DETERMINANTS OF HOUSEHOLD FOOD SECURITY: THE CASE OF BOL0S0 S0RE DISTRICT (WOREDA) , WOLAITA ZONE, SOUTHERN NATIONS NATIONALITES AND PEOPLES REGIONAL STATE(SNNPRS) OF ETHIOPIA.

A THESIS

SUBMITTED TO THE INDIRA GANDHI NATIONAL OPEN UNIVERSITY (IGNOU) SCHOOL OF CONTINUING EDUCATION IN PARTIAL FULFILLMENT OF REQUIREMENTS FOR THE DEGREE OF MASTER OF ARTS IN RURAL DEVELOPMENT

BY

YISEHAK ANGELLO

MAY 2014

ADDIS ABEBA, ETHIOPIA

Declaration

I, the under signed, declare that this thesis is my work and all sources of materials used for the thesis have been duly acknowledged.

Name: Yisehak Angello

Signature: _____

Place: St. Mary's University

Date of Submission: May, 2014

CERTIFICATION

This is to certify that Mr/Mss/Mrs…….

Student of M.A.(RD) from Indira Gandhi National Open University, New Delhi was working under my supervision and guidance for his/her project work for the course MRDP-001.

His /Her project work entitled DETERMINANTS OF HOUSEHOLD FOOD SECURITY : THE CASE OF BOLOSO SORE DISTRICT, WOLAITA ZONE which he/she is submitting, is his/her genuine and original work.

Place:…...

Date:….

Signiture……..

Name…….

Address of the Supervisor…

……

ACKNOWLEDGMENT……..II

I am indebted to the Almighty God with whose grace; I could satisfactorily complete my graduate study.

I am deeply grateful and indebted to Dr. Mengistu Huluka, my major research advisor, for his encouragement, suggestions, guidance and over all assistance. Successful accomplishment of this research would have been very difficult without his generous time devotion from the early design of the research proposal to the final write-up of the thesis by adding valuable and constructive comments, which enabled me to complete the research work and thesis write-up. No words can suffice to express my feelings of gratitude to my brother Engineer Paulos Angello and his wife w/o Abeba Getachew for their generous assistance and helpful encouragement during my graduate study with all their kindness and provision of different reference books, facilities by hosting, shelter, etc. All school programs, tutorial and examination schedules and latest information including registration fee were followed and accomplished by my brother on behalf of me. Since the study centre is 400 kilometers away from my destination, it was completely impossible to carry out and succeed in this study without his all rounded intervention. Furthermore, my special thanks go to Ato Yoseph Lemma who is in USA now, encouraged and provided me valuable technical assistance, guidelines and very supportive documents. I would like to express my heartfelt thanks and sincere appreciation to my elder brother Ato Abreham Angello and his wife Yemisrach Matewos who supported me morally as well as material wise. Ato Altaye Ayele who is the manager of WDA, Mesay Dacho who is in USA now, Zelalem Paulos /ICT Expert/

And Yacob Zula for their unforgettable continuous encouragement and duties such as computer printing, capacitating, editing, hosting, etc. during the research work.

Once again, I want to acknowledge my wife and my younger brother for their handling of my sponsorship . Special appreciation is also unreservedly expressed to Ato W/Mariam Wolere and Berket Yacob from Zonal BOA and Ato Yoseph Moliso from Zonal BoPED for their providing me the secondary data during data collection .The last but not the least thanks to Petros H/Wold who is the head of BOA in the study District as a coordinator and Kidane Dunda the Extension supervisor, Ashagre Habte crop expert and Abnet Ajja coffee expert were involved in field supervision in their respective Kebeles which were selected randomly .PAs(i.e., Gurumo Koysha from Dega, Dolla fom Woyina Dega, and Matala Hembecho from Kolla) were picked by using random sample method . Again ,I would like to thank the Development Agents /DAs/ Mekonen Fako,Bekele Balcha and Mebratu Matewos who were collected questionnaire data as being an enumerator from the three respective PAs with least cost by devoting their precious and ample time .

Particular thanks go to my staff members Balcha Beyene/the driver/, Techa Ukka, Fekadu Chakiso, Meselech Lota, Muluneh Mena, Tigabu Hussen and Tadele Gelan for their encouraging and supporting me morally as well as material wise. I am also indebted to my father, brothers and sisters and all family members as well as my children /Kalkidan and Natinael/ for their assistance and encouragement.

My special and particular thanks goes to my friends W/Worsen, Niguse and Tsehay Siefu, W/o Haregewa Denbu/my mother in law/, G/Wold Bisa and his wife Tsehay

Dumesa, Abnet and Genet Abreham for their material support and moral encouragement throughout my academic work.

Finally, I am indebted to my brother Zewudie Anjulo and his wife Zebenay; Ato Yacob Anjulo and his wife Azalech, Ato Abebe Anjulo and his wife S/r Desta Mena, My sisters Yemisrach, Birtukan and Tewabech who were the source of special strength towards the successful completion of my study.

DEDICATED TO MY YOUNGER BROTHER

ENGINEER PAULOS ANGELLO

AND

MY LOVELY WIFE

W/O ETETU SEIFU W/MARIAM

BIOGRAPHY……I

The author was born in Areka town, of Wolaita Zone of SNNP Regional State December 1963 G.C. He attended his primary and junior secondary education in Wolaita Zone at Ottona Junior Secondary School. Then, he joined Soddo Comprehensive Senior Secondary School and completed his secondary education in 1977. He joined the then Addis Ababa University of Science Faculty/AAU/ in 1978 and graduated with Diploma in Physical Science/Maths Major and Physics Minor/in July 1979.

Soon after his graduation, he was employed in the then Ministry of Education /MOE/in July 1979 /and served in Keffa / Mizan Teferi Secondary High School for one year and then transferred to Jimma Comprehensive High School where he served for four years. Also he had got a chance to join Ministry of Coffee and Tea Development/MCTD/ as being a Planning Expert from 1984-1996.In addition to these, the author served in Ministry of Agriculture/MOA/ in Wolaita Zone from 1997-2001.Then the author joined Hawasa Agricultural College in Continuing Education Program/ CEP/ where he rewarded his BSC in PPDF/Plant Production and Dry land Farming/in the year 2006.After his graduation, he served as Office Manager/Department Head/at different District and Zonal levels of Government Offices up to 2013.During his stay there, he joined IGNOU/ Indira Gandhi National Open University/ since 2010 for his post graduate studies.

TABLE OF CONTENTS

ACRONYMS AND ABBREVIATIONS……..X

WDA; Wolaita Development Association

ADLI: Agricultural Development Led Industrialization

AE: Adult Equivalent

ANOVA : Analysis of Variance

BSF: Belgium Survival Fund

CADU: Chilalo Agricultural Development Unit

CSA :Central Statistical Office

DA : Development Agent

DAP: Diamonium Phosphate

EC : European Commission

EMTP: Extension Management Training Program

ENI : Ethiopian Nutrition Institute

FSI : Food Security Index

FAO : Food and Agricultural Organization

FNU: Food and Nutrition Unit

ha : hectares

HDI: Human Development Index

HADU: Humera Agricultural Development Unit

HH: Household

IFAD: International Fund for Agricultural Development

IGADD : Intergovernmental Authority on Drought and Development

IRD :Integrated Rural Development

Kg: Kilogram

Kcal : Kilo calorie

ML: Maximum Likelihood

MEDaC : Ministry of Economic Development and Co-operation

MOPED : Ministry of Planning and Economic Development

MOA: Ministry of Agriculture

MPP: Minimum Package Program

Masl: meters above sea level

NPDPM : National Policy on Disaster Prevention and Management

NGO : Non Governmental Organization

OLS: Ordinary Least Squares

PA: Peasant Associations

PADEP: Peasant Agricultural Development Project

PADETES: Participatory Agricultural Demonstration and Training Extension System

PRA : Participatory Rural Appraisal

Qt : Quintal (100kg)

RRC: Relief and Rehabilitation Commission

SD : Standard Deviation

SG2000 : Sasakawa Global 2000

SPSS: Statistical Package for Social Science

TGE : Transitional Government of Ethiopia

TLU: Total Livestock Unit

UNDP: United Nation Development Program

USAID: United State Agency for International Development

WADU: Wolaita Agricultural Development unit

WFP: World Food Program

WZBoPED: Wolaita Zone Bureau of Planning and Economic Development

WIBS : Wereda Integrated Basic Services

ABSTRACT……XII

A better understanding of factors affecting the status of food security at micro level is required for the organization of technical research, the development of policies and for shaping the direction of action for food self-sufficiency. Consequently, this study is expected to generate ideas that would be useful to reveal the seriousness of the problem and identify the determinants of household food, security. To this end, Investigation of the bio-physical, demographic and socioeconomic characteristics of food secure and food insecure groups of farmers; identification and examination of major causes of food insecurity and measuring food security status of households; identification as to what kinds of the households are more food insecure or secure; as well as assessment and analysis of the local coping strategies of the households in the district was made in this study. With existence of high annual variability in food production mainly due to unpredictable climatic conditions coupled with expanding human population and the lack of access to off-farm opportunity the household food security status is worsening in the study area. This study was therefore, envisaged to assess the determinants of food security at household level and to identify local coping strategies practiced in the district.

This study was undertaken in Boloso Sore district of Wolaita zone, SNNP Regional State. A two stage sampling procedure were used to select 3 Peasant Associations (PAs) and 120 sample respondents from a total of 27 PAs in the district. The survey result revealed that about 73% of sample farmers were food insecure in the district. Primary data referring to the year 2004/2005 were collected from sample respondents through personal interview using structured questionnaire administered by 3

enumerators. Furthermore, the study was supplemented by secondary data collected from various sources.

Data on demographic, socio-economic and biophysical characteristics of the sample respondents were presented, organized and discussed using various tools of both descriptive statistics and econometric analyses. Attempts were made to look into the specific characteristics of the food secure and food insecure groups using univariate analysis (T-test and chi-square (χ^2) tests of significance). Logistic regression model was used to identify the continuous and discrete potential variables capable of affecting the food security status in the district. The model results reveal that among 14 explanatory variables included in the logistic model, 8 were found to be significant at less than 10% probability level in the district. These significant variables include family size (FAMSZ), number of oxen owned (NOOXEN), the use of fertilizer (FERTIL), food expenditure pattern (FODEXPT), number of livestock owned (TLU), size of cultivated land (CULTAR), off-farm income (OFFIAE) and income per adult equivalent (INCAE). Furthermore, the model results show that the logistic regression model correctly predicted 91% of the sample farmers, 81% of food secure and 95% food insecure groups. Thus, identifying analyzing, and understanding those elements that are responsible for household food security in places like Boloso Sore district needs urgent research undertakings and the results are believed helps to guide policy decisions, appropriate interventions and integrated efforts to combat food security at the district and household levels.

1. CHAPTER ONE: INTRODUCTION

1.1 Background of the study

Endowed with considerable agricultural potential, Ethiopia had been self-sufficient in staple food was classified as a net exporter of food grains till the late 1950. It was reported that the annual export of grain to world market amounted to 150,000 tons in 1947/48 (Alemayehu, 1988, as cited by Tesefaye and Debebe, 1995). However, since early 1960s, the country's domestic food supply situation has been declining and failed to meet the food requirements of the people. Particularly, from the beginning of the mid-1980s, food production has exhibited a downward trend.

