ADDIS ABABA UNIVERSITY
SCHOOL OF GAJUATE STUDIES
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DEMOGRAPHIC, ENVIRONMENTAL AND SOCIO-ECONOMIC DETERMINANTS OF FOOD INSECURITY AT HOUSEHOLD LEVEL IN BANJA *WOREDA* AWI ZONE AMHARA REGION

BY:
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Demographic, Environmental and Socio-economic Factors of Food Insecurity at Household Level in Banja Woreda, Awi Zone Amhara Region

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DEDICATION TO MY

Father Muluneh Akal

Mother Enatnesh Kassahun

Brother Chekole Muluneh

Sister Bogalech Muluneh

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years age of children about 52% are stunted, 47% are underweight and 11% are wasted (FDRE, 2002).

A combination of factors has resulted in serious food insecurity in Ethiopia. population pressure, land degradation, recurrent drought, decline in crop and livestock productivity, small size of farm plots, low level use of modern agricultural inputs, lack of access to credit services, lack of infrastructure, lack of social service, soil erosion and deforestation are the major causes of food insecurity in Ethiopia (Degefa, 2002, FDRE, 2002; Yared, 2001).

In order to break the cycle of household food insecurity problem of rural people various development strategies and programs have been implemented in different food insecure parts of the country. The government of the Federal Democratic Republic of Ethiopia (FDRE) has had an economic development strategy, which is built on four building blocks. These are Agricultural Development Led Industrialization (ADLI), Justice System and Civil Service Reform, Decentralization and Empowerment, and Public and Private Sectors Capacity building. ADLI has been seen as along-term stratagem to achieve faster and broad-based economic growth and development by making use of technologies, which are labor-intensive, but land augmenting such as chemical fertilizers, improved seeds and other agricultural practices (MOFED, 2002 cited in Adinew, 2007).

The government of Ethiopia has recently embarked upon a new initiative called Productive Safety Net program. It has planed to reach more than 8 million chronic food insecure people within the period 2005-10. Initially, 5 million people in about 263 *woredas* of 8 regions would be targeted in the year 2005 (Fekadu, 2007). Under this program, two approaches are used to meet the problem of food insecurity. The first approach, which provides access to food mainly through employment, supports chronically food insecure households. The second group consists of those who fall in to transitory food insecurity caused by temporary environmental and other disasters. These only require emergency assistance, which will be terminated as soon as conditions return to normal (Forum for Social studies (FSS), 2007). The objectives of PSNP are to provide households with enough income (cash/ food) to meet their food gap and thereby protect

their household assets from depletion. And to built community assets to contribute to addressing root causes of food insecurity (Ibid).

1.2 Statement of the Problem

Various studies confirmed that in Ethiopia food insecurity is widespread. For instance, the country has been facing serious food shortages at least once in ten years since 1889 but more recently in less than ten years (Shumiye, 2003). Even during normal production years, millions of Ethiopians have lacked adequate food supplies each year and have depended upon food assistance. About 30 million people were at risk of food insecurity at the turn of the century (Fassil, 2005). However, the seriousness of food shortage varies from one area to another depending on the state of the natural resources and the extent of the use of these resources (Degefa, 2005).

In Ethiopia, more than 80% of the population depended on agriculture (MOI cited in Dulla, 2007).But agriculture cannot meet the food requirement of the rural households. In rural Ethiopia, 49% of the population is food insecure (Diao and Eleni, 2005). According to the survey conducted in Amhara region in 2003, about 75.6% of the sample rural households responded that they do not have enough stock until the next harvest. The proportion population that was chronically affected by food insecurity was about 17% of the total population of the region and 36% of the total population living in the food insecure *woredas* (Bureau of Agriculture and Rural Development, 2003).This is shows the low-level productivity of agriculture.

And agricultural productivity is constrained by backward agricultural technologies, population pressure, environmental and natural resources degradation, poverty, weak institutional capacity to uproot the causes of food insecurity, inadequate infrastructure and social services and inappropriate policies which in turn cause food insecurity (Getahun, 2003: FDRE, 2003).

In addition to these, the use of low level improved and modern agricultural inputs such as fertilizer, improved seeds, pesticides and herbicides, traditional farm implements and tools, post harvest technology and inadequate extension service in general hamper the

growth of agricultural production in general and food production in particular (Getahun,2003).

The high population pressure in rural areas leads to high land fragmentation, which again leads to the shortage of cultivated land and reduction in per capital land size available for farming. This brings low agricultural production and productivity. Households with small plots cannot produce enough grain to meet their consumption requirements, For example, 'between 1960 and 1990 the population increased from 23 to 48 million while per capital food output collapsed by 41 % from 240 to 142 kg' (Befekadu and Berhanu, 2001). Because of population pressure, deforestation, overgrazing, declining of productive farmlands and unemployment had been dramatically increased in rural Ethiopia (FDRE, 2003; Getahun, 2003).

Environmental and natural resource degradation reduce food production through recurrent drought, ecological imbalance, soil erosion and loss of soil fertility. In Ethiopia, the most important negative impact of land degradation on food production is manifested in stagnating, decline yields, and high levels of poverty (FDRE, 2003; Getahun, 2003).

In Banja *woreda*, mixed agriculture is the main economic activity of the population, which is totally depending on rainfall. In addition, it is highly populated area (*Woreda* Administion/er). The study area also faces a problem of food insecurity. From 25 *kebeles* 10 were seriously and the other 7 *moderately* affected by food shortage problem. Totally, 17 out of 25 *kebeles* were food insecure. Only 8 kebeles were identified as food secured. In addition, Banja *woreda* is one of the four food insecure *woredas* of Awi Zone (an assessment made by Amhara region's food security office, 2008). According to the chairman of the *woreda* agricultural and development office, most of the students in this *woreda*, drop out their education and go to another area to find work for food. If it continues like this, he said, the *woreda* would lay in a serious problem because only old age people will be left in the household

Since the macro-level analysis of the problem of food insecurity cannot fully addressed the disparities at the micro-level, which will result in general recommendations to the

widely varying local situations. Therefore, it deserves analysis of food insecurity status at the household level to come up with various mechanisms of combating the problem. Therefore, this study was conducted to examine determinant factors that affect food security status of the people in the *woreda* at household level.

1.3 Objectives of the Study

The general objective of the study was to explore demographic, environmental and socio-economic determinants of food insecurity at household level. The specific objectives were:

- To examine, the impact of demographic variables: sex and age of head, household size and dependency ratio on household food security status;
- To examine the influence of is educational level of the head of the household in relation to household food security status;
- To examine the level of people's access to productive assets such as land, modern inputs, livestock ownership and financial capital in the view of their impact on household food security status;
- To examine biophysical constraints: rainfall and soil quality, in the view of their impact on household food security status;

1.4 Hypotheses of the Study

H1-The probability of being food insecurity increases among female-headed households than male-headed households

H2- As the age of the household head increases (with in economically active age group), the risk of food insecurity decrease

H3- Large household size is positively related with household food insecurity

H4- Household head educational attainment is negatively related to household food insecurity

H5- The size of farmland has an inverse relation with household food insecurity.

H6- Large number of livestock ownership is inversely related with household food insecurity.

1.5 Significances of the Study

So far, no study has been conducted on the issue of food insecurity in Banja *woreda*. Therefore, the findings of the study may provide knowledge about the role of demographic and socio-economic determinants that cause food insecurity. In addition to this, the findings may be useful in initiating the regional and local planners and decision makers to implement their development programs. Moreover, the result of the study may serve as a stepping-stone for further study.

1.6 Scope and Limitations of the Study

Food insecurity is determined by demographic, environmental, socio-economic, socio-cultural and political factors. However, the analysis of this study will not entertain socio-cultural and political factors. As a result, this study may not show all factors of food insecurity.

Household food insecurity analysis is a complex activity. As it is the collective effect of a number of quantified and non-quantified factors that have direct and indirect influences. Households are also heterogeneous in the assets they have and outcome they want to achieve. This requires the consideration of large sample size, however, due to limited resources; the study was restricted only 390 households. Hence, the explaining power of the data may be affected.

1.7 Organization of the Thesis

The thesis is presented into six chapters. The first chapter is an introductory part, which incorporates statement of the problem, objectives, hypothesis, significance and limitations of the study. The second chapter is devoted to literature review and analytical framework of the study. The third chapter deals with research methodology; such as sampling design, data set, ethical consideration, methods of data analysis and variable identification. Chapter four presents the general backgrounds of the study area. Chapter five discusses the results of the study. The final section is devoted to conclusions and recommendation.

period of time. Chegar implies poverty and explains starvation as a result of deprivation and deteriorating economic conditions, and kifu-kene denotes bad day or evil day resulting in premature mortality and emaciation (Getachew, 1995).

2.1.2 Major Types of Food Insecurity

Depending on the time of persistence, the food insecurity can be chronic (permanent) & acute (transitory) (Dgefa, 2002). Chronic food insecurity is a continuous food inadequacy caused by the inability to acquire food (constant failure in access to food). It affects households that lack the ability to either buy or produce enough food. Its root causes could be poverty, fragile natural resources base, weak institutions (notably markets & land tenure) & inconsistent government policies (Devereux, 2000).

Acute (transitory) food insecurity is a temporary decline in household's access to enough food. Its causes could be drought, flood, migratory pests, fluctuations in income or prices etc. It can be further divided in to temporary & cyclical (seasonal) (Thomson and Metz, 1998). Temporary food insecurity occurs for a limited time because of sudden and unforeseen or unpredictable circumstances (like drought or pest attack) that affect households' entitlements. For urban households, sudden unemployment may also be the cause for temporary food insecurity. Cyclical (seasonal) food insecurity occurs when there is a regular pattern in the periodic inadequate access to food. It is possibly due to logistical difficulties or prohibitive costs in storing food or borrowing, particularly when it is difficult for households to borrow to even out flows of food overtime (Adinew 2007).

2.1.3 Components of Food Security

Food security has four central ingredients or pillars. These are food availability or adequate food production, economic access to available food, use/utilization and time (sustainability or stability) (FAO, 2006).

i. Food availability

It refers to the sufficient supply of foodstuffs in a country from production or imports for all people. In this regard, there is a "basket" of food available for a population to consume but this concept says nothing about how it is distributed.

ii. Food accessibility

It refers to the ability (entitlement) to acquire food for consumption. It may be through purchase, production or public assistance (gift or inheritance). Food may be enormously available but not necessarily accessible. Hanger & famine, for example, could occur in the absence of any change in food production if the value of people production & work activities declined relative to the cost of staple food. That is, food availability is not a necessary & sufficient condition for food entitlement. Food accessibility considers questions of distribution (Adinew, 2007).

iii. Food utilization

It concerns the physical use of food derived from different sources for human consumption. It may be true that food is available to individuals who have access but nutrient deficiencies or health problems may result from the imbalanced diet of food that is consumed (Ibid).

iv. Time (sustainability)

It refers to the sustainability or security issues for how long the security persists (Maxwell and Frankenberger, 1992).

2.1.4 Theories and Discussions on Food Insecurity

It is known that food insecurity is a complex and multi-pronged issue. As a result, many scholars tried to develop several paradigms about achieving economic growth in general and attaining food security in particular. The general explanation theory mainly emphasizes on the impact of drought, land degradation, political instability and population pressure on the performance of food security situation

2.1.4.1 Demographic Theories (Population Growth vs. Food Availability)

In the area of population studies, there exist two broad divergent and competing theories regarding the nexus between population growth and food availability. There are pessimistic (Malthusians) and optimistic (Boserupian) theories (Marguette, 1997).

According to Serviastaval (2004)cited in Adane (2008) the Malthusian arguments are, population and the demand of food increases over time but natural resources especially arable land are limited in supply.

Malthus considers population as dependent variable and environment and technology as independent variable that determine the size of population that could survive in a given environment. The implication of this view is that saturation acts as a natural check on population growth, with famine maintaining equilibrium between the need for food and food supply (Ibid).

Contrary to Malthus, Boserup considered population independent variable, and technology and environment (land resource) as dependent variable. Further population growth is mandatory and indispensable technological transformation and effective and efficient use of natural resource (Marguette, 1997).

