	20.466	1
No	67	44.7	17.9	82.1			
Access to credit get	62	41.3	66	26.6			
not get	88	58.7	34	73.4	22.552[a]	22.783	1

Source: Field survey, 2019

II. Gender of the household head

It is a dummy variable is used to denote this variable with

Gender = 1. Male

2. Female

The statistical analysis result of table 4 revealed that 73.3% of the sample households were male-headed, while 26.7% were female- headed. This indicates that there are more male-headed sample households than female-headed households.

The statistical analysis result revealed indicates that 77% and 71.3% of male-headed sample households were food secure and food insecure, respectively, whereas 23% and 27.7% of female-headed household**s** were food secure and food insecure, respectively. In general, male-headed households were more food secure than female-headed households. This implies female households were exposure to food insecurity.

Due to the existing socio-cultural values and norms males have freedom of mobility, participate in different meetings and trainings. Therefore, male headed households may have higher crop production than female headed households (Pender *et al*, 2004).

III. Educational status of the household head (EDUC):

The impact of education on household food production might be through promoting awareness on the possible advantages of modernizing agriculture through technological inputs and by diversifying household incomes, which in turn enhance household's supply. Households led by non-literate heads are less likely to understand modern farming technologies provided to them through any media (extension workers, radio, etc) than literate household heads. EDUC assumed binary values and was expect to have a positive influence on HFS.

1. Cannot read and/or write
2. Can read and write

The statistical analysis result of table 4 revealed that 67and 83 of the sample households were found to be literate and illiterate, respectively. Among literate households, 44.7% and 28.7% were found to be food secure and food insecure, respectively, while 55.3% and 71.3% of the illiterate households were found to be food secure and food insecure, respectively. This means that there is a significant association between education and food security status.

This result indicates the significance of education for household food security improvement because educated household heads were usually practiced family planning programs thereby limit their family size when compared with their counter parts and become able to manage food demands of their households. Moreover, they engage themselves and their family members in various non-farm income- generating activities. For example, Urassa (2010) argues that households with more education or other forms of human capital stand a better chance of engaging in non- farm income or credit. Therefore, could be more able to afford inputs and there by becomes more efficient in their farming practices. Hence, farming households with more education had the possibility of obtaining higher yields and become food secure. The result of this variable is consistent with the study done by KoffioTessio .EM.,et al. (2005). They reported

that in rural areas, education improves agricultural productivity, leading to food security. This implies that more educated house hold could improve food security.

Based on the focus group discussions and in-depth interview; showed that farmers have better understanding and educational background was more able to afford inputs, more efficient in their farming practices and more productive than uneducated farmers and less aware farmers.

Caswell *et al*. (2001) indicated that farm households with well-educated members are more likely to adopt modern agricultural production technologies than those without; especially improved crop varieties for relatives to adopt that education creates a favorable mental attitude for the acceptance of new practices.

IV. Family size of the household (FSIZE):

As pointed in various literatures, family size is identified as one of the important demographic factors that affect household food security status. In light of this it was hypothesized that family size has negative relationship with food security status of a household, in such a way that households with large family size have a chance being food insecure than those with small number of family size.

The survey result of table 4 revealed that 80% and 20% of the sample households greater than the sample mean (5.71) and less than or equal to the sample mean (5.71), respectively. Among these households whose family size was above the mean, 62.52 % and 90.1% were food secure and food insecure, respectively, whereas 37 %and 9.6% of the households less than or equal to the sample mean (5.71) and become food secure and food insecure, respectively.

Therefore, the hypothesis that family size with high dependency ratio negatively affects the probability of households to be food secure is confirmed. This result is in conformity with the findings of Frehiwot (2007) and Abebaw (2003). This indicates that larger household size tends to be food insecure compared to smaller family size in the study area. This fully agrees with prior expectation.

4.2 Socio-Economic Resources

I. Farm land size of household head

The mean farm land size of the sampled households' was 1.79 hectares and used for categorizing this variable. The maximum farm size owned by the sample households are 3 hectare and the minimum is 0.5 hectare.

The statistical analysis result of table 4 revealed that 46.7% and 53.3% of the respondents have a land size of above the mean and below the mean, respectively. Among these households who have own land size above the mean, 87.7% and 23.4% were found to be food secure and food insecure, respectively, while 14.3% and 76.6% the households who have land size below the mean were found to be food secure and food insecure, respectively. This implies that, possession of large land size of the household increases the potential crop products this results the household to fulfill their own food requirements. Therefore, the size of farm land has vital role in households' food security.

Households with larger farm sizes tend to be more food secure than those with smaller sizes, and vice versa. This is possibly because that the size of landholding is a proxy for a host of factors including wealth, access to credit, capacity to beer risk and income. Larger farms are associated with greater wealth and income and increased availability of capital, which increase the probability of investment in purchase of farm inputs that increase food production and ensuring food security Yeshak G.,et al (2014).

During the key informant discussion with the kebele Agriculture and Rural Development Office Experts, it was also noted that land in the study sites is becoming more and more fragmented and scarce due to growing population size and population densities as fertility rate of women in productive age group is very high. Hence, there is increasing trend of land division among household members as new grown- ups in a family demand share of their family's land which makes individuals' possession of land very small. As a result, farm land size and food security have direct proportional relation.

II. **Off-farm income generating activities**:

Off-farm income includes non-agricultural wages, self-employed income, petty trading, weaving, remittances, charcoal and firewood selling, and handicraft. A dummy variable was used to denote this variable.

OFFARM = 1. Didn't participated

2. Participated.

The survey result of this variable revealed that 43.3% and 56.7% of the sample households are participated off-farm income and without access to off-farm income generating activity, respectively. Of these households, 48.2%and 40.4% have access to participated off-farm income generating activity and become food secure and food insecure, respectively. While 51.8% and 59.4% of the households do have access to participated off-farm income generating activity and become food secure and food insecure, respectively.

Therefore, there was positive relationship between access to off-farm income and food security status of the rural households. This could be attributed to the fact that income generated through off-farm activities may easily accommodate the constraint needed for food security investments or purchase of food crops for households.

Frankenberger (1992) noted that participation in off-farm activities enables households to modernize their production by giving them an opportunity to apply the necessary inputs and reduces the risk of food shortage during periods of unexpected crop failures through food purchases.

III. **Total annual cereal yield**

Total annual cereal yield (in kilogram) produced by the household head from June 2010to June 2011E.C. The lower the amount of grain food obtained from own production, the more likely the household to be food insecure. The mean value of yield of the sampled households was 706.12 kilogram and used for categorization.

YIELD = 1. < 706.12 kg

2. ≥ 706.12 kg

The statistical analysis result of table 4 revealed that 45.3% and 54.7% of the respondents were produce cereal products above the mean and below the mean, respectively. Among these households who have own above the mean, 96.4 % and 14.9% of the sample households respondents were found to be food secure and food insecure, respectively, while 3.6% and 85.1% of the sample households who have got below the mean were found to be food secure and food insecure, respectively.

This implies that the lower the amount of grain product obtained from own production, the more likely the household to be food insecure.