The inadequate growth in production has led to increasing food insecurity in many parts of Ethiopia over the past decades. Some of the principal causes of inadequate growth in food production, and increasing food insecurity, according to FDRE (1996) and Chung et al. (1997) and Wolday (1998) are: inadequate and unreliable rainfall, soil degradation, lack of political stability caused by ethnic conflicts and territorial dispute, poor transport and infrastructure in the rural areas, misguided economic policies such as land tenure, geographical diversity, rapid population growth, outdated production technology and small land holding size, high cost of farm inputs, rain-fed farming and inefficient irrigation systems, lack of storage, disease, inadequate nutritional knowledge, heavy workloads for women, etc

Throughout the last three decades the performance of agriculture reveals that the sector has steadily fallen into deep crisis. The average annual agricultural growth rate was 2.2 percent during the 1960s but dropped to 0.7 percent in the 1970s and stagnated at 0.5 percent in 1980s. The performance in the early 1990s, has been even less satisfactory,

with growth reached its lowest point in 1991/92 as a result of the aftermath of the civil strife, when it dropped to -0.5 percent (Wolday, 1998). Similarly, during the last two decades (1979/80 – 1997/98), per capita production covers on average, about 56% of the minimum consumption rate, where as the per capita supply covers on average about 61% (CSA, 1998; Tesfaye, 1999). This suggests that the country's crop production is unable to keep pace with the growth of its population, and thus, food insecurity will continue to be a serious problem as food production remains stagnant and a high rate of population growth continues unabated. On the other hand, in the 1980s, food production was increasing at a rate of 1.7 percent per annum compared to the population growth of 2.9 percent annually. Per capita agricultural production declined by 2.7 percent, while crop productivity has remained low at average yields of 1.2, 0.6, and 0.5 tons per ha for food grains, pulses, and oil seeds, respectively (MEDaC, 1997).

Thus, the country has been and is facing serious food supply shortage. As a result, there has been a growing gap between food requirements and availability and a growing reliance on international donations for a major portion of food consumption needs. The food gap widened in the 1980s ranging between one and two million metric tons of cereals in 1985 and continued through 1995 (FDRE, 1996). In terms of supplying minimum food consumption requirement, the country is unable to meet even the recommended level of minimum daily per capita food intake of 2100 kcal (225kg per year) or approximately 616 gm/person/day targeted by Transitional Government of Ethiopia (TGE, 1994) during its five year Agricultural Development Plan for 1993/94–1997/98. Hence, the country's actual consumption, of calories was estimated

to be, on average, 20 percent below this minimally acceptable nutritional standard (FDRE, 1996; Tesfaye, 1999; and Wolday, 1998). The Ethiopian Food Security Strategy (FDRE, 1996) estimated that about 52% of the country's population is below the poverty line. The same source shows that the number of drought affected population in the country since the big famine of the mid-1980s to 1995 ranged from a minimum of 2.53 million in 1987 to 7.85 million in 1992. World Bank's (1992) estimates also put the number of chronically and seasonally food insecure people at 21 million about (40%) and MoPED (1992) also estimates some 27 million (50%) of the total population of Ethiopia in 1992. The estimates of IFAD (1989) as cited by Asres, (1995) and Maxwell (1990) were 19 and 38 million, respectively. Maxwell and Debebe (1992) have also estimated the food insecure to be about 27 million including other social groups (such as the displaced). Of these estimates the greatest number were residing in rural areas. With regard to the regional dimension, IFAD (1989) as cited by Tesfaye and Debebe (1995), five regions including the main cash crop producing areas (Wello, Gamo ,Gofa, Illubabor, Hararghe and Sidamo) were identified as the most deprived areas. Shoa, Arsi, Gojjam and Wollega were comparatively categorized as regions with reasonable access to resources, goods and social services. Similarly, based on the result of food security index (FSI), Tesfsye and Debebe (1995) also ranked and grouped the regions into three categories, highly food insecure, moderately food insecure and less food insecure. In this regard Wolaita ,is categorized as one of the highly food insecure Zone. Furthermore, the result of an outcome of a multi-agencies food security and poverty indicators categories Wolaita zone was categorized in very highly and highly vulnerable areas of the country (UNWFP, 1999). See Figure 1 below.

Food insecurity, in Wolaita Zone(SNNPRS) in general and Boloso Sore district in particular is a serious problem. The zone is categorized into highly food insecure or one of the least self sufficient region of the country (Tesfaye and Debeb, 1995). Similarly, a food demand situation analysis report of the year 1995-1999 showed that the total average annual production in the zone meets only 65% of total demand of food on the basis of 2100 kcal minimum recommended nutritional requirement (WZBoPED, 1999). This implies that a good number of people of the zone are food insecure for a number of months in a year. BSF/UNICEF (2000) also reported that the annual food deficit in the year 1998/99 was about 45 percent especially for Boloso Sore district, which is an indication of worsening food security status there.

1.2 Statement of the Problem

In spite of the fact that the agricultural sector has received attention in the country's development strategies since 1970s, when the Third five-year development Plan (1968-1973) was launched, Ethiopia is still a food deficit country. This is mainly due to the dependence of agriculture on rain-fed, traditional, subsistence small holder farming that depends on methods of production where oxen-drawn local wooden ploughs and manually operated hand tools are commonly used for seed bed preparation, seeding, weeding, harvesting and threshing. Pre-and post-harvest crop loss is estimated to range from 15 to 20 percent of the total annual produce (Tesfaye, 1999). Agricultural productivity per hectare of smallholder farm land remained very low, less than one ton (CSA, 1997). The major causes of the poor performance of agriculture in Ethiopia have been (a) suppression of private sector initiatives by the former government, (b) civil war, (c) out dated production technology in the dominant peasant sub-sector and small land holding size per family, (d) unreliable rainfall and recurrent drought (e) inadequate infrastructure

in the rural areas, such as poor linkage between research and extension (g) miss-guided economic policies such as a land tenure policy which were not conducive for investment and inefficient marketing policy which made the movement of food grain between regions difficult (Wolday, 1998). The fact that the economy depends largely on agricultural production, which is very vulnerable to natural, and manmade disasters makes it subject to famine. Households' inability to cope with food insecurity due to successive production failures manifested itself as famine.Indeed famine has so far been part of the Ethiopian history (Bezabih, 2000). Drought shocks have been relatively common occurrence in Ethiopia in the past. In the four and a half decades since the 1950, there have been 12 events of drought, for the last two years. It appears that the frequency of harvest failures has also increased over the years. Thus, the probability of a drought shock occurring in Ethiopia is as a high as 3 out of l0 years. Moreover, with growing population, the magnitude of food insecurity is likely to increase for each event of drought. The number of drought affected population in the country since the big famine of the mid-1980s to 1995 ranged from a minimum of 2.53 million in 1987 to 7.85 million in 1992 (FDRE, 1996). Since the country as a whole has diverse agricultural production potential and resource endowment, there is a wide range of variation in area cultivated, total food produced, population distribution, and consumption requirements among the regions. For instance, among different administrative regions the highest agricultural potential is in Keffa, Illubabor, Sidamo, Welega, parts of Gojam and parts of Shewa while a low potential of arable land is found in Hararghe, Wollo and Tigray (former administrative classifications). As a result of these variations in potential between the regions, the numbers of food insecure people are also varying considerably (Tegegn, 1995, Dejene et. al. 1995, as cited by Eshetu, 2000). Likewise, Wolaita Zone(Boloso Sore) district of SNNP Regional State is part of the country, which has experienced food insecurity problem and categorized as highly food insecure since the last two decades(Table1 below) .

Table1: Sources of risks of food insecurity and affected populations

Please, find this Table attached with the hardcopy

A recent study by Wolaita Zone Bureau of Planning and Economic Development Office (WZBoPED) and BSF/UNICEF (2000) had shown that agricultural land in Wolaita Zone is under immense pressure from an expanding human population trying to cultivate rapidly degrading resources. Soil erosion is severe as cultivation expands increasingly in marginal areas. Farm size is very small with an average land holding per household ranging between 0.3-0.5 hectare and getting smaller with the incoming new generation. This increased pressure on land among the increased number of young farmers leads to abandonment of fallow system. The cycle of drought, famine and distress is widely known. Off–farm and non-farm opportunities to improve the lives of farmers and their families are limited. With ever-increasing population and limited cultivable area the household food security status is worsening in the study area. With regard to food production (grain) and availability, Boloso Sore woreda is highly food deficit. According to food balance sheet prepared for the year 1998/99 production years by WZBoPED and BSF/UNICEF (2000), the total production was 16,479 tons while net grain production after 15% deduction for seed and post harvest loss plus 356 tons food aid was 14.363 tons. The per capita production was 168 kg/person, which was much less than the minimum recommended nutritional requirement of 225 kg/person on the base of 2100 kcal. The estimated annual food demand for the district was 19246 tons while deficit was 4883 tons. As a result of this annual food deficit, about 2000 people (male) migrate seasonally every year in search of jobs outside the district BSF/UNICEF (2000). The food balance sheet and the existence of migration shown there is high annual variability in food production and availability, which confirms the existence of food insecurity problem among the households of the district.

Efforts by policy makers and researchers to design effective food security strategies has been constrained by a lack of reliable and relevant information concerning the causes of food insecurity and its dimension. As a result, designing policies and interventions has too often become "an exercise in planning without facts" (Webb, et al. 1994). Information is, therefore, highly required, and surveys and studies have to be carried out. While the problem of food insecurity has big diversity and a multiple dimension, which ranges from the global, regional, country, local, household to individual level; more attention is only given to the country level so far. Moreover, the various, complex and interrelated causes of household food security and local responses during crisis situation are not studied in detail, especially at a household level. Thus, identifying, analyzing, and understanding those elements that are responsible for variation in household food security in places like Boloso Sore district are needed to guide policy decisions, appropriate interventions and integrated efforts to combat food insecurity at the district and household level. This study attempts to reveal the seriousness of the problem and identify the major determinants of food security at the household level.

1.3 Objectives of the Study

The vagaries of climatic conditions coupled with an expanding human population trying to live on rapidly degrading small size of land holding which is getting smaller with the incoming new generation and lack of opportunities for off- and non-farm jobs, the food security situation is worsening in the study area. This condition triggered development agencies working in the area to look into various schemes to understand the situation.

This study was envisaged in this selected district in view of the problems discussed above.

The specific objectives of the study were:

1. To assess the determinants of food security at household level;
2. To investigate the biophysical, demographic and socio-economic characteristic of food secure and food insecure groups of farmers; and
3. To identify local strategies of households to cope with food insecurity

1.4 Significance of the Study

Having clear picture and information on the status of food security and its determinants in the study areas, one can provide a basis for a detailed analysis on food security in the country. A better understanding of factors affecting the status of food security at micro level is required by organizations concerned with community development, researchers, and development policies makers. The study also provides directions for further research, extension and development schemes that would benefit the farming population. Furthermore, the result may identify areas of intervention to alleviate poverty in general, and food security, in particular.

1.5 Scope and Limitations of the Study

The study was conducted to identify the determinants of food security at household level and to assess their relative importance in determining the state of food security at micro level in Boloso Sore district of Wolaita zone. The study covers only one of the twelve districts of Wolaita Zone of the Southern Nations Nationalities and Peoples Regional State. Moreover, the study deals with a limited number of households and focused on the determinants of food security at household level but not include

intra-household dimensions. The scope of this study was limited by time, budget and other resource limitations. Even if the study was restricted in terms of its coverage its findings can be used as a spring board for more detailed and area specific studies.

1.6 Organization of the Thesis

The rest of this thesis is organized in five chapters. Chapter two deals with review of literature that includes theoretical frameworks of food security and empirical studies made in the country and elsewhere in the world. Chapter three presents a brief description of the study area while chapter four deals with methodology of the research. Results obtained are discussed in detail in chapter five. Chapter six presents summary and conclusions of the study.

2. CHAPTER TWO : REVIEW OF LITERATURE

2.1 Determinants of Household Food Security

2.1.1 Food Security Situation in Ethiopia

Throughout the last two decades the country experienced low domestic crop production compared to the total domestic food supply (Tesfaye, 1999). The country was not self-sufficient in food production between 1979/80-1997/98. The gap between crop production and total supply became wider especially between 1982/83 and 1994/95 showing the importance of food imports in the country's food supply structure (Table 2 below).