Boserup sees population growth as a force favoring an adaptation and diffusion of technological innovation that expands agricultural production there by reducing vulnerability to food insecurity and hunger. She argues that the positive effect of population concentration is by making financially feasible investments in infrastructure (water, irrigation, energy, transport, and improved production technologies etc) (Marguette, 1997; Degefa, 2005).

2.1.4.2 Climatic Theory

Drought or flood causes crop failure and can lead to famine in rain-fed agricultural areas. Both scarcity and excessive water have adverse effect upon crop and livestock assets, which form the main resources of livelihood for subsistence peasants. Drought manifests itself not only in reducing production but also through adverse effect. That it brings about in terms of reducing rural employment and raising food prices on the market (Degefa, 2005). Devereux and Maxwell 2003, also explain drought as it can lead to famine through the following reasons.

> *First, it reduces crop, which undermine direct access to food by producers. Second, drought reduces the values of assets that people can sell to buy food. Third, drought raises food prices because large numbers of people shift from being self-sufficient food producers to being market dependant consumer. Forth, drought reduces employment opportunities because of its negative effect all local economy: and finally, drought*

reduces informal support system because of covariate risk (Devereux and Maxwell, 2003; cited in Adane 2008:10).

Many famine disasters that caused the death of millions of people in sub Sahara Africa and south Asian countries over several decades witness this. For instance, the Ethiopian famine in 1958, 1973, 1984/85, and 2001/03 are partly explained by drought and resultant crop failure and mass deaths of livestock (Fasil, 2005). Drought causes also reduction of rural employment and drastic increases of food price in the market (Degefa, 2005).

2.1.4.3 Disaster Theory

Disaster happens only if a hazard meets a vulnerable situation. Hazard is an event that could lead to danger, loss or injury. People are vulnerable to disaster when they are unable to adequately anticipate, withstand and recover from hazards (Wisner and college, 2001 cited in Adane 2008). The concept of vulnerability reveals two important issues. The first addresses the pre-crisis condition, which is incapability to cope with the external shocks. The second issue is the post crisis where by a household fails to readily recover from the effect of the shocks (Degefa, 2005).

2.1.4.4 Sustainable Livelihood Framework and the Analysis of Food Insecurity (SLF)

The analysis of food insecurity though SLF has become popular because it provides a practical tool kit for linking the analysis with multi-dimensional and people centered analysis of poverty-looking beyond income and consumption levels to include an assessment of people's strategies, assets and capabilities (Devereux,2004 cited in Adane 2008).

The SLF includes five elements these are vulnerability context, livelihood assets, transforming structures and processes, livelihood strategies, and livelihood outcomes (DFID, 2000). From these elements vulnerability context and livelihood assets are the main component of household food insecurity analysis (Adane, 2008)

Vulnerability context: refers to the eternal environment in which people exist and negatively affect people's livelihood asset (Deveruex, 2001). Vulnerability contest

comprises trends (of demographic, resources), shocks (such as human health shocks, natural shocks, crop/livestock health shock), seasonality (of rainfall, prices, production, employment opportunities etc). The most important characteristics of these factors is that they are not susceptible to control by local people themselves, at least in the short and medium term(DFID,2000 cited in Dulla 2007).

Livelihood assets: the ability of the household to be food secure depend on possession of livelihood assets. These assets or capitals in the SLF are generally grouped in to five. These are natural, physical, human, financial and social.

Natural capital: refers to land, water and water and biological resources that utilized by people for their daily means of survival. This capital is particularly important for households whose livelihood is totally or partly dependent up on the natural resource base (Degefa,2002).

Human capital: Human capital represents the skills, knowledge, ability to labor and good health that together enable people to pursue different livelihood strategies and achieve livelihood objectives in general and food security in particular(Adane, 2008).

Physical capital: Refers infrastructures such as transport, shelter, irrigation, and production equipment, which enable people to pursue their livelihood (Scoons, 1998 cited in Adane, 2008). Physical capital influences the sustainability of livelihood system in general household food security in particular through the notion of opportunity costs or trade-offs, as poor infrastructure can preclude education, access to health services income generation (Dulla, 2007).

Financial capital: Financial capitals are resources that people use to achieve their livelihood objectives. There are two sources of financial resources. These are an available stock, which comprises cash, saving and liquid assets, and regular inflows of money such as labor income, remittances and so on. Financial capital is the least available and the most versatile as it can be converted in to other types of capital (Kollmair and Gamper, 2002 cited in Dulla, 2007).

requirement level that is 2100 kcal per person per day which is equivalent to 225 kg of grain per person per year (Workneh, 2006).

A research conducted in Northern Shewa of Amhara Region, shows that 72.7% of the total sample households have been taking daily per cap capita calories below the minimum recommended intake (Girma, 2007). And a research conducted in Jmma Arjo District also shows that the livelihood of only 17.2% of the sample households is found to be sustainable (Dulla 2007).A study in Western Hararghe, Daro-Labu *woreda* also shows 68.9% of the sample households categorized themselves food insecure (Adane, 2008).

The number of people who were dependent on food aid in early 1970 has increased from 1.5 million to 14.5 million in 2002/3 (Samuel, 2005). Debebe 1995 also explained that between the period of 1980 and 1994 the proportion of import volume to domestic production has ranged between 6 % and 24% that is per capital food import raised from 10kg relatively during good years to a level 30kg during bad years. Generally, at national level, the country has been threatened many times by strong food insecurity problem.

2.2.2 Determinants of Food Insecurity in Ethiopia

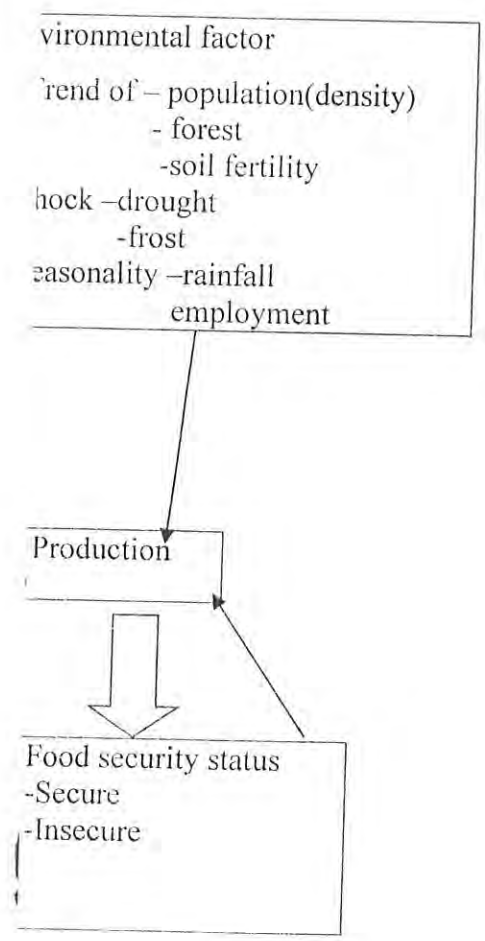
Kefle and Yoseph (1999) attribute the food insecurity situation in Ethiopia to the combination of human made as well as natural factors. like fragile natural resources base, inadequate and variable rainfall, improper farming practices, lack of access to improved inputs loss in arable land ,poor storage technology, poor transport and infrastructure, unfavorable population growth, civil war as well as program implementation problems have resulted in a serious and growing problems of food insecurity in Ethiopia.

Dagnew(2000) also summarized that the major factors that contributed to food insecurity in Ethiopia. These include: the widening gap between food production and population growth, continuing degradation of natural resource base, natural disaster (recurring drought), a limited access to agricultural technologies and inputs, lack of all appropriate development policy, lack of access to formal credit and banking, weak private sector, weak investment in agricultural input or out put market related service, displacement of people and women's luck of access to resources.

A study on food security constraints in Ethiopia by Wolday Amha cited in Adinew (2007), in northern Ethiopia indicate landholding size is the main constraint (84%) for achieving food security. There are also other constraints such as high prices of inputs (67.4% of the respondents) in sufficient rainfall (64.2 of respondents). Population growth (62.8% of the respondents) pest and disease (35.8% of the respondents), land degradation (35.4% of the respondents), malaria (33.3% of the respondents), limited access to credit (28.8 of the respondents) which causes food insecurity.

2.2.3 Determinants of Household Food Insecurity

Food security is a complete phenomenon attributed to a range of factors that vary across regions, countries and social groups as well as over time. These factors range from immediate factors that affect food supply at household to the basic factors that affect the overall food security of a given country. Specially food insecurity at household level a rises from several causes and is devastating when more than one cause occur together (Devereax, 1993).



Number of oxen, size of livestock, labor, and size of land holding is the most important factor or determinants of the household food security status (Yared, 1999). Better food secure households are characterized by having better size of land, a pair of oxen and above. better size of other animals and better family labor. where as, poor household are characterized by low size of landholding, no ox or one ox only or small animals, lack of labor, low productivity, grain shortage, minimal access to cash credit, newly established, elderly female headed and disabled households. Workneh (2006) has suggested that cultivated land size number of oxen, size of other livestock and amount of non-income has showed significant role in enhancing household food security.

survey, pre-test survey was done to check the compatibility of the questionnaires with local realities. Then some adjustment of questionnaires was made and the real survey has conducted.

To collect the data, four agricultural and development workers of the respective *kebele* and four preparatory program students, those who know the language and culture of the study area, were recruited and trained for two days on the contents of questionnaire, ethical issue and general approaches of the data collection.

Besides the survey questionnaire, four (FGDs), one at each *kebele* were held to collect data on environmental factors of food insecurity or vulnerability context. Such as, trends (of population, forest, soil quality); shocks (like drought, frost, crop/livestock disease); seasonality (of rainfall, employment opportunity); whether there are gender differentials to access productive assets; and the main constraints of crop production / animal rearing. One group had five to seven voluntary members from different age groups, different economic status and both sexes. The head of the *woreda* agricultural office and the administrators of the *kebeles* were contacted as key informants to collect information on the same issue provided to FGDs, the main determinant factors of food insecurity and how they cope up with.

3.3 Ethical Consideration

First, letter of support was written by Institute of Population Studies of Addis Ababa Univer ity based on which the office of administrations of the *woreda* wrote letter of support for data collectors. Secondly, the sample households were informed before respon ing to the questions that their response will be kept secret and use only for study purpose. Thirdly, households were informed that they have full right not to participate at all or n t to respond to any of the questions.

3.4 Methods of Data Analysis

The analysis of food insecurity is a complex activity because of the cumulative effect of the number of factors that can be quantitative or qualitative with direct or indirect influences. Due to this reason, various techniques of analysis (food balance model,

descriptive statistics, bi-variet and multivariate) were employed to address the objectives of this study.

Information generated from key informant interviewees and focused group discussion were analyzed by using qualitative techniques, while the quantitative data, household sample survey data, were coded and entered into software known as Statistical Package for Social Science (SPSS). Then the specific methods of data analysis like cross tabulation and computation of descriptive statistics such as frequency, percentage, mean were carried out. Regarding inferential statistics, chi-square test was used to test whether there is an association between dependant and independent variables. Based on the bi-variant analysis (chi-square), some variables were selected according to their predictive power and further analysis continued by using multi-variate logistic regression to test the net effects of independent variables on the dependant variable. Binary logistic was selected for model fitting because the dependant variable was dichotomous (food secure or food insecure).The logistic regression function for household food security status is explained by the following model $1\text{-}Pi = 1/1+e^{-(a+bx)}$

Where a = is an intercept

b = slop/logit parameters

P = probability that households being food secure

X = predictor variables

The probability that household is being food insecure (1-Pi):

$$1\text{-}Pi = e^{-(a+bx)}/1+e^{-(a+bx)}$$

The odds ratio which is the ratio of the probability that households is being food secure to the probability that households being food insecurity (Pi/1-Pi)

$$\text{Log } (P/1\text{-}P) = a+bx$$

Hence, based on log odd, logistic regression can be interpreted as changed in log odds due to one unit change in the predictor variables.

3.5 Household Food Balance Model

The household food balance model has been utilized to quantify available food at the household level (Degefa, 2002). In this study, it can be applied in the following way for 12 months.