IV. **Livestock holding (TLU):**

It is a continuous variable and measured in TLU (Tropical Livestock Unit). Unlike urban dwellers, the rural households accumulate their wealth in terms of livestock. They are prominent sources of wealth to farm households and supply manure to improve soil fertility. The mean value of TLU was 3.1

The statistical analysis result of table 4 revealed that 61.3% and 38.7% of the sample households were found to be above the mean and below the mean, respectively. Among these households who have own above the mean, 87.3% and 96.8% were found to be food secure and food insecure, respectively, while 10.7% and 60.6% the households who have below the mean were found to be food secure and food insecure, respectively. Households with large livestock size are expected to be less vulnerable to food insecurity especially in times of drought when crops fail to yield (Little et al., 2006).

This implies that, possession of large size of livestock increases the likelihood of the household to be food secure.

4.3 Agricultural technology input

I. Households' fertilizer adoption

It is the non-continuous variable having the dichotomous nature that in this study it takes the value (1) for adopters of fertilizer; and (0) for non-adopters. Using fertilizer can increase the yield of farm households.

The survey result of table 4 revealed that 44.7 % and 55.3% of the sample households were fertilizer adopters and non fertilizer adopters, respectively. Among these households fertilizer adopters 71.4% and 28.6% were food secure and food insecure, respectively, whereas 28.7% and 71.3% of the households were non adopters and become food secure and food insecure, respectively. This shows that using fertilizer can increase the yield of farm households. As a result, in this study, adoption of fertilizer and the food availability status of farm households are hypothesized to have positive and significant association.

As information obtained through focus group discussion from agricultural experts and extension workers, farmers were reluctant to accept advices in training center and problem in implement practical support on farmlands. Some farmers used weed killer for *crop* but not properly applying on *crop* farm. This problem could affect proper crop growth and reduced crop yield.

Proper application of soil fertilizer is important for good *crop* production. The advisable adding of soil fertilizer is adding Dap during sowing then adds Urea at weed removal time. But some farmers were not used the above mentioned proper application of it and resulted in lower production and food insecure.

During the discussion, the issues raised and discussed related to fertilizer such as poor quality, high cost, forced adoption and high interest rate of credit service to buy it, become serious from time to time. Now, the problems become closer beyond the capacity and tolerance of the farmers. Kefyalew (2011) explained that the percentage of farmers who apply Urea in particular is, however, low as it does not exceed 36%. The high price of fertilizer is the major constraint for about 47.6% of the farmers under consideration, followed by supply shortage and late arrival of fertilizer.

II. Household's adoption of improved seed

It is the non-continuous explanatory variable expected to affect farm HH‘s income intensity. The variable has the dichotomous nature that takes the value (1) for improved seed adopters; and (0) for non-adopters.

The survey result of table 4 revealed that 55.3% and 44.7% of the sample households have been used improved seeds and did not use improved seeds, respectively. Among these improved seed adopter households 53% and 47% were food secure and food insecure, respectively, whereas 17.9% and 82.1% of the households were non-adopters of improved seed and become food secure and food insecure, respectively. This implies that, farmers used new varieties of seed were more productive than indigenous users.

According to the depth interview and focus group discussion, show that farmers used indigenous seed varieties than new seed varieties, due to maximum cost influence of new seed varieties . As result, indigenous crop seed users were less productive and less food secure.

III. Participation in support of rain-fed crop with Irrigation

It is a non- continuous and dichotomous explanatory variable expected to affect the intensity of crop food availability positively and significantly. Supporting rain fed crop with irrigation can increase agricultural crops yield, thereby, food availability from crop and other products.

The survey result of table 4 revealed that 19.3% and 80.7% of the sample households have been used both rain-fed and irrigation system crop production and did not use Irrigation system crop production, respectively. Among these rain-fed and irrigation system crop producers households 86.2% and 13.8% were food secure and food insecure, respectively, whereas 25.6% and 74.4% of the sample households were non user of Irrigation system crop production and become food secure and food insecure, respectively. The chi-square result of this variable is statistically significant at 95% level of significance. This indicates that rural households adopt more and more irrigation system crop production resulted large amount of crops and becomes food secure. Irrigation users have better total calorie availability per households than non users. The use of irrigation reduces the likelihood of food insecurity. By developing different water harvesting structures produce variety of agricultural products in the extended non-growing seasons. This matches with the finding of Messay (2011).

4.4 Institutional Factors

I. Access to credit services

It is the dummy variable taking the value 1 if the household is access credit, 2 otherwise. This is the ability of households to obtain credit both in cash and kind for either consumption or to support production from lending institutions.

The survey result of table 4 revealed that 41.3% and 58.7% of the sample households have access to credit service and do not have access to credit service, respectively. Among these households who can get access to credit service, 66% were food secure and 34% were food insecure. Whereas 26.6% and 73.4% of the households did not have access to credit service and become food secure and food insecure, respectively.

Therefore, there is no association between access to credit service and food security status of the rural households. This could be because of high-interest rates and farmer's inability to use the credit received for the intended purpose. This result is in line with the report of IFPRI (2009) that many smallholder farmers in Nigeria are unable to access credit due to the issues of collateral and high-interest rates as well as the short-term and fixed repayment periods for agricultural loans by lending institutions.

On the contrary, a study carried out by Pappoe (2011) found that access to credit improves the food security status of farming households among bio fuel producers in the central region of Ghana. therefore access to credit service improve food security at low interest rate but according to survey result high interest rate and short term repayment period leads to food insecure for rural households.

II. Access to agricultural extension service

It is the non-continuous explanatory variable (1=yes, 2=no) expected to affect farm households' aggregate food availability status.

The survey result of table 8 revealed that 46.7% and 53.3 % of the sample households have access to agricultural extension service and do not have access to agricultural extension service, respectively. Among these households can get agricultural extension service, 87.7% and 23.4 %

were food secure and food insecure, respectively, whereas 14.3 % and76.6 % of the households did not get access to agricultural extension service and become food secure and food insecure, respectively. Muhamed (2011) explained that result of the finding indicated that access to extension service was positively and significantly related to the volume of crop products. If a crop producer gets extension contact the amount of crop product increases.

According to the focus group discussion shows that; generally kebele extension workers gave general information about agricultural production and input utilization but not given special practical training about *crop* production.

III. Household‘s attitude in Food aid

A dummy variable was used to denote the variable.

AID = 1. Good

2. Not good

The survey result of table 4 revealed that 69.3 % and 30.7% of the sample households were have the attitude food aid is good and have the attitude food aid is not good, respectively. Among these households who said that the attitude food aid is good 48.2 were food secure and 81.9% were food insecure. While households who said that the attitude food aid is not good 51.8% were food secure and 18.1% were food insecure.

Therefore, the survey result indicates that food aid is a short-term solution to food insecurity and does not contribute to asset creation or rehabilitation of beneficiary communities.