Table 2: Indicators of household food security

Please, find this Table attached with the hardcopy

The lowest production occurred during the 1984/85 peak famine year whilst in the 1980s the highest production was in 1982/83 (i.e. about 4.874 million tons and 7,805 million tons) respectively. Production per capita was about 174kg in 1979/80, which is the highest figure during 1979/80-1997/98. The lowest per capita production was about 93kg in 1993/94, about 53 percent that of 1979/80 (Tesfaye, 1999; CSA, 1998; Tesfaye and Debebe, 1995). Production per capita was less than 150 kg for almost all of the specified period except 1982/83 and after 1995/96. Until 1994/95, the per capita production was significantly declining (Table 2.1). Generally, the production per capita of the country exhibits a declining trend causing a rise of food aid per capita. This suggests that the country's crop production was unable to keep pace with the growth of its population. Per capita food supply or availability is calculated as net domestic supply divided by the total population of the country. Both per capita food production and food availability indicate the country's capability to feed its population from domestic production and food imports. The ratio of net production to the net food supply measures the degree of the country's self-sufficiency in food crop production. The ratio was consistently less than l00 percent indicating that the country has not experienced self-sufficiency in food crop production during the above mentioned period, and therefore depended on food aid and commercial food import to fill the gap. According to the gap analysis between food requirements and supply, the deficiency, which needs to be filled is quite high, amounting an average of 87kg. per person per annum and as a result many people are persistently living under a situation of malnutrition, facing structural food deficit. During the last two decades per capita

production covers, on average, about 56 per cent of the minimum consumption rate, where as the per capita supply covers, on average, about 61 per cent (Tefaye and Debebe, 1995; Tesfaye, 1999). Even with imported food, the per capita food supply was below the requirements. This assessment shows, that the food production, consumption and deficit situation of the country over the past two decades indicates that there were no years during which Ethiopia enjoyed surplus cereal production, exceeding the consumption requirements (Table 2.1). As a result, the populations of the country have been facing food shortage or under nutrition, even in normal years (when the country is not struck by droughts).

.

Table 2.1 Trends in food production, supply and demand in Ethiopia

Please, find this Table attached with the hardcopy

The fact that the economy depends largely on agricultural production, which is very vulnerable to natural, and manmade disasters makes it subject to famine. Households' inability to cope with food insecurity due to successive production failures manifested itself as famine (Bezabih, 2000). According to the review made by Webb and von Braun (1994:20), the first traceable famine in Ethiopia occurred during 253-242 BC. Several incidences of famines were reported since then. The most recent tragic famines were experienced in 1984/85 and it was prevalent in the central and north Eastern Highlands and the low land pastoral areas of eastern and southern regions.

According to report of (EC, 1997) the country's chronic food insecurity is categorized into three elements, which are distinct but nevertheless linked. First of all there is insufficient production/supply, with the development of supply being hampered by unsuitable agricultural production techniques, a high number of fragmented smallholder farming, which only allow traditional agriculture, environmental degradation, inadequate rainfall, lack of access to inputs and credit, pre-and post-harvest losses as well as underdeveloped trading systems. On the demand side, the weak purchasing power created by the endemic poverty of the population is preventing the development of market conditions, which could encourage an increase in production. Finally historical factors (with the economy having experienced years of negligence and war) plays on these first two elements since the country has to overcome several years of war, famines and neglect of food insecurity (EC, 1997). The above discussion reveals that food insecurity is a complex problem, where it involves different factors beyond food production, consumption and distribution systems. In order to overcome this complex problem, the economic policy of the country must give due emphasis to tackling

household food insecurity. Particularly in areas including food production, food prices and the operation of food markets, employment opportunities, access to economic assets and basic services such as education, health, water supply, credit, extension and infrastructure to break the food insecurity cycle. Above all, directing all rural development efforts towards achieving the households' food security in a well-planned and integrated manner would help to address food insecurity problems. A general picture of food security problem in the country has been shown in previous section. To design effective policy and take appropriate measures, however it requires a disaggregated description of the problem. Identification of the source, duration and the characteristics of affected population are a useful approach in this regard. Although poverty is a common characteristic of food insecure households, they may be differently categorized depending on access to land, diversity of income sources, and state of development of the economy and so on (Braun, et al, 1992).The World Bank study (1992) has worked out and offered a set of food insecurity profiles of different social and demographic groups in Ethiopia which more or less answers the question of who, why and how many people are food insecure.

The classification presented in Table 2.2 gives a good picture of food insecurity profile in Ethiopia disaggregated into eight categories out of which four are chronic and others are transitory. A distinction is drawn between transitory and chronic food insecurity. Chronic food insecurity is a long-term and continuous inadequate food intake caused by the inability to acquire food and is more closely linked to poverty.

Transitory food insecurity is a temporary decline in household's access to enough food. This is a result of episodic events such as drought, or civil disturbance, etc. (von Braun

et al, 1992; Debebe, 1995; Maxwell and Frankenberer,1992). The major categories under chronic food insecurity are: rural resource poor, rural settlers, urban poor and urban unemployed; while the transitory food insecure include rural pastoralist in drought areas, rural population affected by the civil war, rural refugees and urban vulnerable to policy reform (World Bank, 1992). Depending on the above food insecurity profiles of the country, the food insecure households in the study area can be identified and categorized into those rural resource poor households, who belong to members of different socioeconomic and demographic groups. These include farming households whose farm land is very small and have soil infertility problem, those without any ox and possess few livestock, those who earn and produce relatively small amount of income and farm produce, and those who are unable to purchase food for all household members and for whom there have been few alternative form of off-and non-farm employment.

Table 2.2: Classification of food insecure in Ethiopia

	Rural	Urban	Others
Chronic	Resource poor households -land scares -ox-less -female-headed households -elderly - poor non-agricultural households -newly established settlers	Low income household Employed in the informal sector groups outside the labor market -elderly - disabled some female-headed h households	*Refugees Displaced People Ex-solder
Transitory	Less resource-poor households Vulnerable to shocks, especially but not not only drought -Farmers and others in drought-prone areas - Other vulnerable to economic . h hsocks e.g.in low potential areas	Urban poor vulnerable to economic shocks especially food price rises	Groups affected by temporary civil unrest.

Note:*Other column shows groups temporarily residing in both area.

Source: Maxwell and Debebe,1992

It is difficult to know exactly how many households are food insecure due to definitional and measurement problems and inadequate data (von Braun, 1992). However, as mentioned earlier in section 1.1 efforts were made by various studies IFAD (1989) as cited by Aseres (1995), World Bank, (1992); MoPED, (1992); and Maxwell and Debebe,

(1992) to arrive at rough estimates of the number of food insecure people in Ethiopia. Accordingly, based on the measurements/indicators, social category and size, IFAD (1989) estimates the rural food insecure population at 43% (18.9 million), while World Bank (1992) and MoPED (1992) estimate the proportion of rural population who are food insecure at 39% (21.3 million) and 49.4% (27.1 million), respectively (Table 2.3). On the other hand, another food security study by FNU/ MoPED (1994) in the four major towns of the country (Bahir Dar, Jimma, Awasa and Dire Dawa) shows that about 57%, 55%, 38% and 29% of the urban households were, respectively unable to purchase food to meet a per capita consumption of 1700 kcal/day. The average food insecure people of these four towns were about 45 percent.However, if the nutritional requirement is raised to 2100 kcal, the food insecure people will rise to 56 percent of the urban households. The situation in the late 1990s was not encouraging it is rather frustrating extreme. The reduction in production mainly as a result of poor Belg rains followed by late, low and erratic Meher rains in the past couple of years led the country to severe food crisis. For instance, Masefield (2000) as cited by Eshetu (2000) estimates the food insecure population at 2.7 million in 1996 and 7.7 million in 2000, while the estimated food aid in similar years ranges from 262 thousand metric tons to 900 thousand in 2000. Based on this FAO/WFP report, the present food aid levels have been exacerbated by the significant depletion of livelihood assets in recent years. This is also as a result of multiple shocks, together with erosion of traditional coping mechanisms and opportunities for income diversification for many rural households, which is an indication of a worsening food insecurity situation.

Despite variations in estimates, (Table 2.3) all the above mentioned studies pointed out that chronic food insecurity in Ethiopia is extremely high requiring urgent national and international consideration. Transitory food insecurity in many part of the country has been also frequent and extreme requiring integrated relief intervention.

Table 2.3: Estimates of food insecure people in Ethiopia

Please, find this Table attached with the hardcopy

2.1.2 Conceptual Framework of Food Security

2.1.2.1 Concepts and Definitions

The conceptual framework of food security has undergone considerable evolution, reflecting the changes in perception of the world food situation over time, as it is inherently linked with the interrelationship between population and food production problems. However, much attention was focused on the term 'food security' which was first highlighted as a technical concept at 1974 World Food conference (Abassa, 1995). During 1970s the concept of food security was conceived as adequacy of food supply at global and national levels (Maxwell and Smith, 1992). Until the 1980s, the concept of food security was more supply-oriented , i.e., expansion of domestic food production and stock holdings both at national and global levels (FAO, 1974). The approach encouraged particularly food-deficit countries to direct their food policy towards the attainment of food self-sufficiency and eventually reduce their dependency on an unstable international grain market. Likewise, the unit of analysis was limited to aggregate production and consumption at macro levels. However, the African food crisis of the early 1980s and the following debate on 'food access' brought a drastic change in the contemporary understanding of food security and its respective unit of analysis. After the debate the focus of unit of analysis shifted from national and global to household and individual levels (Maxwell and Smith, 1992). Sen (1981) developed a new idea on food security. He argued that the mere presence of food in the economy or in the market does not 'entitle' a household or a person to consume it. According to Sen, people usually starved mainly because of lack of the ability to access food rather than because of its availability. In a sense, income or purchasing power is the most

limiting factor for food security. Equating national food security with food self-sufficiency is such a problem that needs to be clearly understood. Attaining macro–level food self–sufficiency does not assure the achievement of food security at micro-level. This leads us to a further distinction between macro (food supply insecurity) and micro (food consumption insecurity) dimensions of the problem (FAO, 1986). Regarding the linkage, having enough food availability at the national or local level or food self –sufficiency for that matter is only a necessary but not a sufficient condition for ensuring that households have adequate access to food.Similarly food access, is only necessary conditions and not sufficient conditions for the next stage to be met (i.e., consumption). Food self-sufficiency, which is usually confused with food security, refers to producing all the required food domestically and is a pre-condition for food security while food security itself is a necessary condition for nutritional well being.

All the above discussions evidently show the dynamism of the food security concept from being merely supply focused to encompassing income (purchasing power), nutritional, environmental and health considerations. Food security historically referred to the overall regional or even global food supply and shortfalls in supply compared to requirements. The term has been applied more recently at a local, household or individual levels (Foster, 1992) and has been broadened beyond notions of food supply to include elements of access (Sen, 1981, and Maxwell, 1996). Conventionally, food security is defined as access by all people at all times to enough food for an active and healthy life (World Bank, 1986). Most definitions of food security vary around that proposed by the World Bank (1986); major components of the most common definitions are summed up by Maxwell and Frankenberger from over thirty

reviewed definitions as" secure access at all times to sufficient food for a healthy life" (1992:8). The USAID (1992) defines food security as: "when all people at all times have both physical and economic access to sufficient food to meet their dietary needs for a productive and healthy life." Food security is a broad and complex concept that is determined by agro physical, socioeconomic and biological factors (von Braun, et al. 1992). According, to this definition, food security has three fundamental elements. Food availability is achieved when sufficient quantities of food are consistently available to all individuals within a country. Such food can be supplied through household production, other domestic output, or commercial imports or food donation. Food access is ensured when households and members of the household have adequate resources to obtain appropriate food for a nutritious diet. Access depends on income available to the household, on the distribution of income within the household, and on the price of food. Food utilization is the proper biological use of food, requiring a diet providing sufficient energy and essential nutrients, potable water and adequate sanitation. This aspect, thus focuses more on nutrition, and in this it differs from the normative definition by the World Bank (1986). By implication, the food insecure have lost, or are at risk of losing, availability of and access to food or the ability to utilize it (Chung et al., 1997). Several researchers have included the concept of vulnerability in their definitions of food security (Watts and Bohle, 1993; Radimer, Olson, and Campbell 1990; Kendall, Olson, and Frongillo, 1995) as cited by Chung (1997). However, Radimer, Olson et al. and Campbell (1990); Kendall, Olson et al., and Frongillo (1995) have broadened the notion of food security to include elements of social acceptability while, Chambers (1991) include sustainability.