Fcij = (Fpij + Fbij+ Faij)-(Flij + Frij + Fsij)

Where Fcij = net food consumption for household i in year j.

Fpij = total food produced by household i in year j.

Fbij = total food purchased by household i in year j.

Faij = total food from other sources (food aid) by i in year j

Flij = post harvest loss to household i in year j (10%) (Degefa, 2002)

Frij = total crop utilized for seed from the home by the household i in year j (5%)(Airham,2004 cited in Girma, 2007)

Fsij = total grain sold by household i in year j.

All the data needed for the model with the exception of post harvest loss and seed reserve were collected through household survey. According to the above model, all grains and animal products available for households from all possible sources were converted in to kilocalories with respective crop types and animal products.

After determining the total kilocalorie of the household consumed per annum, then divided it by the total number of household size, which has converted to adult equivalent to get the mean per capita kilocalorie intake per annum. The mean daily per capita kilocalorie intake was calculated by dividing the mean per capita kilocalorie intake per annum to the number of days in a year (3651/4). Then the result will be compared with the minimum recommended daily requirement kilocalorie that an individual person should obtain from all foods to be active and healthy i.e.2100 kilocalories.

3.6 Variable Identification

Dependant variable(Y) is the daily per capita food availability for each household estimated by Household Food Balance Model for 12 months (September 2008 to August 2009) both are inclusive. Households who had less than the minimum recommended daily-required kilocalorie i.e. 2100 were given the value of 1, and 2 for those who had greater than or equal to 2100.

Predictor variables (independent)

In this study, the predictor variables are categorized in to demographic, socio-economic and environmental factors.

Demographic variables

.1 = Sex of household head (1= male, 2= female)

.2 = Age of household head (1= ≤ 44, 2 = > 44). 44 is mean age.

.3 = Family size, it is the total number of persons living in a household being converted to adult equivalent (1= < 4.5, 2 = ≥ 4.5). 4.5 is the mean family size.

.4 = Dependency ratio, it is the ratio of number of economically dependant household members to economically independent members (1= ≤ 2, 2= >2).

Socio-economic variables

X5 = Land size, the amount of land that the household owned (1= <2, 2= ≥ 2).

X6 =Education, education status of head of household (1= Illiterate, 2= Literate).

X7 =Labor force size, the available of labor force size in the household. This is converted to man equivalent labor force (1= <3, 2= ≥3).

X8 = Livestock ownership, the size of livestock that a household owns. It is in Tropical Livestock Unit (TLU) (1= < 10, 2= ≥10).

X9 = Access to draught power (1= yes, 2= no).

X10 = Distance from the main road in minute (1 = ≤ 60, 2 = 61-120, 3 = >120).
X11 = Distance from market center in minute (1 = ≤120, 2= >120).
X12 = Saving in kind or in cash (1 = yes, 2 = no).
X13 = Remittance (1 = yes, 2= no).
X14 = Credit (1 = yes 2 = no).

X15 = Participating in non-farm activity (1= yes, 2= no).

X16 = Applied chemical fertilizer (1= yes, 2 = no).

X17 = Use improved seed (1 = yes, 2 = no).

X18 = Use manure (1 = yes, 2= no).

X19 = Use irrigation (1 = yes 2 = no).

Environmental factors

X20 = Average land fertility status (1 = poor, 2 = moderate).

CHAPTER FOUR: BACKGROUND OF THE STUDY AREA

4.1 Physical Setting of the Study Area

4.1.1 Location

Banja *Woreda* is located in Awi Zone; Amhara National Regional State (ANRS). Engibara is the capital city of Banja *Woreda* and Awi Zone. It is found at a distance of 452 km. from Addis Ababa to the North West and 122km from Bahir Dar, the capital of the ANRS.The study area is bordered in the North with Fagta Lekoma, in the South Ankesha Guagusa, in the East Sekela, and in the West Guangua. The total area of the *woreda* is 47,915 ha or 479.15 km^2.

4.1.2 Agro-Ecology

According to *Woreda* Agricultural and Rural Development office, the *woreda* has two agro-ecological zones. These are *dega,* which covers 80%, and *woina-dega* 20% of the total area of the *woreda.*

4.1.3 Soil Type

According to the *woreda* natural resource conservation department, in the study area there are three types of soil; these are clay soil, which covers 70%, sandy soil 20%, and silt soil 10%. Therefore, clay soil is the dominant one.

4.1.4 Land Use

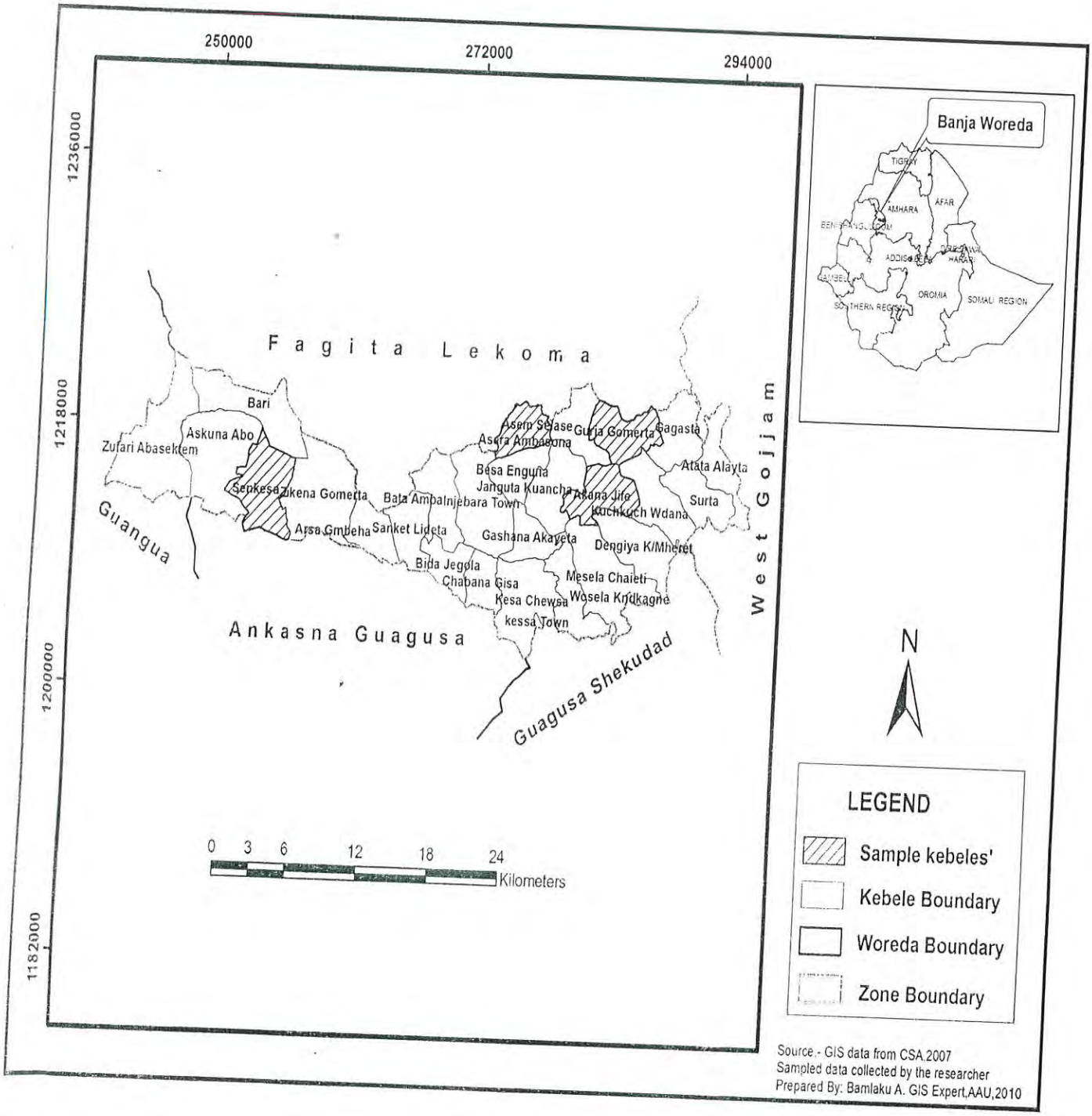
The total area of the *woreda* is about 47,915.8 ha. From this about, 48% of the area of the *woreda* is potentially cultivable; 24% grazing land; 23% is covered with forest and woodland; and 5% is under other land use and cover type.

Table 4.1 Land distribution by land use pattern of Banja *woreda* 2008/9

Land use and cover type	Area (ha)	Percentage
Cultivable land	23128.7	48
Grazing land	11462.9	24
Forest & wood land	10541.3	23
Others	2783.9	5
Total	47915.8	100

Source: *Woreda* office of Agriculture and Rural Development

Finger: 4.1 Location of Banja *Woreda* and the study *Kebeles*



4.2.4 Educational Level

As indicated in Table 4.5, 82.4% of the populations were illiterate among which 41.9% and 85.4% were urban and rural dwellers, respectively. Generally, the data implied the high illiteracy rate of the study area especially in rural area.

Table 4.5: Distribution of population of Banja *woreda* by Educational level

Educational Level	Total	Percentage	Urban	Percentage	Rural	Percentage
Illiterate	83451	82.4	2962	41.9	80489	85.4
Non-regular	7182	7.1	747	10.6	6435	6.8
1-6	2791	2.6	682	9.7	2109	2.2
7-8	3633	3.6	986	13.9	2647	2.8
9-12	1882	1.9	581	8.2	1301	1.4
12+	292	0.3	217	3.1	75	0.08
Not stated	33	0.03	----	0	33	0.04
Total*	101324		7066		94258	
Percent literate	17.61		58.08		14.57	

Source: 1994 population census of Ethiopia, Amhara Region, volume 1, part II

*It refers to population aged ten years and above.

4.2.5 Major Economic Activities of the Study Population

The major livelihood of the study area is subsistence mixed agriculture that entirely depends on seasonal rainfall. About 87.4% of the respondents also respond as they practice mixed farming. But there is no cash crop like coffee, chat and oil seeds. The type of crops produced in the *woreda* is varied depending on its agro-ecology. The three dominant crop in *dega* agro-ecology were potato, teff, and barly. In *woina-dega* maize, teff and wheat in their descending order. The three-bottlenecked constraints of crop production in the *woreda* were insufficient land holding size, poor soil fertility and failure to utilize irrigation.

Cows, sheep and horse are the dominant animal in *dega* and cows, goats and donkey in *woina-dega* agro ecological zone. The main constraints of animal rearing were lack of sufficient pastureland and fooder, lack of access to better stock breeds and traditional altitude towards large number (survey data). Oxen, horses and cows were used to plough land.

CHAPTER 5: RESULTS AND DISCUSSIONS

5.1 Some Background Characteristics of the Sample Households

Food security status of the household is highly influenced by demographic characteristics of the household and the opportunity to access livelihood assets. Hence, before examining the interrelationship between household demographic, socio-economic, and environmental conditions with their food security status, the general features of the sample in relation to some characteristics are presented hereunder.

5.1.1 Sex Composition: Among the household heads covered in the survey, 62.1% of them were males and the remaining 37.9 % were females (Table 5.1).

5.1.2 Age of Head of the Household: Most of the household heads were found in the age group 35-49 which is 42.8%, followed by the age group 50-64 (24.9 %). While the age groups 20-34 and 65 and above were 18.2% and 14.1% respectively. The Mean age of respondent was 44 years (Table 5.1).

5.1.3 Marital Status: As far as the marital status of the household heads is concerned, 0.3% was unmarried; 60.8 % were currently married (i.e. at the time of survey); 26.4% were widowed and 12.6 % were divorced (Table 5.1).

5.1.4 Religion: All of the sample household heads were orthodox Christians.

5.1.5 Ethnic Group: Among the sample household heads 52.6% were Amhara ethnic group and the remaining 47.4% were Agew ethnic group (Table 5.1).