In most cases, food aid had a negative effect on the attitudes of farmers towards work and their own agricultural activities Oxfam .GB. (2004). an increase in the number of non-working member of household or dependency ratio increases the food insecurity level of household Ojogho. O. (2010). Therefore from the survey result indicates that food aid is a short-term solution to food insecurity and does not contribute to asset creation or rehabilitation of beneficiary communities.

4.1.1 Descriptive Results

Based on the recommended daily food intake of 2,100 kilo calorie, it was observed that 37.3 % of the sampled households of the Woreda were food secure while 62.7% were food insecure. Summary statistics of selected predictor variables are presented in table 9.

Table :-Descriptive statistics of continuous variables

I	Variables	Household Food Security Status			
		Food Secure (sample size, n1 = 56)		Food Insecure (sample size, n2 = 94)	
		Mean x_{1i}	Std. dev. s_{1i}	Mean x_{2i}	Std. dev. s_{2i}
1	Age of household head (years)	30.71	8.20801	43.49	13.71346
2	Family size (number)	5.11	1.473	6.06	47.928
3	Annual yield (kilogram)	376.48	29.4699	342.98	25.3097
4	Farm land size (hectares)	2.107	.400412	1.6	.37586
5	Livestock Unit (TLU)	3.87	.83719	2.74	.59424
6	Per capita daily caloric availability (kilo calorie)	2327.34	292.600	1881.91	196.010
	Head count ratio (H)	37.3		62.7	

Source: own survey data

From the results presented in tables 5 the study area could be regarded as food insecure given the fact that only 37.3 % of the households were able to meet the recommended calorie intake of 2,100 kilo calorie per capita per day, while 62.7% could not meet the recommended calorie intake.

The mean age of household for food secure is 30.71 with standard deviation8.20801 and food insecure household heads is 43.49 years with standard deviation of 13.71346 years. On the average food secure households have 5 family members with standard deviation of 1.473 while food insecure households have 6 members with standard deviation of 1.056.

Food secure households produced on average 376.48 kilogram cereals with standard deviation of 29.4699 kilogram while food insecure households produced 342.98 kilogram with standard deviation of 47.928 kilogram. The average number of live stock owned by food secure household was 3.87with standard deviation of 0.84, while food insecure households have 2.74 with standard deviation of 0.59 live stocks. During the period under study; food secure households get on the average 2327.34kilo calorie energy per day with standard deviation of 292.6 kilo calorie energy per day while food insecure households get 1881.91 kilo calorie energy per day with standard deviation of 196.01 kilo calorie energy per day.

From the group statistics it can be observed that the food secure households have relatively greater averages on age of head of household, annual yield, farm land size, livestock number, and annual cereal income than their counter part households. On the other hand, the food insecure households have greater averages of family size.

4.1.2. Binary logistic regression

The binary logistic regression model was applied to screen out the most significant variables of the study. The binary logistic regression model was used to investigate determinants of rural household food security. The analysis of the survey revealed that 6 out of 7 explanatory variables included in the model were found to be significant in explaining the variation in food security status of respondents.

The results confirm that variables such as family size, off-farm income, farm land size, live stock, irrigation access and access to credit service were key determinants of food security of the rural household. Specifically off farm income, farm land size, live stock, irrigation access and access to credit service had a positive impact on the determinants of food security. Family size had a negative influence on food security of a household. Furthermore based on the model, the study identifies determinants of food security as a cumulative effect of several factors like, credit service large family size, shortage of farmland, and other concerned bodies should pay attention to alleviate the problem. The coefficients of variables in the model were significant at 1% ($p<0.01$), 5% ($p<0.05$), and 10% ($p<0.1$) levels of significance. However, age did not show any significant influence. The statistical non-significance of this coefficients suggests that the variables are not important in explaining the of rural household food security situation

Table :- Binary logistic regression model

	B	S.E	Wald	DF	Sig	Exp	95% C.I EXP	
							Lower	Upper
AGE	.311	.662	.22o	1	.639	1.364	.372	4.998
OFFARM	.391	.193	4.099	1	.043	1.479	1.013	2.159
IRRIGATION	3.198	1.075	8.849	1	.0003	24,476	2.977	201.257
TOFAMSIZE	-.056	.013	17.289	1	.000	.946	.921	.971
CREDIT ACSS	.343	.195	3.102	1	.078	1.409	.962	6.06
FARM LAND SIZE	1.265	.708	3.190	1	.074	3.544	.884	14.28
LIVESTOCK	.523	.202	6.700	1	.010	1.688	1.136	2.509

1. **Age of the household heads**

The result of the regression analysis for the household head age (HHA) was not showing any significant influence. The statistical non-significance of this coefficient suggests that the variable is not important in explaining the significant influence of rural household food security.

2. **Off-farm income**

As shown in table the coefficient of off-farm income (OFI) was statistically not significant at 10% level of significance and exhibited a positive association with food security status of the rural households. The positive association could provide farm job opportunities and start-up capital. Studies conducted by Reardon (1997), Barrett et al. (2001), and Meles et al. (2016) stated that the coefficient of the off-farm income was positive indicating that there is a positive relationship between off-farm work and food security. They reported that the success of households and their members in managing food insecurity is largely dependent on their ability to get access to off-farm job opportunities, which could aid as livelihood diversification strategies.

3. **Family size**

The average family size of the sample households was found to be 5.71 ranging from 3 to 8 persons with a standard deviation of 1.307. Based on the result of the regression analysis, family size (FS) is statistically significant at 1%. It is negatively associated with rural farm household food security situation. Hence, household size and the quantity of households' crop food are correlated negatively.

In this study, arm households size and the intensity of crop food availability are associated negatively. This shows that household with large sizes had higher possibility of being food insecure than those with smaller size (Amaza, et. al., 2006).The results of Bashir et al. (2012), who found that an increase of one member in the household decreases the chances of food security by 31%. This indicates that households with larger family size are more likely to be food insecure than their counterparts. The negative association could be due to an increase in the number of family dependency ratio. By taking into account the negative impact of large family size on the food security situation of rural households, farming households should be educated on the importance of family planning and the burden that it causes on their livelihood so that they may bear the number of children which their resources can support.

This shows that households with large size have a higher possibility of being food insecure than those with smaller size, and vice versa.

4. **Livestock**

The result of binary logistic regression analysis in table10 indicates that, livestock is statistically significant at 1% level (B=0.523, p-value=0.01).

It was positively associated with household food security implying that increase in food security was caused by an increase in the number of TLU. This finding is similar with the general literature and some previous studies (Bogale and Shimelis, 2009; Messay, 2009). The possible explanation for this is that household who had livestock that would be sold and buying food during the times of food shortage. Study reveals, livestock possession is crucial to reduce food insecurity Yamane; (2008).

According to this study, low number of livestock is one of the fundamental determinants of food insecurity in the study area.