According to Maxwell and Frankenberger (1992) and the World Bank (1986), the definition explicitly focuses on four core concepts: ‘sufficiency’ (defined as the calories required for an active and healthy life), ‘access’ to food (ability to access food through production, purchase, exchange or gift), ‘securing’ (defined by the balance between vulnerability, risk and insurance) and ‘time’(where food insecurity can be chronic, transitory or cyclical. The concept of sufficiency or ‘enough ‘is confusing and ambiguous. It is presented in the literature in various ways as a “minimal food consumption; target level” “ adequate to meet nutritional needs;” “enough (food) for life, health and growth of the young and for productive effort;” (Maxwell and Frankenberger, 1992). In general the concept concentrates more on calories required not only for survival, but also for an active and healthy life.

The second of the core concepts is “access,” which is the pioneering contribution of Sen (1981) on “the entitlement approach.” The issue is about whether the household or individuals are able to acquire sufficient food or not. One of the most commonly accepted definitions of food security is adequate access to food at all times. Access in this sense can definitely be ensured if all the households and their members have sufficient resources to acquire adequate food. It is dependent on the level of household resources (capital, labor, and knowledge) and on prices. Access can be achieved without households being self-sufficient in food production, what is more important here is the ability of households to generate sufficient income, which, together with own production, can be used to meet food needs. According to Sen (1981) risks to food entitlement could originate from a number of sources such as: weather variability, food production and supply variability, variability in price and market, health hazard and

morbidity causing risks, employment and wage variability. In general, it could be environmental, natural, political, social, cultural and economic risks (Sen,19981). 'Securing' access to sufficient food, as suggested by Maxwell and Frankenberger (1992) is also associated with the existence of risk which varies from natural to man-made factors. Deterioration in natural resource, disruption in food systems, and distortion in state policies and social ties are some of the risky condition that contributes to the worsening of food entitlement.

Finally, the conceptual framework of food security has progressively developed and expanded based particularly along with the growing incidence of hunger, famine and malnutrition in developing countries. For ease of comparing the differences and similarities, selected definitions of food security given by different organizations or authors since 1975-1996 is summarized in the following Table 2.4. As can be observed from the following definitions of food security, there are slight variations in approach. Although these variations tend to produce small differences in interpretation, the overall basic principles of food security, i.e., food availability and food access are fairly stressed in every definition mentioned below. For the purpose of this study, the definition put forward by World Bank (1986) was taken as a working definition of food security while, the household level also considered as the key unit of food security analysis.

Table 2.4: Summary of selected Definitions of food security

Please, find this Table attached with the hardcopy

2.1.2.2 Factors that affect Food Security

The main determinants of agriculture production include commodity prices, quantity/quality of labor and other factors such as land, technology, and government agricultural policy and institutional services (Alamgir and Arora,1991).The chronic and recurrent food insecurity problems in Ethiopia experienced in the past three decades were a result of a combination of a widening gap between food production and population growth decline productive resources /including farm land/,natural disaster, and lack of appropriate development policy. Some empirical studies that identified factors affecting household food security are summarized as follows: IFPRI(2000) argues that in order to reduce food insecurity, one must understand its causes. It seems obvious that a household is food -insecure if it doesn't have enough food, and but the causes are much more complex and interrelated. They range from factors as specific as diarrhea disease to and the solution proposed are just as wide-ranging. Researcher debate on which of the causes of food insecurity is most important and IFPRI(2000) suggests that the framework of food insecurity is comprehensive, incorporating both biological and socio-economic causes, and encompasses causes at both micro and macro levels. It breaks the determinants of food insecurity into three levels:immediate determinants (the most proximate level) underlying determinants and basic determinants (deepest level).

Another study by Maxwell(1992)indicates that the underlying causes for food insecurity in Africa are the limited growth of the agriculture sector, increasing income disparity, rapid population growth, and urbanization. These factors are often the consequences of bad governmental or donor policy. The same study shows that war, drought, a decline

of world policies, and other exogenous shocks may then reveal inherent weakness of a country's food system. Food insecurity study conducted in Uganda by Muendaya (1998) indicates that the general causes for transitory/chronic food insecurity at household level are varied and include climatic, socio-economic and political factors. He further classified the determinants as drought, floods and hailstorms, diseases and pests, rural-urban migration, poverty, civil conflict, labor shortage, inaccessibility to agricultural inputs, and inaccessibility to adequate land. He further added that national policy and program interventions and macro-economic policies affect inaccessibility of credit .

Empirical study on household food security and nutrition surveillance conducted in four towns of Ethiopia, namely Hawassa, Bahirdar, Dire Dawa and Jimma with the main objective of assessing household food consumption ,expenditure and income pattern and assess vulnerability to food insecurity, shows that all the four towns have been chronically food deficit area for 13 years (GoE, 1993). This was caused by one or a combination of the following factors: household income level, employment status of the head of the household, educational attainment of the head of household and gender of the head of the household. Dagnew(1998) who studied the causes of food insecurity in Ethiopia and other parts of Africa says it is useful to distinguish between long-term trends, which affects the vulnerability of individuals, households and nations and sudden chocks which trigger food systems into crisis.

He further notes that all causal factors for both chronic and transitory food insecurity are poor agricultural growth, unequal distribution of productive resource and income, rapid population growth and urbanization. Drought, flood, war and growing refuges problems

are also main causes of transitory food insecurity in Ethiopia like in many other African countries. He maintains that inappropriate policies of government and/or donor agencies have also been important contributing factors for both chronic and transitory food insecurity in most African countries including Ethiopia .Specific causal factors for both chronic and transitory food insecurity in Ethiopia are seasonal rainfall variation, lack of drought oxen, inadequate farm size, soil fertility decline, and shortage of basic farm input (Dagnew 1998). A study made in southern Ethiopia by Dagnew (1993) indicates that the livelihood of rural people in general and household food security in particular are dependent on the ownership of key productive factors including farm, drought animals, breeding cattle, family labor ,back warded farm implements, and small livestock. He argues that the level of ownership of particular productive assets such as drought oxen, breeding cattle and farmland size determine the seasonal or annual production and income of rural households. This also broadly determines the coping abilities of households in periods of food crises. Of all the productive assets indicated, the ownership of drought oxen most markedly determines annual household income and economic differentiation among rural households.

A food security study made in Wolaita by Getachew(1995)indicates that there are established empirical evidences that link risks of household food insecurity to access to productive resources such as land, livestock and alternative income opportunities in the agricultural and non-agricultural sectors as well as to location of resource in particular agro-ecological zones. The study concludes that size of holding is one of important factors in determining household food security. His results suggests that food insecurity is more sever among households with little landholding. He further attributed the food

insecurity situation in Ethiopia to man-made and natural factors, which includes a fragile natural resource base, inadequate and erratic rainfall, improper farming practice, lack of access to improved inputs; the lack of rural credit, and the prevailing land tenure system.The same study indicates that the relationship between the amount of livestock resources owned and food insecurity was negative. Household size had a positive relationship with food insecurity, i.e. increase the risk of the household food insecurity".

2.1.2.3 Measurement and Indicators of Food Security

2.1.2.3.1 Classification of Indicators

Assessment of food insecurity is a difficult issue as there are no universally established indicators, which serve as measuring tools. Food security requires a multi-dimensional approach since it is influenced by different interrelated socio-economic, environmental and political factors (Debebe, 1995). Along with the development of the concept of food security, a number of indicators have been identified to make monitoring of food situation possible in some early warning systems. For example, three sets of indictors are often used to identify possible collapses in food security.

These include food supply indicators (rainfall, area planted, yield forecasts and estimates of production); social stress indicators (market prices, availability of produce in the market, labor patterns, wages and migration) and individual stress indicators, (which indicates nutritional status, diseases and mortality) (RRC, 1990). These indicators are very important to make decisions on the possible interventions and timely responses. Frankenberger (1992:84) also classified the different types of indicators into two main categories; 'process' and 'outcome' indicators. The former provides an estimate of food supply and food access situation and the latter serves as proxies for

food consumption. Process indicators mainly include food supply and food access indicators. Food supply indicators are known to provide information on the likelihood of shocks or disaster events that affects household food security. Food access indicators, unlike supply indicators are relatively quite effective to monitor food security situation at a household level. Their application as mentioned by Frankenberger (1992), varies between regions, seasons and social strata reflecting various strategies in the process of managing the diversified sources of food, i.e., shift to sideline activities, diversification of enterprises and disposal of productive and non productive assets. 'Outcome' indicators include all direct and indirect indicators of household food consumption, which shows the level, and changes in food consumption and the amount of food in stores serve as proxy estimates for measuring household food situation. They can be disaggregated at lower level as opposed to food supply indicators. The problem with outcome indicators is that some of the indicators like anthropometrics results may not exactly indicate the level of food crisis since nutritional intake is affected by a number of factors like healthcare. (Another important indicator for food security is a coping strategy, which is related to food access indicators). According to Davies(1993) as cited by Debebe (1995) coping strategies developed by households and the sequential responses through which people used to pass at times of decline in food availability is one indicator of food security; the responses vary from commitment of low domestic resource to distress migration depending on the intensity of crises. Chung et al. (1997) identified and proposed two types of indicators at individual and household levels. First, generic indicators are those that can be collected in a number of different settings and are derived from a well-defined conceptual framework of food security. Second, location specific indicators are those indicators typically carried only within a particular study area because of unique agro

climatic, cultural, or socioeconomic factors. Location-specific indicators can be identified only from a detailed understanding of local condition by using qualitative data collection methods, while the generic indicators are drawn from the food security literature and tested using statistical methods. Generic indicators associated with each link in the food security causal chain are given in Figure 2 below.

Furthermore, other researchers analyzed the strategies for dealing with insufficient food at a household level as indicators of food security. Such strategies include short-term dietary changes, reducing or rationing consumption, altering consumption composition, altering intra-household food distribution, depletion of stores, increased use of credit for consumption purposes, increased reliance on wild food, short-term labor migration, pledging, mortgaging and selling of assets, and distress migration (Rahmato, 1991; Frankenberger, 1992; Teklu, 1992; Davies, 1993; Eele, 1994; as cited by Maxwell, 1996). Traditional indicators of food and nutrition security, such as calorie adequacy and anthropometrics indicators, have been found difficult to incorporate in to ongoing monitoring and evaluation systems. Indicators such as number of unique food consumed, dependency ratio, household size, and asset ownership, are able, either singly or in combination to identify households at risk. Moreover, von Braun et al, (1992) stated the use of the level, and changes in, socioeconomic variables as proxy indicators of the status and change in food security.

Figure 1: A conceptual frame work of food security and generic indicators categories.

Please, this Table is attached to the hardcopy

2.1.2.3.2 Generic Indicator Categories

There is no fixed rule as to which method of measurement should be employed to measure the diversified indicators of food insecurity. The indicators were measured differently depending on the objective of the study, data availability and complexity of the situation. In some instances, ratios has been used indicators e.g., increased number of livestock on the (characteristics of households and socioeconomic) background of the area, scale of investigation, level of aggregation and purpose of the analysis. Thus, in the study, average annual expenses/AE are used to compute proxy indicators of food security. In line with this, a number of researchers stated that, under risky situation, safety- first rule approaches were used to estimate disaster level or minimum level of income which should at least be met (e.g. Roumasset 1976; Robison et al., 1984; Hazell and Norton, Rae, 1994 as cited by Bezabih,2000).