5.1.6 Household size: Household size is mentioned in most literature as one of the main predicting variables for food security status of the household. The simple count of household members was converted in to Adult Equivalent (AE) based on their age and sex distribution. The conversion scale for computation of AE is given in annex II A. As can be seen from Table 5.1, about 44.1% of households their family size was between 4.01--6.00. Only 0.5% of the households had a family size of greater than 8. The respective family sizes for the other 3.3 %, 41.0%, and 11.0% of the households were 0.75-2.0, 2.01-4.0, and 6.01-8.0. The average household size was 4.50.

*5.1.7 **Dependency Ratio***: Dependency ratio refers to the ratio of the sum of total number of persons in the age group less than 14 and greater than 65 to the number of household members in the age group 15 to 64. It indicates the proportion of household members that are economically capable to contribute to food security of a household. Table 5.1 shows the dependency ratio of about 91.0% of the households was between 0-2 and only 9 % of the households had dependency ratio of greater than 2.

*5.1.8 **Labor Force Size***: In this study, labor force size of a household is described in man-equivalent which was calculated based on the age sex distribution of the household members (see annex II B for man equivalent conversion scale). Most of the households (47.9%) had 2.01-4.0 labor force size and 29.5 % of them had 0.4-2.0 followed by 21.3% which had 4.01-6.0 labor force size. Only 1.3% households had greater than 6 (Table 5.1).

*5.1.9 **Educational Level**:* Information collected on literacy status indicates that more than half of the household heads, (66.9%) were illiterate, 17.7% attended non-formal education, and 15.3% attended formal education. Among these 9.7% were grade 1-6, 4.1% were grade 7-8 and 1.5% were grade 9 and above (Table 5.1).

Table 5.1: Background Characteristics of the Respondents

N=390

Variables		Frequency	Percentage
Age group	20-34	71	18.2
	35-49	167	42.8
	50-64	97	24.9
	65+	55	14.1
Sex	Male	242	62.1
	Female	148	37.9
Marital status	Unmarried	1	0.3
	Currently married	237	60.8
	Widowed	103	26.4
	Divorced	49	12.6
Religion	Orthodox	390	100
Ethnic group	Agew	185	47.4
	Amhara	205	52.6
Family size	0.75-2.0	13	3.3
	2.01-4.0	160	41.0
	4.01-6.0	172	44.1
	6.01-8.0	43	11.0
	8.01+	2	0.5
Dependency ratio	0-2	355	91.0
	2.1+	35	9.0
Labor force	0.4-2.0	115	29.5
	2.01-4.0	187	47.9
	4.01-6.0	83	21.3
	6.01+	5	1.3
Educational level	Illiterate	261	66.9
	Can read & write	69	17.7
	Primary	38	9.7
	Junior secondary	16	4.1
	Secondary & above	6	1.5

Source; Field Survey, September 2009

5.1.10 Land Size: From the different natural resources on which food security status of the household depends, land is the most dominant one. As shown in the Table 5.2, 49.7% of the households owned land size of 1.25-2.0 ha, and 35.6% owned less than or equal to 1 ha of which 0.3% did not have land, 12.1% owned 2.25-3.0 ha. Only 2.6% of the households owed greater than 3 ha. The average land holding size was 1.49 ha.

5.1.11 Access to draught power: About 92.1 % of the respondents have at least a pair of draught power, among which 38.7%, 44.6% and 8.7% used oxen, horses and cows respectively to plough their land (Table 5.2).

5.1.12 Livestock Ownership: The size of livestock that a household owns is given in Tropical Livestock Unit (TLU).The conversion scale used to compute TLU is given in annex ΠC. About 69.5% of the households had less than or equal to10.0 TLU of which 13.6% did not have TLU, 15.9% had 10.01-20.0 TLU, 14.6 % had greater than 20 TLU (Table 5.2). The average TLU of the sample households was 6.98. Livestock rearing is one sub sector of agriculture and it has a great role in food security status. But the average TLU (6.98) is too low to solve food shortage problem.

5.4.1.13 Financial Capital: Data on financial capital of the households were collected with regard to whether, they receive credit, remittance, and saved in cash or kind.
Credit: The large percentage of respondents (75.1%) did not receive credit. Only 29.9% did.

Savings: The heads were asked whether they saved in cash or kind to use in the case of emergency. As shown in Table 5.2, only 13.1% of the respondents stated that they saved in cash or kind and the other 86.9% did not save.
Remittance: The percentage of households that received remittance was insignificant that is 3.3% and the rest 96.7% did not receive (Table 5.2).

5.1.14 Non-farm Activity: Households' capability to access food is determined by their income sources and purchasing power particularly during food stress. Regarding the study area, the proportion of respondents who participated in non-farm income generating activity were 11.8% which is insignificant. The other 88.2% did not participate in non-farm activity (Table 5.2).

5.1.15 Modern Agricultural Input: About 93.1% of the respondents use at least one of the following agricultural inputs such as fertilizer, herbicide, pesticide, improved seed, and manure. And 6.9% of the respondents do not use at all (Table 5.2).

Table 5.2: distribution of respondents by access to livelihood assets

N=390

Variables		Frequency	Percentage
Land Size(ha)	0-1	139	35.6
	1.25-2.0	194	49.7
	2.25-3.0	47	12.1
	3.25-4.0	8	2.1
	4.25+	2	0.5
Have draught power for plough	Yes	359	92.1
	No	31	7.9
Type of animal used to plough (N= 359)	Oxen	151	38.7
	Hors	174	44.6
	Cow	34	8.7
TLU	0.2-5.0	192	49.2
	5.01-10.0	130	33.3
	10.01-15.0	49	12.6
	15.01-20.0	13	3.3
	20.01+	6	1.5
Credit	Yes	97	24.9
	No	293	75.1
Saving	Yes	51	13.1
	No	339	86.9
Remittance	Yes	13	3.3
	No	377	96.7
Non-farm activity	Yes	46	11.8
	No	344	88.2
Agricultural input	Yes	363	93.1
	No	27	6.9
Distance from Market(minute)	5-30	214	54.9
	31-60	119	30.5
	121-150	57	14.6
Distance from Main road(minute)	5-60	110	28.2
	61-120	88	22.6
	121-180	77	19.7
	181+	115	29.5

Source: Field survey, September, 2009

5.1.18 Average Land Fertility Status: 77.9% and 21% of the respondents had categorized the fertility status of their land as poor and moderate respectively. Only 1% of the households expressed their land fertility status as good.

Land size and age of household head: As one can clearly observe from Table 5.5, the mean land holding size has increased from the age group ≤ 34 to 50-64 and it starts to decline in the age group 65+. That is, 0.83, 1.54, 1.77, and 1.68 ha for the age groups ≤ 34, 35-49, 50-64 and 65+ respectively. The Pearson Chi-square test also shows significant association between age category of the heads and land size ($p<0.05$).

Table 5.5 Mean Land Size (ha) by Age Group of Household Head

Age	Mean	N	Std.Deve.	X^2	df	Sig.(2-sided)
≤ 34	.83	71	.45	29.705	3	0.000
35-49	1.54	167	.56			
50-64	1.77	97	.80			
65+	1.68	55	.50			

Source: Field Survey, 2009

Land size and family size: As shown in the Table 5.6, the mean land size of households which have less than 4.5 family sizes is 1.48 ha and for those who have greater than or equal to 4.5 family size is 1.49 ha. There is a slight difference. The independent sample t-test for equality of mean also confirmed that it is not statistically significant ($p>0.05$).

Table 5.6 Mean Land Size (ha) by Family Size (AE)

Family size	Statistics			t-test for equality of mean		
	N	Mean	Std. Deve.	t	df	Sig.(2-tailed
< 4.5	217	1.48	0.74	-183	388	0.855
≥ 4.5	173	1.49	0.61			

Source: Field Survey, 2009

5.2.2 Human Capital

Sex of Household Head and Literacy Status: As can be seen from Table 5.7, of 242 male heads, 51.7% are illiterate and the literate accounts for 48.3% of the heads. Among female household heads, only 8.1% are literate and the other 91.9% are illiterate. Generally, literacy rate for female-headed household heads is so small when compared with their male counterparts. The X^2 test result also shows significant association between sex of the household head and literacy ($p< 0.01$).

Table 5.7 Literacy Status by Sex of Household Heads

Sex of the head		Educational category		X^2	df	Sig.
		Illiterate	Literate			
Male	Frequency	125	117	67.175	1	0.000
	Percentage	51.7	48.3			
Female	Frequency	136	12			
	Percentage	91.9	8.1			

Source: Field Survey, 2009

Labor Force Size and Sex of Household Head: Like other resources, female-headed households had smaller size of mean labor force, which is 2.85, when compared with male heads that is 3.11. This difference in mean labor force size is statistically significant as confirmed by independent sample t- test for equality of means ($p<0.05$).

Table 5.8 Labor Force Size by Sex of the Household Heads

Statistics	Sex of household head		t-test for equality of means		
	Male	Female	t	df	Sig.(2-tailed)
N	242	148	1.931	388	0.034
Mean	3.11	2.85			
Std. Deve.	1.17	1.40			

Source: Field Survey, 2009

Labor force size and age of household heads: With regard to distribution of labor force size by age group of household heads, the average labor force size has increased from the age group ≤ 34 to 50-64, however, it declines in the age group 65+. That is 2.44, 3.13, 3.19, 3.09 for the age groups ≤ 34, 35-49, 50-64, and 65+ respectively. The Pearson Chi-square test also shows significant association between labor force size and age category of the head ($p<0.001$).

Table 5.9 Labor Force Size by Age Group of Household Head

Age	Mean	N	Std. Dev.	X^2	df	sig
≤ 34	2.44	71	1.32	379.38	150	0.000
35-49	3.13	167	1.22			
50-64	3.19	97	1.25			
65+	3.09	55	1.18			

Source: Field Survey, 2009

5.2.3 Physical Capital

Sex of household head and livestock ownership: According to the t-test result, male household heads are more advantageous in terms of average TLU ownership compared to female household heads. The mean TLU for male household head's (7.66) was more than twice the mean TLU of female-headed households (3.57).

Table 5.10 : Livestock Ownership by Sex of Household Heads

Sex of hhh	Statistics			t-test for equality of means		
	N	Mean	Std.Dev.	t	df	Sig.
Male	242	7.66	5.08	8.64	388	0.000
Female	148	3.57	3.44			

Source: Field Survey, 2009

Sex of household head and Draught power ownership: As is the case for other resources, female-headed households had less access to draught power (85.8 %) than male headed households (95.9%). The Pearson chi-square test also shows significant association between the sex of households head and access to draught power ($p<0.001$).

Table 5.11 Draught power Ownership by Sex of Household Heads.

Sex of hhh	Have draught power				X^2	df	sig
	Yes		No				
	Frequency	Percentage	Frequency	Percentage			
Male	232	95.9	10	4.1	12.695	1	0.000
Female	127	85.8	21	14.2			

Source: Field Survey, 2009

Age of household head and livestock ownership: Regarding ownership of livestock by age group of household heads, the mean TLU had increased as the age group increased. But in the age group 50-64 shows some decline. That is 3.13, 6.97, 6.13, and 7.27, for the age categories ≤ 34, 35-49, 50-64, 65+ respectively.

Table 5.12 Livestock Ownership by Age Group of Households

Age category	Mean	N	Std.Devation
≤ 34	3.14	71	2.63
35-49	6.97	167	5.20
50-64	6.13	97	4.81
65+	7.27	55	5.24

Source: Field Survey, 2009

The age category and Draught power ownership: As one can see from Table 5.13, the access to owned draught power has increased as the age increased. But it has declined in the age group 65+. However, it is greater than the age group ≤ 34. And there is statistically significant association between age category and access to draught power ($p < 0.001$).

Table 5.13 Draught power Ownership by age category of the household.

Age category	Draught power				X^2	df	Sig.
	Yes		No				
	Frequency	Percentage	Frequency	Percentage			
≤ 34	54	76.1	17	23.9	34.409	3	0.000
35-49	161	96.4	6	3.6			
50-64	95	97.9	2	2.1			
65+	49	89.1	6	10.9			

Source: Field Survey, 2009

5.2.4 Financial Capital

Access to credit and Sex of household head: Unlike other livelihood assets, female household heads are more advantageous in access to credit than the male counterpart is. About 30.4% of the total female household heads that participated in the survey reported that they had access to credit in the last 12 months (2008/9), while only 21.5% of male household heads had access to credit at the same period. The Chi-square test showed statistically significant association between access to credit and sex of head of the household ($p < 0.05$).