5. **Farm land size**:

it is a continuous explanatory variable, measured in (Ha).The variable was found to be significant at the 1% level (p = 0.074) and was positively correlated with the household food security status of households, contrary to what was expected, with a beta coefficient (β) =1.265 and ratio Exp (β) = 3.544 The model predicts that when a household farm land size increase, the household to

be food secure is more likely while holding all other independent factors constant. Large farm land size of the households is expected to get more crop yield. Hence, it is expected to affect farm household's intensity of food availability. Therefore, in this study, farm land size and households' food availability intensity are presumed to associate positively and significantly. Cultivated land size was influence food security positively. The results of the logit model in the study of Bogale and Shimelis (2009) indicated that sample households which had larger farm size had less risk of being food insecure.

6. Accesses to credit service

Access to rural credit service has a positive and significant relationship with the household food security at 1% level of significant ($p = 0.078$), beta coefficient (β) =0.343 and ratio Exp (β) = 1.49. Households who have access to credits from governmental or non-governmental have better food availability than who do not have credit access. Credit is crucial for farmers to increasing agricultural products through introducing agricultural technologies and diversifying livelihood strategies. As mentioned earlier there is critical shortage of farming land and as a result of this, the woreda is working towards expansion of micro and small enterprises to strength purchasing power. This relates positively with result of Messay (2009).

7. Irrigation

The variable was found to be significant at the 5% level ($p = 0.003$), beta coefficient (β) = 3.198 and was positively correlated with the household food security status. Practice of small scale irrigation was positively related with household food security showing a unit increase in food insecurity with a 3.197 unit increase in the practice of small scale irrigation. This goes in line with the findings of many previous studies conducted in Ethiopia which showed statistically significant and positive relationships between irrigation use and household food security (Degefa, 2005; Bogale and Shimelis, 2009). The possible explanation is that access to and use of small-scale irrigation enabled households to produce twice a year. This might have increased their access to both income and food from crop production.

The interviewee suggested that the extension workers supervised farmers on farm land during sowing but the supervision process was simple rounding as well as not all inclusive. It seems simple observational activities. The main problems of experts were lack of expert follow up

during the time of disease known as head smudge. Discussants confirmed that, in the past years agricultural extension workers were forcefully gave unwanted new varieties seed such as *kuncho Teff* varieties. *Kuncho Teff* variety was grown to high but yield was very low. It served for animal food residues.

This is confirmed by Asres (2014) stated that the insignificant positive effect of agricultural extension participation on technical efficiency might be due to poor performance in the operation of extension systems, deficient program design and information delivery systems. It served for animal food residues.

During the focus group discussion, the issues raised and discussed related to fertilizer such as poor quality, high cost, forced adoption and high interest rate of credit service to buy it, become serious from time to time. Now, the problems become closer beyond the capacity and tolerance of the farmers. Kefyalew (2011) explained that the percentage of farmers who apply Urea in particular is, however, low as it does not exceed 36%. The high price of fertilizer is the major constraint for about 47.6% of the farmers under consideration, followed by supply shortage and late arrival of fertilizer.

CHAPTER FIVE

5. CONCLUSION AND RECOMMENDATION

5.1. Conclusions

The aim of this study was to examine the determinants of food security in rural households of Banja woreda in Awi zone. Accordingly the findings of the study revealed that 62.7% of the households were food insecure and 37.3% food secured through the use of Household Food Insecurity Access Scale measurement. These food insecure households could not cover the recommended daily food intake of 2,100 kilo calories.

According to descriptive statistics of the sample farm households, the averages of variables such as household size were found higher with food insecure households than the food secure households. On the other hand, the food secure households have relatively greater averages on the farm land size, educational level of the head, number of livestock and number of oxen than food insecure households. In addition, it was found that fertilizer user households were better food secure as compared to their counterpart households. Similarly, it was found out that large family size has high influence in worsening the food security status of households. From this it is possible to conclude that households with greater household size are more likely to be food insecure as compared with households with smaller household size. Further descriptive analysis carried out to examine differences among food secured and food insecure households revealed that the former have more number of livestock, have greater average annual cereal product, have large amount of average land size per capita than the latter.

Land holding size was also found one of the important factors in ensuring food security to the households. Farmers with greater farm land size showed better food security status than the less endowed households. Having large farm land size is not only essential to produce enough crops but also is a determinant factor for farmers to use new technologies such as fertilizers, improved seeds and so on. But, the land holding in the study area is very low. Similarly, households who own smaller number of livestock is in a more food insecurity situation than those who have larger. Livestock enables the households to be food secure either through the income earned or by direct consumption. Lack of access to rural credit in turn has limited the potential of many

households to engage in various non-agricultural ventures to diversify their income and cope with seasons of food shortages.

Use of agricultural inputs that are used to improve productivity such as improved seeds and fertilizer is limited in the farm households as the utilization of such inputs requires the availability of financial capital. Therefore, given the poor productivity potential of the soil and poor agricultural management practices in the study area, the production obtained from such degraded lands could not sustain the food requirements in many farm households.

The result of binary logistic regression model indicated that six out of seven variables namely household size, farm land size, access to credit service, irrigation, off farm and livestock participation were found to be statistically significant as determinants of household food security in the study area. Family size of household head was found to be negatively related with probability of being food security. Farm land size, access to credit service, irrigation, off farm and livestock participation were positively related with probability of being food security. However, age did not show any significant influence. The statistical non-significance of these coefficients suggests that these variables are not important in explaining the of rural household food security situation.

However, the researcher believes that this is not a complete study to come up with solid solution to address the food insecurity situation in the study area. This is because the range of factors and elements that affect food security are complex and multifaceted in nature and not easy to comprehend. Therefore, effort has been made in this study to examine the effect of some demographic and socio-economic factors on household food security.

In general, in order to achieve the farm household's food security, strategies should be designed in a way that would focus on and address the identified determinants as well as other factors that are useful to achieve household food security.

5.2. Recommendations

1. The government and nongovernmental organization were expand and strength the off-farm and non-farm activities by providing training and credit services can supplement their income and gradually relieve the diminishing landholding size and to reduce food -+96insecurity.
2. Agricultural experts should pay close attention to rural farm households that have enhanced exposure and use information and knowledge to improve agricultural production, natural resource and overall well-being of the society.
3. The government strengthening both formal and informal education and skill training should be promoted to reduce food insecurity in Banja woreda. The more household head educated, the higher will be the probability of educating family member and familiar with modern technology adoption.
4. The government and microfinance institutions should timely delivery inputs and long-term credit services together the resources; technology and knowledge must be supported and strengthened in order to enhance food security in Banja woreda, Awi zone.
5. Advancing institutions in Banja woreda such as microfinance should make loan distribution time table like reducing the gap between application date and loan distribution date. This will help distribution of loan in time. Thus, encourages farmers to utilize the loan for a given objectives as intended time.
6. The government should give Proper attention to limit family size. Create sufficient awareness to practice family planning activity in the rural households. So that family size would be controlled through integrated education services.
7. In Banja woreda the government and stockholders should give Proper attention to increase food production and productivity through better access to livestock management practices, improved crop varieties with full management practices, and diversification of farm products with value addition. Besides, encouraging off-farm and non- farm income generation interventions such as public work and community projects could help in ensuring food security.
8. The community should be actively participate in the productivity of major cereal crops increased through the use of increased farm inputs such as fertilizers, improved seeds, pesticides, credit service, access to irrigation facilities and post-harvest management.