2.1.2.3.3 Measuring Food Security

At national level, food security can be measured in terms of food demand (requirement) and supply indicators; that is, the quantities of available food versus needs. The supply of food at this stage may be from current production and stocks from previous production where as the needs can be determined on the basis of biological or nutritional requirement of a given society for a certain period of time usually a year or a day. The recommended minimum nutritional requirement for adult person has been set at 2100 kcal per person /day is usually used as a yardstick (ENI, 1993; FNU/MoPED, 1994; von Braun et al., 1992). Tesfaye and Debebe (1995) made an attempt to apply an alternative approach to food security measurement by employing food insecurity index, which is constructed using UNDP human development index (HDI). The index

measures shortfall in food security indicators from the acceptable levels by focusing on three important variables: adequacy, stability and access to food supply and ranking of regions based on their food insecurity index. This approach has been used to identify vulnerable regions and households to provide an early warning information for decision makers to make timely decisions about a coping mechanism in order to avoid disaster and protect the food insecure segment of the population (Tesfaye and Debebe, 1995). At the household level, food security is best measured by direct surveys of income, expenditure and consumption and compares that with the adequacy norm appropriate to the households. Such household surveys may be costly to be carried out often and as a proxy, the level and changes in socioeconomic and demographic variables such as real wage rates, employment, price ratios, migration, etc. may be used if properly collected and analyzed at the individual level. The measurements become more difficult due to intra-household complication of age and gender. Measurements are taken at the individual level. This information indicates food insecurity after the household was undergone through the disaster (Von Braun et al., 1992). The basic aim of choosing household level analysis is to identify those households that are food insecure and those whose food security is at risk, to identify the factors that affect food security, and attempt to quantify the underlying relationships (Riely and Mock, 1995). Even though, it is possible to examine relative levels of food insecurity or rank orders defined by specific indicators, it is sometimes important to define cut-off points to establish some understanding of absolute levels of food insecurity. Riely and Mock, (1995) defined food insecure households as those consuming less than 80% of minimum recommended calories, or less than 70% of recommended intake. Two major approaches have been

widely used in measuring food consumption, and both are subject to measurement problems (Bouis, 1993) as cited by (Maxwell, 1996). The first is the “expenditure technique” used by economists where by gross household’s production and purchases over time are estimated, estimates of the growth or depletion of food stock held overtime is made and the balance is considered as consumed. The second method, which is utilized by nutritionist, measures the amount of food consumed by the family members during 24 hrs recall. It enables generating information necessary to determine the extent of undernourishment, malnutrition and under nutrition. This method results in more reliable consumption data and captures intra-household distribution differences. Although, both of these methods result in consumption figures, which can be used as proxy of household food security, neither provides a full assessment of food security because neither measures vulnerability or sustainability. For both methods, conversion of gross household food consumption into calories, and dividing the calories by the number of adult equivalents in the household results in concise figure for average calories consumed per adult equivalent per day, which is then compared with an estimate of caloric requirements (Maxwell, 1996). The frequently used cut-off point for analytical purposes is considered as household that provides less than 80% of the caloric requirements for its total number of adult equivalents as food insecure for the recall period. This approach, however, requires considerable amount of resources in terms of money, time and personnel and neither methods has been accepted as “ gold standard” for analysis of household food security (Maxwell, 1996). Eele et al. (1993) adopted household-level methods of food security analysis throughout their work. According to them, households become food-insecure when the acquisition of food falls

below what is required for all members to live “active and healthy” lives. Based on these methods, for a household to be “ Food-secure” the following balance should hold: household acquisition of food expressed in nutrient units is equal to the sum of individual nutrient requirements Including food bought plus household food production retained for consumption plus food received as private gifts plus food aid received as wages or gifts and the net change in household food stocks. Alternatively, Eele et al. (1993) identified food-insecure households through the analysis of the food consumption characteristics of households below the poverty line and comparing variables associates with the symptoms of food insecurity. They examine household expenditure patterns and classify households by the budget share devoted to food commodities (usually households who spend more than 70 percent of their expenditures on food can be expected to be food-insecure). In general, methods of analysis to identify the food insecure and indicators to be selected should be relevant, timely, and cost effective. To this effect, in this study, the minimum level of expenses which should at least be met or required per adult equivalent per annum will be computed based on the amount of food required by an adult person, minimum expenses needed for clothes, health care, education, short term loans, taxes social obligations, etc. The value of food required (2100 kcal per day per AE or 225 kg of cereal per AE per year according to ENI, 1968, and FNU/ MoPED, 1994) plus the sum of estimated minimum amount of money needed to cover the above mentioned expenses per AE per annum will be used as a threshold (cut-off point) beyond which the household is said to be food secure or insecure in the study area.

2.1.3 Household Coping Strategies

What do households do during food crisis or risks ? Households are not passive victims of food insecurity or drought. But based on their capacity, every household undertakes different activities to cope with crisis and to minimize it. This capacity, however, depends on and varies with the level of households' entitlement and vulnerability to crisis. Households adopt and develop diversified coping strategies and sequential responses through which people used at times of decline in food availability. Coping strategy is defined as the bundle of poor people's responses to declining food availability and entitlement in abnormal seasons or years (Davies, 1993 as cited by Debebe, 1995). Dagnew (1993) also defined coping strategy as "a mechanisms by which households or community members meet their relief and recovery needs, and adjust to future disaster-related risks by themselves without outside support."

The pattern of coping is largely determined by the pre-crisis characteristics of individual households that involve a succession of responses to increasingly sever conditions (Cutler and Stephenson, 1984). This doesn't represent an overnight awakening to danger, rather a progressive narrowing of options that leads from broad attempts to minimize risk in long term through actions designed to limit damage caused by a crisis, to extreme measures aimed at saving individual lives, even at the expense of household dissolution (Webb and von Braun,1994). For analytical purposes, the various actions can be grouped under three stages: risk minimization, risk absorption, and risk-taking. The first stage involves insuring against risk in an environment of limited credit and insurance markets. It involves measures of savings, investments, accumulation, and diversification (Webb and von Braun, 1994:57). The next stage of

coping involves a drawdown of investments, calling in loans, and searching for new credit. As capital for investment dwindles, consumption of food and non-food items become restricted, stores of food are drawn down, and the number and variety of potential income sources available become crucial to survival. The last stage of coping, which may become inevitable if famine persists and food aid does not arrive, involves the collapse of normal systems of survival and the adoption of abnormal ones. At this point the diet is dominated by unusual "famine foods" (roots and leaves), and households sell their last assets, including their fields, homes, and clothes. If they still able to do so, some households break up and leave to search for assistance among distant relatives or at relief camps. This sequence of events shows that many of the actions taken to survive become increasingly irreversible as conditions get worse. (Webb and von Braun,1994). The study by Dagnew (1993) revealed that household responses to food shortages can be examined as (a) production based (b) market based and (c) non-market-based (such as depending on the use of different institutional and societal income transfer systems). Traditionally, subsistence producers or peasants derive most of their family consumption requirements from domestic food production. The findings emerging from the above study also show that rural households adopt coping strategies in a generally sequential pattern as the severity of food shortage increases. These strategies by category include (a) a self-insurance strategy which involves changing production patterns; (b) income stabilization strategy including reducing consumption, diversifying secondary economic activities, depending on kin and friends' support, borrowing, sales of small animals, selling family labor, rationing food consumption, eating wild foods, depending on relief food, and begging;

(c) asset disposal, both productive and non productive; and (d) distress migration and family separation. However, not all households adopted the same strategies and responses in the same sequence or with the same intensity. Another study by Eshetu (2000) further revealed that the most common coping practice that are sequentially used during food crisis consisted of reducing number and size of meals, sell of small ruminants and draft oxen, consuming wild food, and borrowing of cash and/ or food from better off neighbors and/or relatives. Another less frequently used strategies were, postponing wedding and other ceremonies, sell of firewood, withdrawing children from school and eating toxic or taboo food. Teklu (1992) as cited by Bezabih (2000) described the coping strategy as a shift between or within the production, consumption, income, assets and migration paths. The production path is indeed related to risk management that the farm households employ to minimize crop loss through diversification of cropping varieties (Hardaker et al, 1997). It could also refer to the coping mechanism though diversification of the income sources as they promptly react to the food scarcity. But such measures adopted by the households to minimize risk are effective for only limited periods of time. Successive years of below average or poorly distributed rainfall have negative effects on production, and hence on income and consumption of the food, as much as possible, save life today without risking the future food production or entitlement capacity of the household (Bezabih, 2000). At early stage, in order to reduce the extent of food households (Webb and von Braun, 1994). The coping mechanisms are also sequentially adopted in a way that the actions taken insecurity, households adjust their production decisions as well as labor allocation and commit non-(or less) productive assets.Coping strategies, though vary from place to

place, and household to household, the most commonly used sequence of responses farm households typically employ as sequential coping mechanisms when faced with a food crisis summarized diagrammatically by numerous authors (Frankenberger, 1992: 92; Debebe, 1995: 12; Bezabih, 2000:25). These can be grouped in three stages: first stage (insurance mechanism), second stage (disposal of productive assets), and the third stage (stage of destitution) refers to distress migration. Apart from these, the authors indicated characteristics of the coping strategies of each stage. As indicated in the aforementioned discussion farm households in different vulnerable areas of the country engage themselves in several activities so as to avoid food insecurity. Boloso Sore is one of the vulnerable district where people are affected by drought induced food security. In the face such adverse conditions, farmers used various coping mechanisms to smooth consumption and escapes sever food crisis.

2.2 A Review of Policies and Strategic Efforts to Address food Insecurity

In developed countries, food and agricultural policies are largely a matter to be negotiated with farmers organizations and government representatives. Consumers are not directly involved in the negotiations. Their concern is on the taxes that they pay in order to support farm subsidy. In Ethiopia, where food occupies the lion's share of the household budget for a significant share of the population, food supplies and agricultural policies have economic, political and social significance. The main objective of the agricultural policies or even the entire macroeconomic policies and the reform process in Ethiopia, at present, is to achieve food security. The experience and the use of food security policies and strategies adopted by different countries, vary because of their unique economic and social structures, natural and social resources endowments, and

political orientation. For example, the experience of Botswana reveals that the issues of food security are not only technical but also political, as it often plays the determining role. Botswana followed a strategy that would enhance more the demand side of food security, i.e., it targeted to increase household purchasing power rather than food production because of its poor physical and climatic potential and give more emphasis as to how to increase the income level of the poor households which would help to improve their access to food mainly through creating employment opportunities outside agriculture (Tesfaye, 1999). China, however, has chosen boosting productivity at the same time as promoting diversification of household income sources by developing off-farm activities such as fishing and forestry. On the other hand, Kenya and Tanzania have opted for self-sufficiency in food grain production with a certain level of market liberalization (Tesfaye, 1999). In all cases, however, integrated rural development and market liberalization have been addressed, even if the degree varies from country to country depending on their specific realities. Thus, it can be deduced from the forgoing paragraph that, for an agrarian country like Ethiopia where the economy largely depends on traditional and subsistence farming for food, employment, foreign exchange earnings, and raw materials, the development of the agricultural sector is most desirable to overcome the prevailing chronic food insecurity problem.To do this, it requires launching well-designed and integrated development policies in general and environmentally sound agricultural development in particular or a supply- augmenting approach, looks viable both in light of short and long-term food security perspectives. The Ethiopian governments during different historical periods took different policy measures and made significant policy changes, to affect agricultural production and

narrowed down the problem of food security. Up until the late 1950s and early 1960s the country had no development plan, let alone an appropriate intervention in the agricultural sector. For the first time in the history, Ethiopia issued “The First five-year Development Plan (1957-62). However, agricultural development came to the attention of the government during the Third five-year Development Plan 1967-73 (Tesfaye, 1999; Eshetu, 2000). The programs were mainly focusing on Integrated Rural Development (IRD) to be implemented in regional framework. These projects, expensive as they were, started with the implementation of the largely Swedish- Financed CADU, and later on three other projects WADU, ADDU and HADU were launched between 1970 and 1972 (Tesfaye, 1999; Eshetu, 2000; Degnet, 1999). With little success in these integrated rural development packages, another two projects were designed. These were the Minimum Package Programs I and II but like their predecessors they ended up without success. During the 1980s, the major policy intervention on the food and agriculture issue was mainly to increase productivity of small holding peasant agriculture through PADEP. PADEP, was designed and launched in 1989 and was phased out in 1993 with success in a few places (MOA, 1997).In 1993 Ethiopia once again adopted program using the same inputs as with the minimum package programs. The package is named SG/2000. The mandate of the SG 2000 is to rapidly increase the productivity of staple food crops by providing modern farm inputs and related services to the smallholders, and supporting extension and research institutions, there by sustaining food self-sufficiency and food security at household level (Takele, 1996). The package uses a simple approach called the

farmer-managed Extension Management Training Plot (EMTP) to transfer the technology.