Saving and Sex of Household Head: During the survey households were asked to inform whether they were able to save money or grain for the case of emergency in the last 12 months (2008/9); hence 15.3% and 9.5% of male and female household heads respectively were able to save. However, the Pearson Chi-square test shows statistically insignificant association between saving and sex of household head ($p > 0.05$).

Table 5.14 Sex of the head by access to credit and saving

		Sex of the head		X^2	df	Sig.
		Male	Female			
Received Credit	Yes	52(21.5%)	45(30.4%)	3.909	1	0.048
	No	190(78.5%)	103(69.6%)			
Saved birr/grain	Yes	37(15.3%)	14(9.5%)	2.746	1	0.099
	No	205(84.7%)	134(90.5%)			

Source: Computed from the data

Access to Credit and Age of Household Head: The percentage of respondents having credit access was high in the age group35-49, which is 31.1% followed by the age group ≤ 34 (26.8%). And it is low in the age group 65+ (14.5%). The Chi-square test shows statistically significant association between access to credit and age of household head ($p<0.05$).

Saving and Age of the Household Head: More proportion of household heads in the age group 35-49 which is 16.2% followed by the age group 50-64 (15.5%) , while from household heads in the age group ≤ 34 and 65+,only 4.2% and 10.9% of them were able to save respectively. The chi-square test indicates that the association between age of household head and saving is not statistically significant ($p>0.05$).

Table 5.15 Age of household head by access to credit and saving

		Age category				X^2	df	Sig.
		≤ 34	35-49	50-64	65+			
Credit	Yes	19(26.8)	52(31.1)	18(18.6)	8(14.5)	8.853	3	0.031
	No	52(73.2)	115(68.9)	79(81.4)	47(85.5)			
Saving	Yes	3(4.2)	27(16.2)	15(15.5)	6(10.9)	7.011	3	0.072
	No	68(95.8)	140(83.8)	82(84.5)	49(89.1)			

Source: Computed from the data

5.3 Descriptive Analysis of Food Security Status and Its Determinant

In order to achieve the objectives of the study household data were generated and analyzed. Accordingly, the food available for consumption in 2008/9 was quantified to examine the kind of relationship that exists between per capita food availability in calorie and the various demographic, socio-economic and some environmental factors influencing the amount and sources of food at the household level.

5.3.1 Food Security Status of the Respondents in the Sample Kebele

As Table 5:16 reveals, only 64 (16.4%) of the sample households obtain greater than or equal to the minimum required kilocalorie (2100) while the majority of them 326(83.6%) obtain below 2100 kcal per day per person. Among these 83.6% households, 35(9.0%) were in a serious food insecure segment that obtained below or equal to 50% of the minimum kilocalorie requirement (2100 kcal). And the other 156(40.0%) and 136(34.6%) of the respondents fulfilled (>50%-80%) and (>80 %-< 100%) of the above mentioned kilocalorie requirements, respectively.

Kebele wise, the most food insecure households were from Gurja Gomerta 103(89.6%) and Asera Ambesena 51(89.5%). On the other hand, relatively better food secured households were found from Senkesa 29(26.4%) and Akena Jfie 17(15.7%). In Senkesa only 5.5% of the respondents obtained below 80% of minimum kilocalorie requirement (2100 kcal). When the *kebeles* are compared by their mean daily per capita kilocalorie, they can put as Gurja Gomerta (1440.5), Akena Jfie (1570.6), Asera Ambesena (1684.6) and Senkesa (2102.5) in their ascending order (computed from field survey, 2009). In both cases, the households of Senkesa are relatively, the most food secured than the households in the other three *kebeles*. This may be due to the reason that Senkesa is found in *woina-dega* agro- ecological zone and the dominant crop in this *kebele* is maize, which has high calorie content that is 3560kca per k.g. But Gurja Gomerta, Asera Ambesena and Akena Jfie are found in *dega* agro- ecology zone and the dominant crop in these *kebeles* is potato which has low calorie (670kcal per k.g) than maize does have (see annex IID). That means five-kilogram potato and one-kilogram maize have equal amount kilocalorie.

Table 5.16 Distribution of households with per capital food availability by *kebele*

Kebele	≤50%2100 (525-1050)		>50%-80%2100 (1050.01-1680.00)		>80%-<100%2100 (1680.01-2099.99)		≥100% (2100+)		Total	
	N	%	N	%	N	%	N	%	N	%
Gurja-Gomerta	23	20.0	63	54.8	17	14.8	12	10.4	115	100
Asera Ambesen	2	3.5	28	49.1	21	36.8	6	10.5	57	100
Akena Jfie	10	9.3	59	54.6	22	20.4	17	15.7	108	100
Senkesa	0	0	6	5.5	75	68.2	29	26.4	110	100
Total	35	9.0	156	40.0	135	34.6	64	16.4	390	100

Source: Computed from Field survey, 2009

5.3.2 Factors Influencing Agricultural Production and Household Food Security

Demographic, socio-economic and environmental factors affect agricultural production and purchasing power. So in this sub-topic, effort has been made to explore those correlates that mainly constrained food security.

5.3.2.1 Demographic Factors

"In Ethiopia, it is apparent that the head of a household strongly influences the household's livelihood and food security. His/her salient demographic features would then influence, to a certain extent, the type and amount of food made available from different sources" (Degefa, 2002:58). Therefore, it is better to assess the difference of per capita food available that exists between sex and age differences of the head.

Sex of household heads and food availability:

Table 5.17 shows that male-headed households had more mean per capita kilocalorie intake (i.e. 1899.67 kcal) than female-headed households (1370.66 kcal). In addition to this, the cross tabulation in the same Table shows that 24.4% of male headed households were food secured while only 3.4% of female headed households were secured. This is mainly explained by differences to access livelihood assets and labor availability. As expressed in 5.2, female-headed households were disadvantageous in terms of access to land, education, labor force, TLU, and draught power than their counterparts. They were advantageous only by credit. The Focus Group Discussants (FGDs) stated that previously women were discriminated, for example, if a woman is divorced, she might not take her share assets especially natural capital like land. And she may not have inherited land from her parents. Nowadays, however, the degree of discrimination decreases but no affirmative action is given to them. Other research findings such as Degefa (2002), Dulla (2007) and Adane (2008) in Oromia Zone, East Wollega and West Hararghe respectively show the same result. On the contrary, Girma (2007), in Northern Shewa has got different result. This may be due to the implementation of affirmative action.

Table 5.17 Sex of the head by mean of food availability in kcal and food security status

Sex of the head	Mean of food Availability(kcal)	Food security status		
		<2100(Insecure)	≥2100(Secured)	Total
Male	1899.67	183(75.6)	59(24.4)	242(100)
Female	1370.66	143(96.6)	5(3.4)	148(100)
Total	1698.92	326(83.6)	64(16.4)	390(100)

Figures in the parenthesis are percentages
Source: Computed from Field survey, 2009

Age of the household head and food availability

As Table 5.18 depicts, when the age of the household head increased, the food availability of the household also increased. Nevertheless, it declines after age 64. This decrement of food availability at old age may be due to the loss of assets for different reasons. As explained above, the mean land size, labor force size, and draught power of the household increased as the age of the household head increased. However, they declined after age 64 like food availability, because food availability is the function of these resources.

Table 5.18 The age of household head by mean of food availability in kcal and food security status

Age category	Mean of food Availability(kcal)	Food security status		
		< 2100(Insecure)	≥ 2100(Secured)	Total
≤34	1496.59	69 (97.2)	2 (2.8)	71 (100)
35-49	1738.57	130 (77.8)	37 (22.2)	167 (100)
50-64	1841.22	75 (77.3)	22 (22.7)	97 (100)
65+	1588.76	52 (94.5)	3 (5.5)	55 (100)
Total	1698.92	326 (83.6)	64 (16.4)	390 (100)

Source: Computed from Field survey, 2009
Figures in the parenthesis are percentages.

Family size and food availability

As the other demographic variables, family size has its own impact on food availability. Table 5.19 shows the inverse relationship between family size and the per capita food availability. The households, who have the family size of 2.01-4.00 AE, had the largest mean per capita kilocalorie and it declines as the family size increases. However, the respondents, which have the family size of 0.75-2.00, had less mean per capita kilocalorie

than those, who have the family size of 2.01-4.00. This may be due to low labor force size. Other research output like Degefa (2000), Dulla (2007), Girma (2007 and Adane (2008) in Oromia Zone, East Wollega, Northern Shewa and West Hararghe respectively show the same result.

Table 5.19 Family size by mean of food availability in kcal and food security status

Family size	Mean of food Availability(kcal)	Food security status		
		Insecure	Secured	total
0.75-2.00	1753.12	10 (76.9)	3 (23.1)	13 (100)
2.01-4.00	1834.67	119 (74.4)	41 (25.6)	160 (100)
4.01-6.00	1664.71	153 (89.0)	19 (11.0)	172 (100)
6.01-8.00	1340.78	42 (97.7)	1 (2.3)	43 (100)
8.01+	1120.60	2 (100.00)	0 (0)	2 (100)
Total	1698.92	326 (83.6)	64 (16.4)	390 (100)

Source: Computed from Field survey, 2009
Figures in the parenthesis are percentages.

Dependency ratio and household food availability

Dependency ratio affects food production and income of the household. Table 5.20 shows that households, which have dependency ratio > 2 had less mean daily per capita kilocalorie than those, which have ≤ 2 dependency ratio by 520.93 kilocalorie. The cross tabulation result also indicates that all the respondents who have > 2 dependency ratio were food insecure.

Table 5.20 Dependency ratio by mean daily per capita kilocalorie and food security status

Dependency ratio.	Mean of food Availability(kcal)	Food security status		
		Insecure	Secured	Total
≤2	1745.68	291(82.0)	64(18.03)	355(100)
>2	1224.75	35(100.0)	0(0)	35(100)
Total	1698.92	326(83.6)	64(16.4)	390(100)

Source: Computed from Field survey, 2009
Figures in the parenthesis are percentages.

5.3.2.2 Socio-Economic factors

Land holding size and household food availability

Land is the most important asset for rural households. It determines the ability of crop production and animal rearing in particular and food security status in general. As noted in Table 5.21, 333 (85.4%) of the respondents have land holding size of ≤ 2 ha, among these respondents only 9.6% were food secured. The other 57 (14.6%) of the respondents have more than two ha land, from them 32 (56.1%) were food secured. The mean daily

Education level and food availability

Table 5.22 depicts that as educational level increases, the mean daily per capita kilocalorie intake also increases. This is because educated farmers can easily adopt modern technology and manage their land properly, which in turn increases production. However, the household heads who have educational level of secondary and above had relatively lower mean daily per capita kilocalorie intake than the household heads who attended primary and secondary education. This may be for two reasons; the first one is psychological impact that means these individuals may not be interested to engage in agricultural activity; rather they may need to work in another job in the city. Secondly, because of their high educational level, they might participate in *kebele* administration and spent their working time in different meetings or other political activities. Due to these reasons, they might not be as effective as those who attend primary and junior educational level although further investigation is needed.

Table 5.22 Educational level of the head by mean daily per capita kilocalorie and food security status

Educational Level of the head	Mean of food Availability(kcal)	Food security status		
		Insecure	Secured	Total
Illiterate	1499.54	259 (99.2%)	2 (0.8%)	261 (100%)
Can read & write	1708.41	67 (97.1%)	2 (2.9%)	69 (100%)
Primary	2417.83	0 (0%)	38 (100%)	38 (100%)
Junior	2938.56	0 (0%)	16 (100%)	16 (100%)
Secondary & above	2403.80	0 (0%)	6 (100%)	6 (100%)
Total	1698.92	326 (83.6%)	64 (16.4%)	390 (100%)

Source: Computed from Field survey, 2009

Labor force size of the household and food availability

The households with 2.01-4.00 labor force size have the highest daily mean per capita kilocalorie (i.e. 1789.04) following the households having 4.01-6.00 labor force (1755.9). The other two extremes have relatively low kilocalorie intake that is 1539.35 and 1051.92 for households having labor force 0.40-2.00 and greater than 6 respectively. The former is due to lack of labor force. The later may be because of underemployment. "If labor force has increased on a limited size of farmland, it causes a declining return to production" (Dulla, 2007: 84). That means the labor force is above the carrying capacity of land and other resources is unproductive.