REFERENCES

Abebaw ,S.(2003). Dimensions and Determinants of Food Security among Rural Households in Dire Dawa, Eastern Ethiopia. M.Sc. Thesis. School of Graduate Studies of Alemaya University.

Adugna,E.(2008). Livelihood strategies and food security in wolayita, southern Ethiopia:The case of Boloso Sore district. Thesis submitted to rural development and agricultural extension to school of graduate studies of haramaya university, haramaya.

Agren, (1968): Food Composition table for Use in Ethiopia.Addis Ababa, Ministry of Agriculture and Sweden International Development Agency.

Alem, S.,(2007 a). Determinates of Food Insecurity in Rural Households TehuluderWoreda, South WelloZone of the Amhara Region, Addis Ababa UniversitySchool of Studies Master's Thesis, Ethiopia.

Alem, S.,(2007 b). Determinates of Food Insecurity in Rural Households TehuluderWoreda, South WelloZone of the Amhara Region, Addis Ababa UniversitySchool of Studies Master's Thesis, Ethiopia.

Amaza, P. S., J.C. Umeh; J. Helsen and A. O. Adejobi. 2006. Determinants and Measurement of Food Insecurity in Nigeria: Some Empirical Policy Guide. Contributed Poster prepared for presentation at the International Association of Agricultural Economists Conference, Gold Coast, Australia;

Andersson, C., Alemu, M. and Stage, S. 2009. Impacts of the productive safety net program in Ethiopia on livestock and tree holdings of rural households. Discussion Paper Series. Environment for Development (EfD) Initiative. EfDDP 09-05;

Ararso, G. S., Schultz, B. & Hollanders, P. (2009) Planning Water Management for Secure Food Production in Sub-Saharan Africa. Irrigation and Drainage, Vol. 58(5), pp. 509-521.

Asres, E., Makoto, N., Kumi, Y., Akira, I. and Arega, D. (2014). The Effect of Agricultural Extension Service on The Technical Efficiency of *Teff* (eragrostisTeff) Producers In Ethiopia: *American Journal of Applied Sciences 11 (2): 223-239, 2014 ISSN: 1546-9239*

Asres. E, Makoto. N, Kumi. Y, Akir. I, and Arega. D. (2014).The Effect of Agricultural Extension Service on The Technical Efficiency of *Teff* (eragrostisTeff) Producers In Ethiopia: *American Journal of Applied Sciences 11 (2): 223-239, 2014 ISSN: 1546-9239*

Barrett. CB, Reardon. T, Webb. P.,(2001). Non-farm income diversification and household livelihood strategies in rural Africa: concepts, dynamics, and policy implications.

Bashir M, Schilizzi S, Pandit R, (2012). The determinants of rural food security: the case of landless households of the Punjab, Pakistan. A school of Agricultural and Resource Economics, the University of Western Australia, Crawley

Befekadu Degefe and Berhanu Nega , 2000, Annual Report on the Ethiopian Economy, 1999/2000. Addis Ababa: Ethiopian Economic Association

Belay Kebede and Belay Kassa.1998: 'Factors affecting loan repayment performance of smallholders in the central highlands of Ethiopia: the case of Alemgena District', Ethiopian Journal of Agricultural Economics, 2(2): 61-89

Berhanu Gutema Balcha, 2001: Food Insecurity in Ethiopia: the Impact of Socio-political Forces. Institute for history, international and social studies in Aalborg. Working paper no.102. Aalborg University, Denmark.

Bewket. W. 2012. Climate change perceptions and adaptive responses of smallholder farmers in central highlands of Ethiopia. International Journal of Environmental Studies

Bogale .A And Shimelis,A. 2009a. Household Level Determinants of Food Insecurity in Rural Areas of Dire Dawa, Eastern Ethiopia; African Journal of Food, Agriculture, Nutrition & Development (9);

Bogale .A And Shimelis,A. 2009b. Household Level Determinants of Food Insecurity in Rural Areas of Dire Dawa, Eastern Ethiopia; African Journal of Food, Agriculture, Nutrition & Development (9);

Bogale. A, Shimelis .A. (2009): Household level determinants of food insecurity in rural areas of Dire Dawa, Eastern Ethiopia. Afr. J. Food Agric. Nutr. Dev. 9(9):1914-1926.

Bogale. A, Shimelis. A. (2009): Household level determinants of food insecurity in rural areas of Dire Dawa, Eastern Ethiopia. Afr. J. Food Agric. Nutr. Dev. 9(9):1914-1926.

Bonnard, P. (1999): Increasing the Nutritional Impacts of Agricultural Interventions. A paper presented at the Horn of Africa Workshop on Agricultural Policy, Resource Access and Human Nutrition, November 3 -5, 1999, Addis Ababa.

Bonnard, P. (1999): Increasing the Nutritional Impacts of Agricultural Interventions. A paper presented at the Horn of Africa Workshop on Agricultural Policy, Resource Access and Human Nutrition, November 3 -5, 1999, Addis Ababa.

Bouis. H. (1993): Food consumption surveys: how random are measurement errors? In: Von Braun J, Puet D (eds) Data needs for food policy in developing countries. International food policy research institute, Washington D.C

Caswell, M., Fuglie, K., Ingram, C., Jans, S. and Kascak, C. (2001). Adoption of agricultural production practices: Lessons learned from the US. Department of Agriculture Area Studies Project. *Agriculture Economic Report No. 792*. Washington DC Central and Southern Africa. Addis Ababa, Ethiopia, CIMMYT: 56-63.

Chang. HH, Wen. FI. (2011): Off-farm work, Technical efficiency and Rice production risk in Taiwan. Agricultural Economics 42(2):269–278.

Chauvin, Nicolas Depetris, Francis Mulangu and Guido Porto. 2012: Food Production and Consumption Trends in Sub-Saharan Africa: Prospects for the Transformation of the Agricultural Sector;

CSA. 2009: Annual Agricultural Sample Survey. www.csa.gov.et/Annual%20Agricultural% 20Sample%20Survey%20and%20 Enumeration.htm;

Dangnew. E. ,(1997): Seasonal and Exceptional Food Shortage. Their Causes and Socio-economic Consequences: A Case Study of Wolaita District in Southern Ethiopia.

Degefa .T. (1996): Belg crop production as a strategy of Households' Food security: A comparative study of Belg Grower and non-Belg farmers in Munessa Woreda, Arsi Zone. MA Thesis , Addis Ababa University, Ethiopia

Degefa T (2005): Rural livelihoods, poverty and food insecurity in Ethiopia, A case study at Erenssa and Garbi communities in Oromiya Zone, Amhara National Regional State, PhD Thesis series 2005:106, Norwegian University of Science and Technology, NTNU, Trondheim

Demeke, M., W. Amha, S. Ehui & T. Zegeye (eds). 1995: Food security, Nutrition & poverty Alleviation in Ethiopia: Problems & Prospects, Proceedings of Inaugural & First Annual Conference of Agricultural Economics Society of Ethiopia, Addis Ababa, (8-9 June);

Devereux, Stephen. 2000: Food Insecurity in Ethiopia: A discussion paper for DFID;

Diriba. G. (1996): Economy at the Crossroad - famine and food security in rural Ethiopia. Care International in Ethiopia, Addis Ababa.