A review of food security policies and strategies in Ethiopia reveal that the government as well as donors were trying to address the problem but most efforts been on transitory food insecurity. Regarding the chronic food insecurity problem, it was only after the workshop on developing a food and nutrition strategy in 1986 that the awareness and attempt started.The preparation of the national disaster prevention and preparedness strategy (NDPS) and the national food and nutrition strategy (NFNS) were some of the efforts made (Aseres, 1995). Another explicit policies during the Ex-Regime to address food insecurity problem were emergency food aid program for relief purposes, the establishment of the public distribution system to provide cheap food to the urban population through Agricultural Marketing Corporation (AMC), and the wheat flour subsidy (MoPED, 1992).

The Transitional Government since it took power has been undertaking various policy measures, the major one being stabilization and structural adjustment programs. Such reforms are designed to bring about long-term economic growth, which may also improve food security in the long run. The Ethiopian Social Rehabilitation Fund, Safety-net programs and various Social Action Programs, which assist food insecure, are some of the attempts to address the prevailing problems (Aseres, 1995). Furthermore, another policy and strategic framework for food security has been predicated on the National Food Security Strategy of 1996; the Agricultural Development Led Industrialization (ADLI) strategy; and the National Policy on Disaster Prevention and Management (NPDPM) (FDRE, 1996). The food security strategy

addresses both the supply and demand sides of the food equation, which means it addresses both the availability and entitlement, respectively. It gives due attention to three major areas: increasing food and agricultural production; improving food entitlement; and strengthening capability to manage food crises. The food production component focuses on the availability and distribution of improved technologies in areas of reliable rains. And expansion of irrigation schemes in areas where there is insufficient rainfall. The food entitlement, strategy aims at reducing food insecurity through introducing alternative poverty reducing development schemes. There are three components of the food entitlement strategy: employment/income support scheme, targeted programs and nutrition intervention. The overall aim is the transfer of resources to the vulnerable population. The emergency capability involves maintaining food security reserves for emergency interventions (FDRE, 2001).

Finally, there must be coherence between the strategy of food security and the overall development strategy and the economic reforms to bring the desired level domestic supply to ensure food security. Furthermore, the above review of experience and efforts to achieve the food security in Ethiopia have shown that improving household access to food through poverty reduction is sustainable solution to the problem of endemic hunger. This obviously implies that household food security intervention is a fundamental component of poverty alleviation program.

2.3 Empirical Studies on Determinants of Food Security

Since food security is a relatively recent development, there are only few studies on the subject particularly in the developing countries including Ethiopia. Some of the studies that were made to identify the determinants of household food security at micro level, has been summarized below. (Chung et al. (1997) reviewed in their recent work, the

diverse determinants of food security status of households). The study highlights causal relationships between the various elements of food availability, access and utilization and focuses on the links between the resources commanded by household (level of off-farm and non-farm production, household income, household and individual food consumption, and nutrition). Young (1992) as cited by Eshetu (2000) and Chung et al. (1997) furthermore identified that a range of important factors that lead to the food insecurity of household in developing world. These factors include reduction of people's food entitlement due to poor harvest, reduction in food availability; increased market prices; loss of waged labor or other resources of income, coupled with such a factors: rapid population growth, poor infrastructure, ecological constraints, limited arable lands, disease, poor water and sanitation, inadequate nutritional knowledge, lack of good governance and ethnic conflict resulted in food insecurity.

A very recent study by Ashimogo (2000) as cited by Eshetu (2000) in Tanzania disclosed that as household food security is positively influenced by total household asset disposal and income. His descriptive analysis revealed that, household with more land and cultivated plots, higher literacy status of the heads, ownership of oxen and farming tools, young farmers and those with few dependents were found to be more food secure than others. Hassen and Babu (1991) as cited by Tegegne (1999) studied food poverty in the Rahad Scheme of the Sudan. The study showed that the larger the size of the household and the lower the share of non-farm earnings, the higher the probability of absolute poverty. Better access to productive assets and longer farming experience, on the other hand, reduce the incidence of poverty. A study by Deciron and Krishnan (1998) attempted to decompose changes in food (poverty) by household

endowment and other characteristics. The result appears to suggest that the higher the assets ownership in terms of land and oxen, distance to roads or towns and better human capital (better education) consistently lower poverty level. So better endowed households were placed to benefit much more from the changed circumstances. Other studies in Kenya by Wangia (1999) as cited by Eshetu (2000) found that agro-ecological zones, total land size, number of livestock, permanent off-farm employment, and total labor used for farming influenced household food consumption and food security. Quinn et al., (1990) as cited by the same authors, carried out a study on 'malnutrition, household food income and, food security in rural Malawi,' and identified small landholdings, low soil fertility, low income levels and limited employment, and labor constraints in agricultural production as the underlying causes of household food insecurity. There are also empirical studies of food security in Ethiopia. An in depth study of five provinces of Ethiopia by Shawl Consultant International (1993) indicated that a number of factors are combined to make the Ethiopian society vulnerable to food insecurity. Among the major determinants of the food insecurity problem are:
(a) physical (rainfall pattern, soil erosion, etc.);(b) demographic (i.e. high growth rate of population, (c) political factors (i.e. distorted state policies in the past); and (d) cultural factors. Getachew (1991) in his baseline study of food insecurity in Wobera and Merti-Jeju province of East Ethiopia, showed that households at risk of chronic food insecurity are rapidly expanding.

The study identified that vital household resources (i.e. land, livestock, and employment opportunities both within and outside the agricultural sector) upon which their food security is built, are being depleted in both the study areas. Land entitlement,

and its size distribution among the sample households is found to be an important determinant of household food security status. Another study by Getachew (1994) in Adama Boset of East Shewa and Habro district of Western Hararghe also identified the following constraints of food insecurity and Famine: poor authority and political conflict; land tenure; population growth and absence of family planning; limited access to resources; environmental degradation; limited off-farm activities; low productivity in the crop and livestock sectors;female headed households(less or no labor power and farm implements), resource poor, old age and disabled households; heavy reliance on forest recourses and cultivation of marginal land, output and input marketing bottlenecks; lack of community participation and unable to pay taxes particularly during times of food shortages. A case steady of Wolaita District by Dagnew (1995) examined the root causes of household's food shortage (insecurity) and famine. He argues that the major causes of serious food shortage lie in the entitlement failures` resulting mainly from collapse in the ownership of key productive assets and purchasing power of rural households. The precipitating causes of serious food shortage (insecurity) or famine is a sudden harvest failure because of rain failures or other disasters. In another study, Dagnew (1993) also identified drought as the major immediate cause of alarming level of food insecurity in many parts of Ethiopia. The result further suggests that in an economic environment where resources for food production are inadequate, increase in number of household size increase the risk of household food insecurity. He concluded his work by indicating that household risk of food insecurity and famine were increased by and large by the declining trends of households resource endowment and unfavorable policy intervention. Markos (1997) as cited by Eshetu (2000) carried out a

study in Tigray, Wollo, and Shewa zones to assess the determinants of food insecurity at household level. In his study, land resources and means of farming, crop and livestock production, non-farm incomes,expenditure and household assets are identified to be the determining factors of household food security or insecurity situations. The principal findings suggest land holding, the major basis for the livelihood of farming communities is very scarce in all of the survey areas. This scarcity coupled with its fragmentation and infertility resulted in food insecurity for those with land less and small plot size owner households. With regard to the means of farming which includes oxen holding, farming system, and labor; as the results show that households with no ox, practicing traditional farming practice, and large family size are food insecure and vice versa.Moreover, households with relatively better production and livestock holding are proved to be food secure than other.

The result also revealed that household who had no valuable assets and off-farm income have less expenditure capacity and was food insecure than those who have these things. Household size was also found to be negatively influencing food insecurity of the households. Wolday (1998) through participatory rural appraisal (PRA) in three districts of Amhara region, identified and categorized the major constraints of food security into environmental, technological, infrastructure, institutional and policy, and sub-economic holdings. More specifically, the results of the discriminate analysis reveal that out of the 23 hypothesized discriminating variables used in the study, 9 variables were found to be significant in discriminating the food insecure and food secure groups. These variables were access to credit, condition of credit payment, household income from pulse and oilseed, production, chemical use, crop sales, fertilizer use, quantity of

own local seed, and improved seed use. An empirical study in nine districts of Amhara Region by Tegegne et al. (1999), using multivariate regression analysis identified that food insecurity is correlated with lack of productive assets such as land and oxen. The results of their regression analysis suggest that the increase in land holding, oxen holding, use of fertilizer, dependency ratio, agro ecology, proximity to urban center, education and age of the household as well as seed application showed significant impact in food availability. Among these land and oxen were found the most important determinants for access to household food security.

The land size is very small and there is no vacant or unoccupied land to help land less or near land less farmers. Most of the small holders do not keep oxen for various reasons. Apart from being too poor to own such animals, their land size may be too small to keep oxen. Fertilizer and improved seeds have a positive impact on food supply while the number of dependents (many children) per family is significantly correlated with food insecurity. The results have also confirmed that increasing education levels helps increase the productivity of farmers and hence increase food availability while improving access to urban centers could also positively influence farm revenue and farm production through the efficiency of factor and product market. Another study by Esthetu (2000) in Legambo wereda of Amhara Region has also found out as food insecurity, is correlated with a number of variables such as agro-ecology, non-farm income, proximity to urban centers and possession of productive assets. In general, as revealed by the multiple regression results, among other factors, agro-ecology, cultivated land size, proximity to urban centers and non-farm income as hypothesized were found out to have positive coefficient and have highly significant impact on the household's food security status.

The analysis of food security determinants by Hwassa Agricultural Research center (2000) in southern Ethiopia using logistic regression model specified with food security as a function of various farmers' characteristics as explanatory variables confirmed that the following are the most important determinants. The analysis revealed that incidence of disease (inset merely bug), soil fertility problem, agro- ecological conditions, inset farm size, wealth status, ethnicity, type of staple food and production of cash crops (coffee) are determinants of food security. Moreover, inset farm size, agro-ecological conditions, ethnicity, low soil fertility and wealth status were identified to be the most important determinants of food insecurity in order of importance in the study area.

A study on agricultural technology adoption in Ethiopia by Beyene (2000) as cited by Eshetu (2000) proved that adoption of improved technologies is required to improve food security and quality of life of the household. The result of his research suggests that education level of the household head, size of land, number of oxen owned, proximity to the main road, and availability of the technological package and credit facility for down payment are affecting farmer's adoption decision and household food security. In summary, various studies were reviewed and different socio-economic and physical factors that were reported to have affected household food security status in different localities of the country were identified. More specifically, a summary of the empirical studies, on the determinants of food security at household level is presented in Table 2.5. The review made so far is found to be quite useful and relevant to this study in that it helps to have a clear understanding about the hypothesized variables to be selected.