Table 5.23 Labor force size by mean daily per capita kilocalorie and food security status

Labor force size	Mean of food Availability(kcal)	Food security status		
		Insecure	Secured	Total
0.4-2.00	1539.35	105 (91.3%)	10 (8.7%)	115 (100%)
2.01-4.00	1789.04	147 (78.6%)	40 (21.4%)	187 (100%)
4.01-6.00	1755.90	69 (83.1%)	14 (16.9%)	83 (100%)
6.01+	1051.58	5 (100%)	0 (0%)	5 (100%)
Total	1698.92	326 (83.6%)	64 (16.4%)	390 (100%)

Source: Computed from Field survey, 2009

Draught power and food availability

About 359 (92.1%) of the respondents had access to draught power and the other 31(7.9%) did not have. The households having access to draught power had better mean daily per capita kilocalorie intake (1728.6) than those who did not have the access (1355.6). Households who have access were asked how they get these animals and 95.3% of them said that own, 1.7% shared, 2.8% borrowed, 0.3% rented and they had the mean daily per capita kilocalorie intake of 1759.6, 1191.1, 1059.4, and 1037.5 respectively. That means the respondents having their own draught power had better kilocalorie intake than others. Moreover, the mean per capita kilocalorie intake of the respondents was different based on the type of animal they use to plough their land. Those who use oxen have relatively better kilocalorie (1948.1) than who use cows (1638.1) and horses (1555.8). (Computed from survey data)

Table 5.24 Access to draught power by mean daily per capita kilocalorie and food security status

Draught power	Mean of food Availability(kcal)	Food security status		
		Insecure	Secured	Total
Yes	1728.6	298 (83%)	61 (17%)	359 (100%)
No	1355.6	28 (90.3%)	3 (9.7%)	31 (100%)
Total	1698.9	326 (83.6%)	64 (16%)	390 (100%)

Source: Computed from Field survey, 2009

Access to livestock and food availability

Since about 87% of the sample households engaged in mixed agricultural economy, livestock play a great role in the food security status of the household. They are the source of food, income and means of transport. Table 5.25 indicates that as TLU increases, the mean per capita kilocalorie intake of the household increases. For example,

the mean daily per capita kilocalorie intake of the households which have greater than 20 TLU (i.e. 2850.1) is equal to almost twice those who have less than or equal to 5 TLU (1490). However, almost half (49.2%) of the respondents have less than or equal to five TLU and 82.6% have less than or equal to 10 TLU. Respondents pointed out the main constraints of animal rearing in their rank as follows: lack of sufficient pastureland and fodder, lack of access to better stock breeds, traditional attitude towards large number, and stock diseases. Due to these reasons, the households could not expand animal rearing and products from animal.

Table 5.25 Access to TLU by mean daily per capita kilocalorie and food security status

TLU	Mean of food Availability(kcal)	Food security status		
		< 2100	≥ 2100	Total
0-5.00	1490.0	186 (96.9%)	6 (3.1%)	192 (100%)
5.01-10.00	1693.4	119 (91.5%)	11 (8.5%)	130 (100%)
10.01-15.00	2160.7	19 (38.8%)	30 (61.2%)	49 (100%)
15.01-20.00	2565.2	2 (15.4%)	11 (84.6%)	13 (100%)
20.01+	2850.1	0 (0%)	6 (100%)	6 (100%)
Total	1698.0	326 (83.6)	64 (16.5%)	390 (100%)

Source: Computed from Field survey, 2009

Access to finance and food availability

If financial access increases, households' purchasing power of food and other agricultural inputs also increased. Financial capital may include credit, saving, remittance, and participating in non-farm activities. According to Table 5.26, households having credit have relatively lower mean daily per capita kilocalorie intake (i.e. 1614.8) than those did not borrow (1726.7). This is because most of the households borrowed money for the purpose of purchasing food. However, it alleviates food shortage problem for a time being it aggravates poverty unless it is used for investment. The FGD participants also supported this idea and said we have access to credit but it is difficult to return. One of the participants in Asera Ambesena kebele said that:

> *My husband died leaving 6 children to me and I could not feed them. Therefore, I have borrowed 1000 birr in 1999 E.C from government institution. In 2000 I was asked to return that money but I did not have any money at that time I borrowed 1500 birr from usuries for one month.*

After that, I returned the previous 1000 birr and borrowed another 2000 birr from the same institution. Then I paid 1650 birr for the usury with interest and used the rest for consumption. In 2001, the same problem happened and I was forced to lease out my one-hectare land for four years and paid back the credit. Now I have only half hectare land.

Only 13% of the respondents have saved money or grain in the last 12 months before the survey, however, they have better kilocalorie intake (i.e. 1817.8) than those who did not save (1681.0). There is a great difference in mean kilocalorie intake between households who, had remittance (2155.8) and those who, did not (1683.2). Of course, only 3.3% of the respondents have received remittances. Participating in non-farm activity is another source of income, which helps to purchase food during crop failure. The results of this study also show that farmers engaged in non-farm activity had relatively higher per capita kilocalorie (1828.5) than those who did not (1681.6).

Table 5.26 Access to finance by mean daily per capita kilocalorie and food security status

N=390

	Have or no	Mean of food Availability(kcal)	Food security status		
			< 2100	≥ 2100	Total
Credit	Yes	1614.8	82 (84.5%)	15 (13.5%)	97 (100%)
	No	1726.7	244(83.3%)	49 (16.7%)	293 (100%)
Saving	Yes	1817.8	34 (66.6%)	17 (33.3%)	51 (100%)
	No	1681.0	292 (86.1%)	47 (13.9%)	339 (100%)
Remittance	Yes	2155.8	5 (38.5%)	8 (61.5%)	13 (100%)
	No	1683.2	321 (85.1%)	56 (14.9%)	377 (100%)
Non farm activity	Yes	1828.5	30 (65.2%)	16 (34.8%)	46 (100%)
	No	1681.6	296 (86.0%)	48 (14%)	344 (100%)

Source: Computed from Field survey, 2009

Agricultural inputs and food availability

"Any farm input that augments agricultural productivity would be expected to boost the overall production, which in turn contributes towards attaining household food security"(Degefa, 2002: 63). These agricultural inputs include fertilizers, improved seeds, herbicides, insecticides and irrigation. In this study, no one used herbicides and insecticides. Among the total respondents 363 (93.1%) applied at least one of the farm inputs listed in the Table and the other 27 (6.9%) did not apply at all. Table 5.27 indicates

that the users have better kilocalorie intake than non-users in all types of farm input especially irrigation.

Table 5.27 Agricultural inputs by mean daily per capita kilocalorie and food security status

N=363

Agricultural input	Use or non-use	Mean of food Availability(kcal)	Food security status		
			Insecure	Secured	Total
Fertilizer	Yes	1722.6	301(83.1%)	61 (6.9%)	362 (100%)
	No	1369.4	4 (80%)	1 (20%)	5 (100%)
Improved Seed	Yes	1744.6	268 (82%)	59 (18%)	327 (100%)
	No	1498.9	37 (92.5%)	3 (7.5%)	40 (100%)
Irrigation	Yes	2918.4	2 (13.3%)	13 (86.7%)	15 (100%)
	No	1650.1	326 (86.9%)	51 (13.1%)	375 (100%)
Manure	Yes	1729.9	299 (83.5%)	61 (16.5%)	360 (100%)
	No	1097.0	6 (85.7%)	1 (14.3%)	7 (100%)

Source: Computed from Field survey, 2009

Distance from main roads and market center with relation to food availability

"Distance from main road and market center is among physical capitals that influence households' livelihood in general and food security status in particular" (Adane, 2008:73). The study result in the Table 5.28 also shows that households who resided nearer to the main road and market center had better kilocalorie intake and food security status than those who resided far from the road and market. That means as the distance increases the kilocalorie intake decreases. For example, households who reside after 5-120 minutes walking from market center had better kilocalorie (1701.6) than who reside after 121 minutes walking (1684.6).

Table 5.28 Distance from main roads and market center by mean daily per capita kilocalorie and food security status

Distance in minute		Mean of food Availability(cal)	Food security status		
			Insecure	Secured	Total
From market	5-120	1701.4	275 (82.6%)	58 (17.4%)	333 (100%)
	121+	1684.6	51 (89.5%)	6 (10.5%)	57 (100%)
From main road	5-60	2102.5	81 (73.6%)	29 (26.4%)	110 (100%)
	61-120	1573.9	78 (88.6%)	10 (11.4%)	88 (100%)
	121+	1524.9	167 (87%)	25 (13%)	192 (100%)

Source: Computed from Field survey, 2009

5.3.2.3 Environmental Factors

Environmental factors are common almost for all households at a *kebele*. Therefore, these types of data were collected through FGDs and KI.

> According Devereux (2001) cited in Dulla (2007) external environment (venerability context) comprises **trends** (of demography, resource), **shocks** (such as human health shocks, natural shocks, crop/livestock health shock) and **seasonality** (of rainfall, prices, production, employment opportunities etc).

Population Trend: The study area is characterized by rapid population growth. According to CSA data the total population of Banja woreda was 118 480 in 1984, 151 950 in 1994 and in 2004 it is projected to 196 870. From 1984 to 1994, 33470 people and from 1994 to 2004, 42919 people were added but the area is constant. Therefore, crude density of the *woreda* becomes increased that is 247.3 /km^2 in 1984, 317.1 /km^2 in 1994 and 410.9/km^2 in 2004.

Resource trend: this includes forest and soil fertility trend of the study area. Forests have different advantages among these; reducing the impact of drought and soil erosion is more related to food security status. Ato Tilahun Bitew, the key informant, the head of Banja *woreda* agricultural and development office, said that:

> *Forest coverage decreases from time to time at a country level in general and study area in particular. This is due to high deforestation rate. However, we try to create awareness about the importance of tree no behavioral change is coming. We convince the people to plant trees on the area, which is difficult to farming. They accept it and plant different trees in their kebele but after a few years, they destroyed it. This deforestation leads to drought and soil erosion, which aggravates food insecurity.*

The common idea raised by FGD participants in each *kebele* with related to deforestation is that "Due to shortage of land, we cannot plant trees in our private land but we need trees for different purpose like construction of house, fuel wood, fence etc. So we are forced to cut trees which are common for all".

It is known that deforestation, soil erosion and lack of fallowing period, which is the results of rapid population growth, decreases land fertility status. About 77.9% of the respondents

categorize their land fertility status as poor. The impact of land fertility status on food availability is presented here below.

Land fertility status and food availability

As the fertility status of the land increases, obviously its yield also increases. Table 5.29 assured this idea. That is the households had mean kilocalorie intake of 1521.4, 2281.3 and 3250.7 from their land fertility status of poor, moderate and good respectively.

Table 5.29 Land fertility status by mean daily per capita kilocalorie and food security status

Land fertility status	Mean of food Availability(kcal)	Food security status		
		Insecure	Secured	Total
Poor	1521.4	299(98.4%)	5(1.6%)	304(100%)
Moderate	2281.3	27(32.9%)	55(67.1%)	82(100%)
Good	3250.7	0(0%)	4(100%)	4(100%)

Source: Computed from Field survey, 2009

Shocks/ hazards: Shocks are sudden problems, which negatively affects livelihood. The most common problems in all *kebeles* that are point out by FGDs were frost and drought. Frost is the most common problem raised specially in the three *kebeles* found in *dega* agro-ecology. One of the FGD participants in Akena Jfie *kebele* said, "I had borrowed 1500 birr to buy improved seed and fertilizer. And I have planted in half hectare land but due to frost I did not get any product". The respondents in the survey also identify these problems as the main constraints of crop production.