Elias. M, Nohmi.K, and Ishida. A.(2015): Farmers' Satisfaction with Agricultural Extension Service and Its Influencing Factors: A Case Study in North West Ethiopia

Eshetu .B. (2000): The underlying causes of household food insecurity and copying strategies. The case of Ligambo Woreda, South Wollo Zone, Amhara region, Northern Ethioia. MA Thesis, Addis Ababa University, Ethiopia

Ezera. M. (1997): Demographic Responses to Ecological Degradation and Food Insecurity - Drought Prone Areas in Northern Ethiopia. Amsterdam, Ph.D. Dissertation

FAO World Food Summit. (1996): The State of Food Insecurity in the World, Rome.

FAO. (1999): Food and Agricultural Organization. Crop and Food Supply Assessment Mission to Ethiopia. FAO's Global Information and Early Warning System on Food and Agriculture. World Food Program, Rome, Italy.

FAO. (2002): International scientific symposium on measurement and assessment of food deprivation and under-nutrition. Executive summary. June 26–28. FAO/Food Insecurity and Vulnerability Information and Mapping System, Rome

FAO. (2004): Food and Agricultural Organization. The State of Food Insecurity in the World, Rome, Italy.

FAO. (2010b): Global hunger declining but still unacceptably high: International hunger targets difficult to reach. Economic and Social Development Department, Rome;

FAO. 2010a: Global hunger declining but still unacceptably high: International hunger targets difficult to reach. Economic and Social Development Department, Rome;

FAO. 2011: The Elimination of Food Insecurity in the Horn of Africa. Technical Cooperation Development

FDRE FSS. (1996a): Federal Democratic Republic of Ethiopia. Food Security Strategy. Addis Ababa, Ethiopia.

FDRE FSS. (1996): Federal Democratic Republic of Ethiopia. Food Security Strategy.

FDRE FSS. (1996b): Federal Democratic Republic of Ethiopia. Food Security Strategy.

FDRE FSS.(1996): Federal Democratic Republic of Ethiopia. Food Security Strategy.

Federal Democratic Republic of Ethiopia 2002,Food Security Strategy. Federal Democratic Republic of Ethiopia, Addis Ababa

Food and Agricultural Organization (FAO). (2014). The State of Food Insecurity in the World 2014: Strengthening the enabling environment for food security and nutrition, Rome, Italy.

Frankenberger .T. (1992) : Indicators and data collection methods for assessing household food security. In: Maxwell S, Frankenberger T (eds) Household food security: concepts, indicators, and measurements: a technical review. UNICEF and IFAD, New York and Rome

Frehiwot. F. (2007): Food Insecurity and Its Determinants in Rural Households in Amhara Region. School of Graduate studies, Faculty of Business and Economics, Department of Economics, Addis Ababa University,

Funmilola. FA, Patricia. OA.(2014): Determinants of food security among low-income households in Maiduguri Metropolis of Borno State, Nigeria. Asian Journal of Social Sciences and Humanities 3(1):74–86. ISSN:2186–8492

Gregory, P. J. 2013. Dorosh, P. and Rashid, S. (eds), Food and agriculture in Ethiopia—progress and policy challenges. Food Security 5, 475-476.

Haile .K, Alemu .G and Kudhlande. G.(2005). "Causes of Household Food Insecurity in Koredegaga Peasant Association, Oromia Zone, Ethiopia".working paper.

Haile, K. Alemu, Z. G. Kudhlande (2005a): Causes of Household Food Insecurity in Koredegaga Peasant Association, Oromia Zone, Ethiopia. Working Paper. University of the Free State, South Africa.

Haile, K. Alemu, Z. G. Kudhlande (2005b): Causes of Household Food Insecurity in Koredegaga Peasant Association, Oromia Zone, Ethiopia. Working Paper. University of the Free State, South Africa

Haile, K. Alemu, Z. G. Kudhlande (2005c): Causes of Household Food Insecurity in Koredegaga Peasant Association, Oromia Zone, Ethiopia. Working Paper. University of the Free State, South Africa

Haile. K, Alemu. Z, G. Kudhlande. (2005): Causes of Household Food Insecurity in Koredegaga Peasant Association, Oromia Zone, Ethiopia. Working Paper. University of the Free State, South Africa.

Hoddinott. J. (1999): Operationalzing Household Food Security and Development Strategies. International Food Policy Research Institute (IFPRI). Technical Guideline, No.1, Washington, DC.

Hoddinott. J. (1999): Operationalzing Household Food Security and Development Strategies. International Food Policy Research Institute (IFPRI). Technical Guideline, No. 1,

Washington, DC.

IFPRI (2009), Global Hunger Index (2009): International Food Policy Research Institute, Washington, D. C

IFPRI. (2002): International Food Policy Research Institute. Reaching Sustainable Food Security for All by 2020. Getting the Priorities and Responsibilities Right. Washington D.C.

Kefyalew. E. (2011): Fertilizer Consumption and Agricultural Productivity in Ethiopia: Ethiopian Development Research Institute Addis Ababa, Ethiopia

Kherallah et al (2002): Reforming Agricultural Markets in Africa. IFPRI. The John Hopkins University Press.

Kidane, H., Alemu, Z, and Kundhlande G.2005: Causes of household food insecurity in Koredegaga peasant Association, Ormia Zone, Ethiopia. Agrekon 44(3);

Kidane. W, Maetz. M., and Philippe Dardle.(2006): Food Security and Agricultural Development in Sub-Saharan Africa - building a case for more public support, FAO, Rome.

Koffio-Tessio .EM, YH. Tossou, KA .Homevor. (2005): Impact of education on agricultural productivity in sub-Saharan Africa. Paper presented at a "Global Conference on Education Research in Developing Countries", Prague, Czech Republic, 31 March–2 April

Little. P.D, M.R. Stone, T. Mogues, A.P. Castro and W. Negatu (2006): Moving in Place: drought and poverty dynamics in south Wollo, Ethiopia. In: Journal of Development Studies 42 (2): 200-225.

Maxwell.S,andFrankekberger.T.(1992):Household food security: concepts, indicators,Measurement. A Technical Review. UNICEF/IFAD.

McBriarty k., 2011: Factors Contributing toward Chronic Food Insecurity among Women in Rural Ethiopia. Report output of an internship with CARE Ethiopia‟s Chronically

Food Insecure Rural Women Program Design Team as part of a masters degree at Northumbria University (UK).