Table 2.5: Summary of the Empirical Studies on Determinants of Household Food Security

Please, find this Table attached with the hardcopy

3. CHAPTER THREE : DESCRIPTION OF THE STUDY AREA

Data and information for this study were collected from a total of 120 farmers selected from Boloso Sore district of the Wolaita zone Southern, Nations,Nationalities and Peoples Regional State. This part of the paper presents a brief description of the study area.

3.1 Location and Area Coverage

Wolaita zone is one of the fourteen zones of the Southern, Nations, Nationalities and Peoples Regional State. It is situated between 6.4'N – 7.1'N latitude and 37.4'E - 38.2'E longitude with an average altitude of 1750 meters and ranges between 501 and 3000 meters above sea level (masl.). It is bounded to the North and the North East by Kambata Tambaro Zone, to the West and South West by Dawaro zone, to the south by Gamo Gofa Zone, and to the East by Sidama Zone (Figure 3). The Zone has total population 1,793,960(Male 883,884 and Female 910,076) based on the national census of 1999 E.C.The average maximum and minimum land holding is 0.5 and 0.125 hectares ,respectively. The Zone has special services of health,3 hospitals,65 health centers and 329 health posts . In educational sector, primary school.421, secondary school 23,preparatory 7 and Agricultural institution of Vocational and Extension Training /ATVET/ 2 (WZBoPED, 2003).Wolaita zone covers approximately a total area of 451,170 hectares or 4,511.7km^2 (4.3% of the total area of the Regional State which covers the area of 10,588,700 hectares) and divided in to 12 districts and 3 reform towns which are further divided into 297 rural kebeles which are the smallest administrative units called Peasant Associations (PAs) and 20 kebeles of the reform

town , respectively .There are 3 agro-ecological zones in the Zone out of which Dega accounts 9%,Weynadega 56% and Kolla 35%. As far as the land use is concerned 246,962 hectares cultivated ,35,888.3 hectares is cultivable, grazing 45,577.8 hectares, forest and bushes 76,611.7hectares and others 46,110.2 hectares from the total area of the Zone (WZBoPED, 2004).There are 52 towns in the zone out of which only 22 have municipalities. The study district, Bolos Sore, is one of the twelve districts of the Wolaita zone of SNNP Regional State and located between 7.98' and 7.18'North latitude and 37.62'and 37.83'East longitude. It is bordered by Kambata Tambaro Zone in the North and Northwest, Damot Pulasa district in the East and Northeast, Boloso Bombe district in the West and Northwest, Soddo Zuriya district in the South and Southwest .The district capital is called Arkka and it is located 30kms away from the zonal capital, Soddo and 300 kms away from Addis Abeba. The district is characterized mainly as flat land with an average altitude ranges 501masl to 2500 masl. In other words, the agro-ecological zone of this district comprises of low lands (Kolla) 5%, middle altitude (Weynadega)56% and Dega.39% agro-ecological zones, with estimated area of 23,310 hectares or 233.1 km^2, which is 5.17%, the total area of the zone and has population density of 371 person per sq km(Wolaita Zone Bureau Of Agriculture (WZBOA) and WZBoPED.2003/04).

3.2 Population Distribution

The zone has a total estimated population of 1,793,960 out of which about 1,524,866 person live in rural areas, of whom 777,682 (51%) were males and 747,184(49%) were females. The remaining 269,094 people live in urban areas of whom 135,892 (50.5%) were females and 133,202 (49.5%) were males. On average, there are 371persons per

km^2 and the area is said to be one of the densely populated zones of the SNNP Regional State (WZBoPED, 2003). According to the same source, those who could take part in various economic activities (active age group of 10 to 64 years) were 1,031,527(57.5%), whereas children of less than 10 years and older people of greater than 64 years account for 762,433 (42.5%) of the total population, respectively.

FIGURE 2 : MAP OF ADMINISTRATIVE DIVISION OF SNNP

REGIONAL STATE

Please, find this Table attached with the hardcopy

FIGURE 3: MAP OF WOLAITA ZONE WHERE CHRONIC FOOD SECURITY DISTRICT NAMELY,BOLOSO SORE IS LOCATED.

Please, find this Table attached with the hardcopy

FIGURE 4. MAP OF BOLOSO SORE SHOWING THE STUDY DISTRICT

Please, find this Table attached with the hardcopy

The total population of the study district in the year 2004 E.C, as projected from the 1999 E.C Population and Housing census, is estimated to be 197,973 (11% of the zone) and of which 5.66 % were reported to be females. The population of the district is very young with 51.7% under the age of 15 years and 1.8% above the age of 65 years. There are a total of 19,457 households in the district with 17% of them headed by women. The average household size is estimated at 6 persons. About 99% of the population are Wolaita, and 0.14% Gurage ,0.18% Silte, 0.03% Oromo, 0.04%Tigre,0.25% Sidama and 0.36 % others . More than 99.5% of the population speak Wolaitigna and the remaining 0.5% speak Guragegna, Amharic,Oromiffa and others. According to the religious category 71% are followers of Protestant,21% Orthodox Christian, 1% Islam, 1% Catholic ,5%Traditional and 1% others (WZBoPED, 2004).

3.3 Agriculture

As elsewhere in the country, agriculture is the major occupation of people living in the study zone. Except for few, the livelihood of the population (residents of both rural and urban areas) in the zone, depends directly or indirectly on agriculture. More specifically, agricultural production (livestock and/or crop production) is the main source of income and employment to the society, though the degree of importance varies from one district to another. With regard to the farming system, in Wolaita zone, mixed farming of crop and livestock is a common practice on mid-altitude while in the low land area of the zone agro-pastoralists rear livestock as the major activity.

3.3.1 Crop Production

In Wolaita zone in general and Bolos Sore district in particular, crop production is carried out in both “meher” main crop season and “belg” seasons. Crops such as maize and teff are the major cereals grown and they occupy the largest proportion of the cultivated land. Pulses such as horse been, field peas, haricot been, and chickpeas are widely grown in the zone and the district and they are second in terms of area coverage next to cereals. Oil crops, such as groundnut, linseed, niger seed and sesame are grown mainly as cash crops. Moreover, the major cash crops grown in the district are coffee and ginger’ and they are the dominant sources of cash income of the household. The total estimated area covered by ginger and coffee during the 2003/04 was about 3221 ha and 1776 ha, respectively. Table 3.1 shows the total cultivated area, production level and yield of different crops in both Wolaita zone and Bolos Sore district for the 2003/04 production year. Production (crop) diversification practice is very common particularly in the mid -highland area where there is relatively sufficient rainfall, while in the lowland part of the district, only sorghum and maize are grown, as the rainfall is insufficient. The proportion of the district’s total cultivated area is 20.46% (19,362ha) of the total cultivated area which is 94,613ha. in the year 2003/04. Likewise, the percentage share of major crops area of the district with respective crop area in the same year were 24.17% (9,136 ha),16.23% (5,229ha), No o**il** crops and 20.33% (4,997 ha) for cereals, pulses and cash crops respectively.

Wolaita Zone Boloso Sore District

Table 3.1: Cultivated Land and Production of Major Crops of 2003/2004

Wolaita Zone					Boloso Sore District			% of district
Crop Type	Area .000 ha.	Production .000 Qt.	Qt/ha Area	% of	Area (ha) .000 ha	Prodn (.000 ha)	Qt/ha	Area to Zone
Cereals	37.806	1383.855	36.60	39.96	9.136	316.103	34.6	24
Teff	2.647	430.091	16		4.157	70.849	17	-
Wheat	3.478	500.338	51		1.268	73.246	58	-
Barley	26.247	57.188	22		0.265	7.346	28	
Sorghum	0.070	1.050	15		0.015	0.420	28	
Maize	5.200	338.000	65		3.431	164.242	48	
Oats	0.164	57.188	14		-	-	-	
Pulses	32.217	403.037	12.51	34.05	5.229	75.328	14	16
Lentils	-	-	-		-	-	-	-
Horse beans	3.364	55.211	16		0.278	5.336	-	-
Chick peas	1.821	29.909	16		-	-	18	
Field peas	3.191	48.796	15		0.2474	4.491	14	
	23.841	269.121	11			65.501		
Oil Crops	0.015	0. 458	30.53.	0.02	-	-	-	-
Niger Seed	0.001	0.019	19		-	-	-	-
Linseed	0.001	0.017	17		-	-	-	-
Ground nut	0.002	0.350	175		-	-	-	-
	0.011	0.072	6.5		-	-	-	-
Cash Crops	24.575	3,062.769	124.63	25.97	4.997	423.876	84.83	
Coffee	14.002	64.0672	4.58		1.776	16.041	9.03	
Ginger	10.573	998.702	283.6		3.221	407.835	135	
Gr.Total	94.613	4850.119	51.26	100	19.362	815307		

Source:-WZBOA(2004), Statistical Abstract of Wolaita Zone

3.3.2 Livestock Production

Livestock production is one of the important activities in the study zone, both in highland and lowland areas. The sector is one of the components of the farming system in the study district and contributes to the subsistence requirement of the population in terms of milk and milk products and meat particularly from small ruminants. It also contributes a lot for crop production by providing draught power, manure and transportation services. Cattle, small ruminants and donkeys are the dominant livestock types kept by the farmers in the districts. The farmers in the study districts, also raise chicken, although, there are a number of killer diseases that make poultry production difficult in the area.

As indicated in Table 3.2 farmers in Bolos Sore district keep large number of livestock. The proportion of livestock number as compared to the zone shows that about 7.6% of cattle, 2% of goats, 11% of poultry ,5.7% of donkeys, 18.6% of Horses and 9% of Mules are found in the district. Imbalance between farm size and herd size is the major cause for low productivity of smallholder farms in the district . Average cattle holding ranges from 3-8 head per household for lowland area and 2-5 head for highland area. Livestock productivity is very low in both agro-ecology due to shortage of animal feed, water supply and poor animal health services. Livestock diseases are the major production constraints recurring at different seasons of the year and seriously affecting the livestock subsector. The major animal diseases prevalent in the district are anthrax, pasteurollosis, black leg and F.M.D. Specifically anthrax and black leg affect the lowland area seriously. Limited veterinary services are given by the three clinics where one at Areka town and the

remaining two are in rural areas in the Boloso Sore district.

Table 3.2 Number of Livestock Distribution in Wolaita Zone and Boloso Sore District 2003/04.

Livestock Type	Wolaita Zone	Boloso Sore District	
	Number of animals	Number of animals	share of the zone(%)
Cattle –Local	1,097,710	75869	
-Cross breed	10923	8429	
-Total	1,108,633	84298	7.6
Sheep -Local	150,383	7485	
-Cross breed	580	4587	
-Total	150,963	12072	8
Goat-Local	185,250	3775	2
Horses-Local	2761	514	18.6
Donkeys-Local	54209	3109	5.7
Mules-Local	3085	283	9
Poultry-Local	734,924	48729	
-Cross breed	41148	38803	
-Total	776,072	87532	11

Source:-WZBOA,2004, Statistical Abstract, for Wolaita Zone and Bolos Sore district

3.3.3 Agricultural Extension

Agricultural extension services is very important to increase crop production through the use of improved seeds, fertilizers, chemicals and improved farming systems. Currently, there are 303 development centers and 1000 development agents serving 275,630 farming households with in the Zone (WZBoPED and WZBOA 2003). In addition to this, the focus of the agricultural extension services in the zone is on crops, livestock and natural resource development activities. With regard to the extension service of Bolos Sore district, as elsewhere in the country, development agents (DA), who live with the farming community, provide extension services. One important issue, which needs the attention, is the farmer to the development agents ratio. In fact, the quality as well as the efficiency of extension service depends partly on the number of farmers that an agent

has to serve. At present, there are about 29 development centers and 81 development agents serving 32,105 farming households in the study district. The distribution of the development agents shows that there is more than two extension agents per Kebele. The ratio of farmers to development agent in the year 2005, is 400. This figure indicates that farmers have better access to extension services when compared to national ratio which is 500 farmers (WZBoPED, 2005).