Seasonality: The high dependence of rural people on rain-fed agriculture and limited irrigation practices worsen the vulnerability of the people to climatic changes. The FGD participants explain the problems of rainfall seasonality as follows "absence of rainfall during the time of germination of crops and high intensity rainfall or rainfall with snow during harvesting time destroyed crops in the field".

5.4 Inferential Analysis of Food Security Status and Its Determinant

5.4.1 Bi-variate Analysis

Chi-square test was used to examine whether there exists association between the dependant variable and the set of predictor variables. The dependent variable is household

food security status, which is expected to be influenced by different variables like, demographic and livelihood assets. The results are summarized in Table 5.30 and 5.31.

5.4.1.1: The Association between Demographic Variables and Food Security Status of the Household

Households do not have equal opportunity in accessing livelihood assets. The variation in accessing livelihood assets may depend on their demographic characteristics. This variation has its own adverse impact on food security status of the household. Therefore, it is better to assess the relationship that exists between demographic variables and household food security status.

Sex of household head, as explained in the previous section males had better livelihood assets than female-headed households. Likewise, there is difference in food security status between them. Among 242 male-headed households included in the sample, 24.4% were food secured but only 3.4% from 148 female-headed households were food secured. The Pearson Chi-square test has also implied significant statistical association between sex of head of the household and food security status ($p<0.001$).

Age of household head is one of demographic factors that determine food security status of the household. As shown in Table 5.30 households headed by less than or equal to 44 years old person (average age) were less secured (i.e. 4.6%) than households headed by persons older than 44 years (25.9%). The Chi-square test also indicates statistically significant association between age of the household and food security status ($p<0.001$).

As far as the relationship between food security status and family size (AE) of the household is concerned, households with lower family size were more secured than those who had large family size. As shown Table 5.30, Among households which had less than 4.5 family size 27.6% were food secured but from the households which had grater than or equal to 4.5 family size, only 2.3% were secured. Chi-square test also shows statistically significant association between family size and food security status ($p<0.001$).

Among households which have less than or equal to 2 dependency ratio 18.03% were food secured and from households which have more than 2 dependency ratio were all in all insecure. However, the relationship between dependency ratio and food security status was statistically insignificant ($p>0.05$).

Table5.30: Chi-square test of association between demographic variables and food security status

Variables	Food security status		Pearson Chi-square	df	Sig. (2 sided)
	Insecure	Secured			
Sex of household head					
Male	183 (75.6)	59 (24.4)	29.530	1	0.000
Female	143 (96.6)	5 (3.4)			
Age of household head					
≤ 44	166 (95.4)	8 (4.6)	31.958	1	0.000
> 44	160 (74.1)	56 (25.9)			
Family size (Adult Equivalent)					
< 4.5	157 (72.4)	60 (27.6)	45.051	1	0.000
≥ 4.5	169 (97.7)	4 (2.3)			
Dependency ratio					
≤ 2	291 (82)	64 (18)	2.549	1	0.086
> 2	35 (100)	0 (0)			

Source: Computed from Field survey, 2009
Figures in the parenthesis are percentages

5.4.1.2 Access to Livelihood Assets and Food Security Status of the Household

As explained in the previous section land is the crucial asset for rural household and play significant role in their life. Table 5.31 depicts that, among households who have less than 2 ha land, only 2.4% were secured but among those who have greater than or equal to 2ha, 56.4% were secured. The relationship between land size and food security status is statistically significant ($p<0.001$).

Literacy status is one of the human capitals, which affects food security status. As shown in Table 5.31, the risk of food insecurity is higher among households headed by illiterate person than those headed by literate one. From the total households headed by illiterate person 99.2% and 0.8% were food insecure and secured respectively. Whereas from the total literate headed households, 51.9% and 48.1% food insecure and secure respectively.

The Pearson Chi-square also shows statistically significant association between literacy status of the head and food security status ($p < 0.001$).

Like other resources, labor force size affects food security status. However, in this study the relation between labor force and food security status was not statistically significant ($p>0.05$). Among the households who have less than 3-labor force size 16% were secured whereas from households who have greater than or equal to 3, 16.8% were secured. There is only a slight difference.

Since livestock is one sources of food for rural households, it has relationship with food security status. As the data result in the Table 5.31 shows among food secured households, 26.6% had less than 10 TLU and other 73.4% had greater than or equal to 10 TLU. That means as the access to TLU increases the probability of being food secured is also increased. The Chi-square test also shows statistically significant association between access to livestock and food security status ($p<0.001$).

Among food secured households, 95.3% had access to draught power and the other 4.7% had no access. However, the association between access to draught power and food security status was statistically insignificant ($p>0.05$).

Distance from main road and market center determine the activities of farmers as producers and consumers. As the distance from the village to main road and market center increases, the food security status decreases. However, the Chi-square test shows statistically insignificant association in both cases with food security ($p>0.05$).

The association between financial capital and food security status is presented in Table 5.31. These financial capital includes credit, saving, remittance, and participation in non-farm activity. Except credit other financial capitals such as saving, remittance, and non-farm participation have statistically significant association with food security status ($p<0.05$) for all cases. Moreover, households who saved, receive remittance, and participate in non-farm activities had better food security status than those who did not. Households who receive credit had less food security status than did not receive.

Land fertility status has strong relation with crop production in particular and food security status in general. Among food secured households, 92.2% had moderate fertile land and the other 7.8% had poor fertile land. The Pearson Chi-square test also shows statistically significant association between land fertility status and food security status ($p<0.001$).

Agricultural inputs are also another determinant factor that influences food security status. These include fertilizers, improved seeds, manure, and irrigation. Except fertilizers all the other inputs had statistically significant association with food security status ($p<0.05$). However, users had better food security status than non-users in all cases.

Table 5.31 Chi-square test of association between livelihood assets and food security status

Variables	Food security status		Pearson Chi-square	df	Sig.(2 sided)
	Insecure	secure			
Land size in hectare					
< 2	282 (97.6)	7 (2.4)	159.181	1	0.000
≥ 2	44 (43.6)	57 (56.4)			
Educational level of the head					
Illiterate	259 (99.2)	2 (0.8)	140.780	1	0.000
Literate	67 (51.9)	62 (48.1)			
Labor force size					
< 3	163 (84)	31 (16)	0.052	1	0.819
≥ 3	163 (83.2)	33 (16.8)			
Livestock size (TLU)					
< 10	254 (93.7)	17 (6.3)	66.536	1	0.000
≥ 10	72 (63.2)	47 (36.8)			
Access to drought power					
Yes	298 (83)	61 (17)	1.113	1	0.291
No	28 (90.3)	3 (0.7)			
Distance from main road in minutes					
≤ 60	81 (73.6)	29 (26.4)	3.132	2	0.084
61-120	78 (88.6)	10 (11.4)			
>120	167 (87)	25 (13)			
Distance from market center in minutes					
≤ 120	275 (82.6)	58 (17.4)	1.685	1	0.194
> 120	51 (89.5)	6 (10.5)			
Saving					
Yes	34 (66.6)	17 (33.3)	12.250	1	0.000
No	292 (86.1)	47 (13.9)			
Remittance					
Yes	5 (38.5)	8 (61.5)	19.966	1	0.000
No	321 (85.1)	56 (14.9)			
Credit					
Yes	82 (84.5)	15 (13.5)	0.084	1	0.772
No	244 (83.3)	49 (16.7)			
Participating in non farming activity					
Yes	30 (65.2)	16 (34.8)	12.833	1	0.000
No	296 (86)	48 (14)			
Land fertility status					
Poor	299 (98.4)	5 (1.6)	219.113	1	0.000
Moderate	27 (32.9)	59 (67.1)			
Applied fertilizer					
Yes	301 (83.1)	61 (6.9)	0.035	1	0.852
No	4 (80)	1 (20)			
Use improved seed					
Yes	268 (82)	59 (18)	11.822	1	0.001
No	37 (92.5)	3 (7.5)			
Use manure					
Yes	299 (83.5)	61 (16.5)	5.035	1	0.002
No	6 (85.7)	1 (14.3)			
Irrigation					
Yes	2 (13.3)	13 (86.7)	56.134	1	0.000
No	324 (86.9)	51 (13.1)			

Source: Computed from Field survey, 2009

Figures in the parenthesis are percentages

5.4.2 Multivariate Analysis

Binary logistic regression model is selected for multivariate analysis and model fitting because of the dichotomous nature of the dependant variable.

5.4.2.1 Assessing the Goodness of Fit of the Model

In this study, two methods are used to check whether the model is well fitted to the data or not. The first is classification table, which shows the percentage of observed cases that are correctly or incorrectly classified. As can be seen from Table 5.32, 324 households with insecure food status were correctly predicted by the model as insecure. Similarly, 57 households with food security status were correctly classified as secured. But 9 households were misclassified: 2 as food insecure and 7 as food secure. Generally 99.4% and 89.1% of food insecure and food secure households are classified correctly respectively. As a whole, 97.7% of the household are classified correctly.

Table 5.32: Classification Table

Observed			predictor		
			Food security status of hh		Percentage correct
			insecure	secure	
	Food security status of hh	insecure	324	2	99.4
		secure	7	57	89.1
	Overall percentage				97.7

Source: Computed from survey data

The second technique used was Hosmer and Lemeshow tests, which helps to accept or reject the alternative hypothesis" the model adequately describes the data". If the significant level of the test is less than 0.05, it indicates that the alternative hypothesis is rejected and the null hypothesis, which states the inadequacy of the model to describe the data, is accepted. In this study, the significance level of the test was found to be 0.433. Therefore, the alternative hypothesis, which states that the model is adequate to describe the data, is accepted.

5.4.2.2 Checking Multi-Collinearity

To avoid the multi-collinearity coefficient of contingency has computed because all independent variables included in the model were non-continuous. The value of

coefficient of contingency ranges between 0 and 1; the smaller value of coefficient of contingency indicates weak association between predictor variables and the opposites true if the value is large. The multi-collinearity diagnosis for the variables of the study shows weak relationship between the predictor variables with a maximum value of 0.575 (see annex).

5.4.2.3 Results of the Model

Table 5.33 shows, the model is estimated by considering household demographic variables and livelihood assets on food security status of the sample households. The odds ratio indicates whether a particular variable is associated with household food security statistically significantly or not. The level of influence of predictor variables on dependant variable is presented based on the value of odds ratio and given in the last column of the Table 5.33. If the value of the odds ratio is greater than 1, the probability to be food secure is high for that group in relation to reference category; whereas if the odds ratio is less than 1, the likelihood to be food secure is low for that particular category. Moreover, if the odds ratio is 1, that the given variable has no effect on food security status of the given household.

Sex of household was found to be significantly related to food security status ($p<0.05$). The likelihood of being food insecure is greater by 0.843 (odds-ratio) among female-headed households compared to male-headed households. Thus, the hypothesis, which states that the probability of being food insecurity increases among female-headed households than male-headed households, is accepted.

Age of the household was found to be statistically significantly related to food security status ($p<0.05$). As shown in the Table 5.33, households headed by greater than 44 years old have 1.132 times better chance to be food secured than households headed by less than or equal to 44 years old person. Therefore, the hypothesis, which stated as the age of the household head increases (within economically active age group). the risk of food insecurity decrease, is accepted.

6.2 Conclusions

Food security analysis is a complex activity because of a complex and multifaceted nature of the factors. Demographic variables by itself may not affect food security status. However, they are the causes of the variation of livelihood assets. Female and younger headed household had low access to livelihood assets such as land, TLU, draught power, labor force, and saving than their counterpart. However, they have better access to credit. The other demographic variable is family size. As the family size increases the per capita livelihood asset decreases. Then the probability of the household food insecurity increases. For instance, in the study area the distribution of pivotal resource, land is not considered family size. Except access to credit, other variation of livelihood assets based on the demographic characteristics of the household is similar with other studies like Dulla (2007) and Adane (2008).

External environmental factors affect food security status of the household through affecting directly or indirectly the livelihood assets of the household. Therefore, the food security status of the household is mainly depends on households' livelihood asset.

6.3 Recommendation

Based on the findings of the study, the following points are recommended to improve the households' food security status of the study area.