Mekonnen.M. (2000): Vice-Minister, Ministry of Development and Cooperation (MEDAC), Government of Ethiopia

Meles. T, Mesere.T, Miruts. M .(2016): Assessment of food security status and factors influencing food security in Hawi Guddina district, Ethiopia. Int Sch

MesfinWolde-Mariam. 1999. The Horn of Africa: Conflict and Poverty. Addis Ababa: Commercial Printing Press

Messay .M. (2009): Causes of rural household food insecurity: a case from Kuyu district, central Ethiopia. Clarion University of Pennsylvania, Clarion, Pennsylvania. J Sustainable Dev Afr 11(4):286–304

Messay .M. (2013): Resettlement and Food Security Nexus in Ethiopia: A Case Study from Nonno District. PhD Dissertation Published by LAMBERT Academic Publishers, Germany.

Messay M (2011): Determinants of agricultural productivity and household food security: Case studies from kuyu

Messay. M .(2009): Causes of Rural Household Food Insecurity: A Case from Kuyu District, Central Ethiopia. J. Sustain. Dev. Afr. 11(4):286- 304.

Miles, M. B., & Huberman, A. M. 1994: Qualitative data analysis: An expanded sourcebook. Thousand Oaks: Sage Publications.

Ministry of Finance and Economic Development (MoFED). (2012). Development and Poverty in Ethiopia: 1995/96-2010/11, Addis Ababa, Ethiopia.

Mucavele,F. G. (.2001).A Vulnerability and Food Security Study of Urban Maputo. Mozambique. FANRPAN, Harare

Muhamed, U. (2011): Market Chain Analysis of Teff and Wheat Production in Halaba Special district, Southern Ethiopia. Haromaya Universtiy. *Master Thesis.*

Mwanki. A. (2005): Achieving Food Security in Africa - Challenges and Issues. Cornell University. USA. Negash

Negash. M. (2000): Environment Depletion as a Way out to Seasonal Food Insecurity - the case of North Wello, Ethiopia. A paper presented on the First Rural and Local Development Studies International Policy Research Workshop, April 14 - 15, 2000. Addis Ababa.

Nyariki. D.M. and S. Wiggins. (2001): Household Food Insecurity in Sub-Saharan Africa - Lessons from Kenya. British Food Journal, 99, 249-262.

Obamiro. E, Doppler, Kormawa P. (2003): Pillars of Food Security in Rural Areas of Nigeria. Food Africa Internet Forum 31 March – 11 April.

Ojogho .O.(2010) : "Determinants of Food Insecurity among Arable Framers in Edo State, Nigeria". Agricultural Journal, 2010; l5: 151-156.

Oxfam Great Britain. (2004): Food Aid Impact Research - a case study in Atsbi and Wonberta Woredas.

Pappoe. P .(2011).:Effect of Biofuel production on household food security in the central region of Ghana. M.Sc. Theis, University of Ghana, Ghana

PenderJ., Ruben R., Jabbar M., and Eleni, G. (2004): Policies for Improved Land Management and Agricultural Land Management and Agricultural Market Development in The Ethiopian Highlands. Summary of Papers and Proceedings of a Workshop Held at The Ghion Hotel, Addis Ababa, Ethiopia.February 19 -20, 2004 IFPRI.

Ramakrishna. G, and Assefa. (2002): An Empirical Analysis of Food Insecurity in Ethiopia - the case of North Wello, Africa Development, 27 (1 & 2).

Ramakrishna.G,and Demeke. A. (2002): An Empirical Analysis of Food Insecurity in Ethiopia - the case of North Wello, Africa Development, 27 (1 & 2).

Reardon .T. (1997) : Using evidence of household income diversification to inform study of the rural non-farm labour market in Africa. World Dev

Republic of Ethiopia.1996: National Food Security Strategy. Addis Ababa

Reutlinger. S. (1987): Food Security and Poverty in Developing Countries. Baltimore. Johns Hopkins.

Sen, A. (1981): Poverty and Famines. Clarendon Press. Oxford.

Shiferaw, F., Richard L., Christy G. (2003). Determinants of Food Security in Southern Ethiopia: Food and Resource Economics Department, Institute of Food and Agricultural Sciences, University of Florida Gainesville, Florida 32611-0240

Shiferaw. F, Kilmer. R, and Gladwin.C. (2003): Determinants of Food Security in Southern Ethiopia - a selected paper presented at the 2003 American Agricultural Economics Association Meeting in Montreal, Canada.

Sijm. J. (1997): Food Security in Developing Countries - an introduction. Centre for Developing Planning. Unpublished M.A. Thesis Department of Geography.Addis Ababa University. Rotterdam,

Stamoulis. K, and Zezza. A.2003: A Conceptual Framework for National Agricultural, Rural Development, and Food Security Strategies and Policies. ESA Working Paper No. 03-17. Rome, Italy.

Svinicki, Marilla D. 2010: A Guidebook On Conceptual Frameworks for Research in Engineering Education; Rigorous Research in Engineering Education NSF DUE-0341127, DUE-0817461; systems. Renewable Agriculture and FoodSystems;

Tesfaye .B. 2003: Influence of land size on house hold food security.The Case of Deder District of Oromiya Region. A Thesis presented to the School of Graduate Studies. Unpublished. Alemaya University, Ethiopia.

Teshome, T. (2010). Food Security Situation in Eth: The Case of Amhara National Regional State: Graduate School of Economics, Ryukoku University, Kyoto, Japan.

Tsegaye G., 2009: Determinants of food security in rural households of the Tigray region. Thesis submitted to postgraduate studies of Addis Ababa University, Addis Ababa Ethiopia.

Urassa. JK. (2010): Rural household livelihoods, crop production and well-being after a period of trade reforms: a case study of Rukwa, Tanzania. Thesis for award of Ph.D degree at University of Sussex, Brighton, p 232

Vadala. A., 2009: Understanding Famine in Ethiopia: Poverty, Politics and Human Rights: Proceedings of the 16th International Conference of Ethiopian Studies, Trondheim 2009

Von Braun, J. and Webb, P. (1994): Famine and Food Security in Ethiopia -Lessons for Africa. IFPRI. John Wiley & Sons, Inc. Singapore

Wali.H. and J.Penporn, 2013: Determinants of Rural Household Food Security in Jigjiga District of Ethiopia.Kasetsart J. Soc. Sci., 34: 171-180.

Webb. P. (1992): Famine in Ethiopia - Policy Implication of the Coping Failure at National and Household Levels. Research Report 92. International Food Policy Research Institute. Washington D. C., Wilma, L., et al (2003): Socio-economic Determinants of Household Food Insecurity, Philippines. Woldemariam, M. (1991): Rural Vulnerability to Famine in Ethiopia, 1958-1977. Vikas Publishing House, New Delhi.

WFP & CSA. 2014: Comprehensive Food Security & Vulnerability Analysis (CFSVA): Ethiopia;(Available), http://www.csa.gov.ethttp://www.wfp.org/food-security/;

WFP . (2008): Food security bulletin: food security monitoring system. Rome: Yamane;

Wilma. L. (2003): Socio-economic Determinants of Household Food Insecurity, Philippines.

Woldemariam. M. (1991): Rural Vulnerability to Famine in Ethiopia, 1958-1977. Vikas Publishing House, New Delhi.

World Bank. (1986): Poverty and Hunger - Issues and Options for Food Security in Developing Countries. A World Bank Policy Study. Washington D.C.

World Bank. 2015: Ethiopia poverty assessment. The World Bank Group. Report No. AUS6744.

World Bank.(2005a): Ethiopian Fact Sheet. Addis Ababa, Ethiopia.

World Bank.(2005b): Ethiopian Fact Sheet. Addis Ababa, Ethiopia.

World Food program, 2011: Country program Ethiopia 2000253. Agenda item 8. Rome, Italy;

World Food Programme (WFP). (2009). Summary of Food Security and Vulnerability in Selected Urban Centers of Ethiopia: Addis Ababa, Ethiopia.

Yamane . 2008: Food security bulletin: food security monitoring system. Rome.

Yamane T. 1997: Statistics, an introductory analysis. 2nd ed. New York: Harper and Row.

Yeshak G, Gezahegn A., Tesfaye L. and Dawit A. 2014. Livelihood strategies and Food Security of rural households in Wolaita Zone, Southern Ethiopia.

Zegeye, T.& Hussien, H. 2011. Farm HHs' food insecurity, determinants &coping strategies: Fadis district, East Oromia, Ethiopia. Ethiopian Journal of Agricultural Economics 8 (1);

APPENDICES

Appendix 1: Questionnaires for respondents

A. English Version

JIMMA UNIVRSTY

College of Social Science and Humanities

Department of Geography and Environmental studies

Dear respondent Questionnaire code ☐

This questionnaire aims to assess the determinants of small farming household food insecurity in rural households of BanjiaWoreda. It is intended for academic purpose only for preparation of a thesis. Your first hand information has a paramount value for me and your answers are fully confidential and no harm to you. Thank you so much for your cooperation!

Personal information

INSTRUCTION: The questions given below are followed by possible alternative responses. So please indicate your responses by selecting the appropriate alternative for each item by writing tick mark " √ "

1. Sex of the respondent 1. male ☐ 2. female ☐
2. What is your age?
3. Marital status 1. Married 2. Single 3. Divorced 4 .widowed
4. What is your educational background? 1=cannot read and write 2. Can read & write 3= Grade ^{1th} -^{4th} 4= Grade ^{5th} -^{8th} 5. Grade ^{9th} -1^{2th} 6. Graduated
5. How many members of family do you have?

Economic related questions

6. During the last 2010 and 2011 years, did your family suffer shortage of food to eat?

1. Yes 2.no

7. If you say yes to qustion6, how did you secure your household food security?

1. Aid 2.credit 3.borrow food/money from relatives 4.other (specify)_____

8. What employment and income earning opportunities are available your household food?

(You may choose more than one)

1= only own farming (self-employment) 3= farm laborer (work on other farms

2= own non-farm employment (trading crafts) 4=migration to work in other areas

5=other (specify)_____

9. Did you have your own land for cropping and pasture? 1=yes 2=no

10. If you say yes to question 9, how much is your total farm land size? (Using hectare)

---

11. During the last 2009 and 2010 years, did you participate in any off- farm income generating activities? 1=yes 2=no

12. Did you have your own livestock? 1=yes 2=no

13. If you say yes to question 12, how many of the following livestock do you have?

Types of livestock	Currently owned on farm (number)
Oxen	
Cows	
Bulls	
Heifer	
Calves	
Sheep	
Goats	

Horses	
Donkeys	
Mules	
Camels	
Chickens	
Other	

14. How much of the following cereals did you harvest during 2010 to 2011years? (Using local measurement unit k.g)

Barely_____ Sorghum_____

Teff _____ Wheat_____ Others_____

Agricultural technology adoption related questions

15. During the last 2010 and 2011 years, have you used agricultural technologies (fertilizers, Pesticides)? 1=yes 2=no

16. What types of fertilizer do you have used?

1. Dap 2. Urea 3. Urea & Dap 4. Compost

17. How many quintal fertilizer do you use? 1.one 2.one&half 3.two 4.two& half 5.above2.5

18. What type of pesticide do you use? 1. Insecticide 2.herbicide 3.both 4.none of them use

19. Did you use improved seeds? 1=yes 2=no

20. Did you get access to utilize irrigation system? 1=yes 2=no

21. How many ha of irrigation land do you have? 1.half 2.one 3. one half 4.two 5.above2.5

22. What type of crop do you grow with use irrigation? 1. Vegetable 2.fruit 3.vegetable& fruit 4. Crops 5. Other

23. How many times do you grow crops annually with use irrigation? 1. once 2.two times 3. I can't utilize 4. Other

24. What type of irrigation system do you practice? 1.tradational 2.modern 3.I can't utilize

Institutional related questions

25. Did you have access credit service to secure your households food during bad harvesting year? 1=yes 2=no

26. During bad harvesting year did you get food aid? 1=yes 2=no

27. What is your attitude towards food aid? 1=food aid is good 2=food is not good

28. Who supply better seed? 1. Agricultural office 2.commerce 3.others

29. Who presents fertilizer? 1. Agricultural office 2.commerce 3.others

30. Who advises the type of crops to be grown? 1. Elders 2. Agricultural experts 3.tradationaly

31. Are you a member of farmers' cooperative? 1=yes 2=no

32. Did you get benefit from service of farmers' cooperative? 1=yes 2=no

33. How much did you estimate the total income product per year? (Using local measurement unit in kg)

Total grain produced by household ----------

Total grain purchased by household----------

Total grain obtained through food-for-work by household----------

Total relief grain food received by household----------

Grand total ----------

34. How much did you estimate the total expenditure product per year? (Total amount using the local unit of measurement)

Post-harvest crop losses to household----------

Total crop utilized for seed by household ----------

Total market output by household ----------

Grain used for social events by household ----------

Grains given out to relatives by household----------

And repayment of grain borrowed by household----------

Grand total ----------

Appendix 2: Questions for key informants

The following checklist uses with questions to guide informants interview that held with kebele and District experts

1 .In your opinion, what factors affect farmers' food security situation?

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2 . What looks like the supports of district and kebele agricultural workers?

---

3 How the households' food security situation improved?

Appendix 2: Binary logistic regression model

		B	S.E.	Wald	Df	Sig.	Exp(B)	95% C.I.for EXP(B)	
								Lower	Upper
Step 1[a]	AGE OFHH	.311	.662	.220	1	.639	1.364	.372	4.998
	OFFARM	.391	.193	4.099	1	.043	1.479	1.013	2.159
	IRRIGATION	3.198	1.075	8.849	1	.003	24.476	2.977	201.257
	TOFAMSIZE	-.056	.013	17.289	1	.000	.946	.921	.971
	CREDIT ACSSE	.343	.195	3.102	1	.078	1.409	.962	2.06
	FAR LANDSIZE	1.265	.708	3.190	1	.074	3.544	.884	14.210
	Constant	37.738	9.765	14.936	1	.000			

a. Variable(s) entered on step 1: AGE OFHH, TOFAMSIZE , ATTUDOFAID, IRRIGATION , OFFARM ,CREDIT ACSSE, FARM LANDSIZE