In order to alleviate land shortage problem and to increase land productivity some measures should be taken. The first one is using irrigation. By using irrigation, one can produce twice a year. That means one-hectare land may serve as two-hectare land. Secondly, instead of depending on grazing land or grass, using other industrial bi-products like, *fagulo(*bi-products of oil industry*)*, *frushca(*bi-product during flour production*)*, and the residuals of *tella* and local *arekie* as alternatives to feed animals. Moreover, focusing on the quality rather than the quantity of animals is very important. Thirdly, using family planning program is advisable. The households should decide their family size based on their resources and engaged some family members in non-farm activity. For example, they can provide industrial bi-products from the city to rural area.

Therefore, agricultural professionals and other concerned bodies should create awareness among farmers on these issues.

In order to make two things equal they should have the same starting point. Therefore, affirmative action should be given to the previously disadvantageous group like female-headed households.

The purpose of borrowing money is an important issue in long run food security status. If it is used for only consumption, it aggravates poverty as this study indicates. However, if it is used for the start- up capital of non-farm activities or to buy agricultural inputs, it promotes development. Therefore, credit-giving institutions should follow up whether the households use the money for investment or not.

Due to low sample size and responses, some variables of the study like health problem were not used. Hence, conducting similar research with large sample size will help to have better understanding on the subject matter. Moreover, this study emphasis to demographic, environmental and socio-economic factors of food insecurity. Thus, further study is required on socio-cultural and political factors and coping strategies of food insecurity.

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Annex-I

A. Survey Questionnaire

I. General Information

1. Location Identification

Zone_Awi, *Woreda*_Banja, *Kebele*_____

Agro-ecology: 1. *Dega*_____ 2. *Woina-dega*_____

2. Interviewer's Name: _____

3. Date of the interview: _____

4. Time of interview: starting time _____ Finishing time _____

II. Household's Demographic characteristics

5. Sex of household head: 1.Male____ 2.Female_____
6. Age of household head (in completed years)_____
7. Marital status: 1. Single ____ 2.Currently married_____
   3. Widowed_____ 4. Divorced_____ 5. Separated _____
8. Educational level: 1.Illitrate ___2.Can read and writes (informal education)-------
   3. Formal education (specify grade level)_____
9. Ethnic background: 1. Agew ___ 2. Amhar---- 3. Oromo ___ 4.Others (specify)___
10. Religion: 1. Orthodox ____ 2.Protestant ____3.Catholic___
    4. Muslim _____5.Tradational belief____
11. Number of permanent household members (including the household head) during the last 12 months ____ Male___Female____Total
12. Please provide us the following information on the characteristics of your household members.

No	Name (optional)	Age	Sex 1=M 2=F	Level of education	Ability of work 1=able 2=unable
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					

21. If you do not use what was your reason?

1. High price 2. Low access 3.lack of knowledge 4.others, specify

22. What is your distance from market center on foot: Hour----- Minute____?

23. What means of transport do you often used to move your goods and farm products as well as your family? (if you use more than one give the rank order)

Items	Means of transport					
	Horse	Mule	Oxen	Donkey	By car	On foot
Grain and other items						
Family transport						

24. Is your household access to health service? 1. Yes 2. No

25. Distance from the health facilities, hour___ minute___

C. Access to livestock and drought power for ploughing

26. Did you have draught power? 1. Yes 2. No (skip to # 29)

27 What type of animals do you use to plough your land?

1. Oxen 2.horse 3.mule 4. Cow 5.donkey 6.other

28. How did you get animals? 1. Own animals 2. Shared 3. Rented
4. Exchanged 5. Gift 6. Other

29. Did you have access to livestock other than draught power in the last 12 months?
1. Yes 2. No (skip to # 31)

30. If yes, please indicate the type and number of animals

Type of livestock	Number
1.oxen	
2.cow	
3.heifer	
4.bull	
5.calf	
6.goat	
7.sheep	
8.donkey	
9.horse	
10.mule	

D. Access to credit/finance

31. Did you or/and any member of your household borrow any money in the past 12 months? 1. Yes 2. No

32. If no, what are the reasons for not to have credit/finance access? (Multiple responses is possible) 1. Did not need credit 2. Fear of debt 3. Too high interest 4. Terms/condition of credit not good 5. Absent of lending institution/individual

33. If yes, please give the following information. (Multiple responses is possible)

Source of credit	Amount borrowed(birr)	Purpose to use the money
1.family/relatives		1,2,3,4,5,6,7,8,9,10,11,12
2. money lenders		1,2,3,4,5,6,7,8,9,10,11,12
3.tradational institution (idir, equb)		1,2,3,4,5,6,7,8,9,10,11,12
4.NGO		1,2,3,4,5,6,7,8,9,10,11,12
5.government institution		1,2,3,4,5,6,7,8,9,10,11,12
6.trader		1,2,3,4,5,6,7,8,9,10,11,12
7.others		1,2,3,4,5,6,7,8,9,10,11,12

codes

1. buy food 2. buy cloths 3. buy other consumption item 4. buy farming inputs
5. buy oxen 6. buy other livestock 7.capital for trading 8.for non-farm
9. taxes and fees 10.education 11. health 12.other

34. Did you save some amount of money (grain) to use in the case of emergency during the last 12 months? 1. Yes 2. No

35. If yes, how much is it? _____

36. Have you received remittance from some one living else where, during the last 12 months? 1. Yes 2. No

37. If yes, how much is it? _____

38. Do you or/and any of your family member work in non-farm occupation?
1. Yes 2. No

39. If yes, what is your approximate income from the non-farm activities you are engaged in? per annum _____.

IV. Food security status

40. The staples that your household consumes during the last 12 months

Crop type	Amount in quintal or kg.				
	Own product	purchase	Food aid	sold	net
1. teff					
2.maize					
3.sorghum					
4.barly					
5.wheat					
6.pulses(beans, peas)					
7.potato					
8.vegetables					
9.oil seeds					
10.other(specify)					
11.total					

41. Do you meet the all-year round food requirements of your household members from own production? 1. Yes 2. No
42. If you are not self sufficient, for how many months do you own productions cover the food requirement at home? (mention name of months)_____
43. According to your own self-assessment, what is your household's food security status during the last 12 months?. 1. Food secures 2. Food insecure
44. What do you think about the main reasons for being food insecure?

Reason for insecurity	1.yes 2.no
Inability to produce sufficient grains and to rear livestock	
Meager income from non-farm activities	
Failure to properly utilize own production and other earnings	
Political instability	

45. What have been the main constraints to expanding your crop production, as well as for keeping sufficient numbers of stock in order to become self-sufficient in food all years round?

Constraints to crop production	1=yes 2=no	3 most importance bottlenecks
-drought		
-frost		
-pests and disease		
-erratic rainfall distribution		
-shortage of farm oxen		
-insufficient land holding		
-poor soil fertility		
-lack of access to appropriate technology		
-limited know-how and skills		
-inability to apply sufficient modern farm inputs		
-dependency on rain-feed farming		
-failure to utilize irrigation		
-lack of access to post-harvest technology		

Constraints to livestock raising	1=yes 2=no	3 most importance bottlenecks
-lack of sufficient pasture lands and fodder		
-stock diseases		
-poor stock management		
-traditional attitude towards large numbers		
-failure to properly use stock and their product		
-lack of access to better stock breeds		

46. Food from animal products

Type	In kg. /liter			
	Own product	Purchased	Sold	Net
Cheese				
Butter				
Egg				
Meat				
Milk				
Honey				

V. Environment

47. What is the average fertility status of your farmland?
    1. Poor 2. Moderate 3. Good 4. Very good
48. How do you evaluate the conditions of the rainfall in your area for crop production and livestock rearing? 1. Excess 2. Sufficient 3. Insufficient
49. Do you face sever health problem in the last 12 Months
    1. Yes 2. No

B. Focus Group Discussion and In-depth Interview checklist

- What is the trend of: forest, soil quality and population?
- Rainfall condition
- Is there access to credit? And how it is important to alleviate food shortage problem?
- Is there any discrimination among female-headed and male-headed households?
- Is there any aid from the government or any other body?
- What are the main constraints of crop production? Hint

  - drought
  - frost
  - Pests and disease
  -erratic rainfall distribution
  - shortage of farm oxen
  - insufficient landholding
  - poor soil fertility
  - failure to utilize irrigation
  - inability to apply sufficient modern farm inputs
  - lack of access to appropriate technology
  - others

- What are the main constraints of animal rearing? Hint

  - lack of sufficient pasture land and fodder
  - stock diseases
  - traditional attitude towards large numbers
  - lack of access to better stock breeds

Annex- II Conversion Scale

A Conversion Scale to Compute Adult Equivalent (AE)

Age group(years)	Male	Female
<10	0.60	0.60
10-13	0.90	0.80
14-16	1.00	0.75
17-50	1.00	0.75
>50	1.00	0.75

Source: Institute pan African pour le Development (1981) cited in Dulla 2007

B. Conversion Scale to Compute Man Equivalent Labor Force (ME)

Age group(years)	Male	Female
< 10	0.00	0.00
10-13	0.20	0.20
14-16	0.50	0.40
17-50	1.00	0.80
>50	0.70	0.50

Source: Rothenberg 1983 and Nair 1985 cited in Dulla

C Conversion Scale to Tropical Livestock Unit (TLU)

Animal type	TLU
Ox	1.00
Cow	1.00
Heifer	0.50
Young Bull	1.00
Calf	0.20
Goat	0.10
Sheep	0.10
Donkey	0.40
Horse	0.80
Mule	0.80

Source: Storcketal (1991)

D Conversion Scale of crops and other types of food into their kilocalorie equivalent

Type of food item	kg	Equivalent kcal
Teff	1	3400
Maize	1	3560
Sorghum	1	3430
Wheat	1	3340
Barley	1	3320
Pulses(beans, peas)	1	3460
Potato	1	670
Vegetables	1	910
Oil seeds	1	4070

Source: FAO (2001) cited in Adinew, 2007

E. Conversion Scale of food from animal product into their kilocalorie equivalent

Food item	Amount	Equivalent Kcal
Cheese	1kg	3610
Butter	1kg	7480
Egg	1kg	1570
Meat	1kg	2320
Milk	1 liter	2600
Honey	1 kg	3800

Source: Table calories www *10 dies 4 you.com/ calculator/ calories.html*

Annex-III

Coefficient of Contingency Table

	X2	X1	X3	X5	X6	X8	X12	X13	X15	X20	X17	X18	X19
X2	1												
X1	0.032	1											
X3	0.133	0.036	1										
X5	0.366	0.245	0.115	1									
X6	0.127	0.415	0.167	0.480	1								
X8	0.203	0.002	0.211	0.346	0.232	1							
X12	0.088	0.084	0.010	0.083	0.261	0.156	1						
X13	0.138	0.086	0.080	0.216	0.203	0.156	0.352	1					
X15	0.008	0.089	0.022	0.129	0.284	0.276	0.400	0.198	1				
X20	0.204	0.250	0.288	0.575	0.481	0.279	0.142	0.177	0.151	1			
X17	0.010	0.118	0.008	0.094	0.104	0.118	0.039	0.067	0.043	0.024	1		
X18	0.038	0.144	0.030	0.085	0.058	0.048	0.056	0.027	0.012	0.029	0.399	1	
X19	0.126	0.156	0.152	0.277	0.228	0.128	0.041	0.037	0.051	0.344	0.016	0.029	1

Xi's refers to variables defined in section 3.6

Source: Computed from survey data

Annex-IV

Rainfall and Temperature Data of the Study Area in 2008/9

		Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Rainfall(mm)		0	0.45	1.6	0.93	2.13	10.47	17.6	19.9	15.5	3.7	0.91	0.90
Temp. (0c)	Max.	24.3	26.57	27.2	26.8	25.58	23.1	20.7	20.2	21.5	21.97	23.4	23.87
	Min.	6.67	10.43	11.1	10.9	10.6	11.5	10.7	10.96	8.8	8.9	7.9	4.48
	Ave.	15.58	18.5	19.15	18.8	18.1	17.3	15.7	15.6	15.15	15.44	15.65	14.17

Source: Meteorological Services Agency

DECLARATION

clare that this thesis is my original work, has not been presented for a degree in any r university and that all sources of material used for the thesis have been duly nowledged.

dent

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isor

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