3.3.4 Input Supply

The most important agricultural inputs widely used by farmers in the study district in particular and the zone in general are commercial fertilizer and improved seed (teff, wheat, maize and sorghum). However, the extent of the use of these agricultural inputs is limited as one can see from the amount of fertilizer supplied and distributed to the farmers and the total number of farming households. The proportion of fertilizer supplied to the district and consumed as well as the number of users in 2003/04 production year were 14.91%, 16.6%, and 17.7% ,respectively (Wolaita Zone BOA 2003). The report indicated that the percentage of fertilizer used by farmers during this year is relatively higher than the average share of other districts.Table 3.3 shows the amount of fertilizer and improved seeds supplied and consumed and the number of users in both Wolaita Zone and Bolos Sore district for the year 2003/04.

Table 3.3: Fertilizer and improved seed Consumption and Supply Over the 2003/04 in (Qt)

Fertilizer	Wolaita Zone				Boloso Sore District				% of district from zone (fertilizer)
	DAP (Qt)	Urea (Qt)	Total (Qt)	Improved Seed (Qt)	DAP (Qt)	Urea (Qt)	Total (Qt)	Improved Seed (Qt)	
Supplied	118,647	58,687	177,334	10,730	12754	9635	22388	1444	13
Used	106,051	41,960	148,011	9,656	12329	8875	21204	1313	14
Number of users	141,401	55,946	197,347	33,237	9246	6656	15902	381	0.08

Source: Wolaita Zone Bureau of Agriculture(2004),Statistical Abstract of Wolaita Zone

3.4 Soil Type and Farm Land Holding

Farmers in the study district traditionally classify their soils in many different ways. However, most of them identify four dominant soil types, namely red, black cotton, gray and brown soil. According to the Agricultural Development Department of the zone, red soil covers about 48%, black cotton 42%, gray soil 8% and brown soil 2%. Bolos Sore district is under immense pressure from an expanding human population trying to live on rapidly degrading resources. Soil erosion is severe as cultivation expands increasingly in marginal areas. The average land holding per household ranges for both the zone and the district between 0.5-1.0 ha and 0.25-0.5 ha respectively. Farm size is very small and getting smaller with the incoming new generation (WZBoPED, 2004).The high population pressure in the district resulted in intensified land use to the extent that the rugged surface is plowed. This practice will in turn lead to serious soil erosion and

depletion. Upland farming without proper conservation measures are cause of low fertility level of the soils in the study areas. In the study district land has been cultivated for a long period of time without the use of chemical fertilizers. Such a continuous cultivation of soils leads to widespread depletion of nutrients with a corresponding drastic loss in productivity and exacerbates food security problem.

3.5 Social Infrastructure and Communication services

3.5.1 Education Services

According to (WZBoPED and WZBOE, 2004), Wolaita zone had 51 Kindergarten,276 Government and 24 private elementary , 144 Government and 18 private junior secondary, 27Government and private 5 senior secondary schools. In addition to these, there are 1 Agricultural Technique school (ATVET),1 Poliy Technique school and 1 University College. According to the same source, the total number of students in elementary were M-121652, F-111113, T-232745 ; junior secondary M-81088, F-74076 T-155164 and senior secondary schools M-29876, F-24208 T-54084 .The grand total of the student is M-232,616, F-209,397 and T-441,993.

Likewise, in the Bolos Sore district there are a total of 38 elementary schools, of which 5 are 1-4 grade and 33 are 5-8 grade. There are also secondary high schools, of which 2 are 9-10 grade. During the 2005 E.C., the total number of students were 51034(27134 boys and 23900 girls). The total number of children at school is about 95%. The number of teachers during the same academic year was 846 of which only 256 were females. Adult literacy rate is very low in the district. According to the 1996 WIBS base line survey, only about 13.95% of the adult population of enrolment were literate. During the year 2005E.C, adult education enrolment was 8700(4700 Males and 4000 Females)

only which is less than 10% of the illiterate in the study District. This shows that illiteracy is also one of the factors in the area that which affects the household to tackle food security problem, particularly the productive forces of the society.

3.5.2 Health Services

With regard to the establishment rendering health related services in the zone, in 2003/04, there were 1 referral hospital with 160 patient beds, 69health centers, 133 clinics, 337 health posts and 42 rural drug shops (WZBoPED and WZBOH,2004).

In Bolos Sore district there is one hospital(Dubo St. Mary,private),19 health posts and 7health centers in the district owned by government as well as there are four private rural drug venders. The hospital is located at the distance of 3kms away from the district capital town of Areka where the specific site is called Dubo. The district is 32kms away from Otona referral hospital(Government)and 30kms away from Christian hospital (PLC) both at Soddo/ zonal capital city/ .There are 15 health attendants and 10 nurses in Dubo ,40health attendants and 25 nurses in Otona referral hospital and 17health attendants and 11nurses in Soddo Christian hospital. The main problems affecting the health status of the people in the district are: lack of safe and adequate water supply, shortage of health professionals, shortage of medical supplies and equipment and shortage of health facilities. The following are the top nine diseases prevalent in the district: malaria, diarrhea, pulmonary tuberculosis, respiratory infection, sexually transmitted diseases, eye diseases, skin diseases and intestinal parasites (WZBoPED, 2004).

3.5.3 Water Supply

Water supply coverage is very low in the district. Only 10% (116,550) of the population have access to improved water supply in 2003/04. There are only 101 deep wells drilled in the district with only 57 distribution water points. In spite of the geological structure of the study area is less difficult, there is less accessibility of drinking water. Drilling of water wells is difficult tasks in the study district in because of it's huge budget demanding. Otherwise, bore holes drilled (with depth of not more than 150-200 meters only) .

3.5.4 Communication

According to WZBoPED (2004) in 2003/04 the zone had 102.5kms Asphalt, 183.4 kms all-weather gravel roads, 246kms rural gravel roads and 1290.5kms rural feeder roads. While on the other hand, the only all weather road existing in the district is the one connecting the district capital Areka with zonal capital Wolaita Sddo and Addis Abeba as well. The lack of a net work of rural feeder roads in the district is hampering trade activities, in spite of the fact that Bolos Sore is one of the cash crop (coffee and ginger) growing area in the region. But now, the five year stretched plan, i.e., the Growth and Transformation Program/GTP/ ,which was launched since 2002 E.C. had conducted the so called URAP/ Urban Rural Appraisal Program/ which will be completed at the end of 2007E.C. URAP has been constructing, maintaining and expanding many more rural feeder roads more than ever before for the last three years and this might substantially minimize the existing rural feeder road problems in the study area. With regard to telephone and postal service there is one service giving center so far. Wolaita zone has 32 manually operating telecommunication stations, and 297 semiautomatic stations

and 20 equipped with digitized automatic telecommunication station. The zone has also 16 post offices four of them were a post office, 12 were Post Agent Offices. 52 towns including Areka, the capital of the study area, have hydroelectric power supply rendering service for 24 hours a day. Lack of social infrastructure coupled with poor and backward marketing facilities, poor road network and communication facilities make Boloso Sore district relatively the inaccessible area of Wolaita zone.

3.5.5 Market Places

As the district is one of the coffee growing areas in the region, there are a number of market centers. The markets are mostly located in open rural villages and in small towns with one major market in the district capital. In addition, some small markets are also found in villages, and are only operational once a week.These markets are traditional in nature and are characterized by inadequate marketing facilities and services, such as good sanitation, product protection, shelter and so on. They are also constrained by deficient transportation infrastructure. Particularly, feeder roads and roads linking rural areas with urban consumption centers are inadequate. Thus, the majority of the areas are inaccessible by vehicles making it imperative to use pack animals (such as donkeys).

Hence, most rural households transport their agricultural produce (surplus over subsistence) to markets and milling places by donkeys and/or on their shoulders. There are over six markets in the district and another five large markets in the neighboring districts.

4.CHAPTER FOUR: METHODOLOGY

4.1 Sources and Method of Data Collection

A number of different methods can be used while under taking an agricultural survey. The methods used depend on the objectives of the study, type of data required for the analyses and availability of resources,(both finance and time). This study made use of the data collected by SNNPRS BoPED and BSF/UNICEF program during March and April of the year 2000. The data in the survey were collected by using structured questionnaires, which were prepared and pre-tested for the purpose of the project entitled “Improvement of Household Food Security in Boloso Sore District of SNNP Region-Ethiopia”.

A series of training workshops on PRA and methods of data collection and on the contents of the questionnaire was conducted at all levels. Three enumerators who speak the local language were recruited from the study area and trained. The enumerators were employed to administer the structured questionnaires. The questionnaires were pre-tested and on the basis of the results obtained necessary modification were made. The formal survey was conducted by administering a structured questionnaire to collect data from 120 randomly selected farmers.

Major variables expected to have association with food security status including household characteristics, farming systems and productive resources as well as biophysical factors were incorporated in to the questionnaire. Data on these variables and other related aspects were, collected by visiting each and every one of the sample respondents. A structured questionnaire and well-experienced and trained enumerators were used in the survey. The collected data were both qualitative and quantitative in

nature. See summary of questionnaire in Appendix 3. Relevant data were collected from secondary sources to supplement the primary information. The secondary sources from published and unpublished documents were extensively reviewed.

4.2 Sampling Techniques

In this study the farming household is actually responsible for making day to day decisions on farm activities and investment on land. Thus, a household was the basic sample unit. A two-stage sampling procedure was used to select sample farmers. In the first stage, 3 peasant associations (PAs) were selected using a random sampling technique for it is not possible to take all the 27 PAs because of time, financial and other resource limitations. In the second stage a total of 120 household heads were selected randomly from the respective list of farmers in the 3 PAs using probability proportional to sample size sampling techniques.

4.3 Data analysis

4.3.1 Analytical Model

Several studies indicate that the state of food security is influenced by an interwoven and interacting set of biophysical, demographic, socioeconomic and other household characteristics of the farmer's operational environment. Therefore, appropriate models accommodating all these aspects of data is required to come up with feasible and relevant outcomes. Models, which include a yes or no type dependent variable, are called dichotomous or dummy variable regression models. Such models approximate the mathematical relationships between explanatory variables and the dependent variable that is always assigned qualitative response variables (Gujarati, 1988; Feder et

al., 1985; Pindyck and Runbinfeld, 1981). These include the linear probability function, logistic distribution function (logit) and normal distribution function (probit).

The major point that distinguishes these functions from the linear regression model is that the outcome variable in these functions is binary or dichotomous (Hosmer and Lemeshow, 1989). Besides, the difference between logistic and linear regression is reflected both in the choice of a parametric model and in the assumptions. Once this difference is accounted for, the methods employed in analysis using logistic regression follow the same general principles used in linear regression (Hosmer and Lemeshow, 1989).

The probability model, which expresses the dichotomous dependent variable (Yi) as a linear function of the explanatory variables (Xi), is called linear probability model (LPM) since the conditional expectation of Yi given

Xi, [E(Yi/Xi)] can be interpreted as the conditional probability that the event will occur given Xi; that is, P(Yi=1/Xi). Due to some well-recognized econometric problems of non normality (i.e., Ui is not normally distributed), heteroscedasicity of disturbance term (Ui), non-fulfillment of $0<E(Yi/Xi)<1$ and lower value of R2, however, linear probability models used too many times are not appropriate to test the statistical significance of estimated coefficients (Liao, 1994; Gujarati, 1988; Pindyck and Runbinfeld, 1981). The logit and probit models will guarantee that the estimated probabilities will lie between logical limit 0 and 1 (Pindyck and Runbinfeld, 1981). Because of this and other facilities, the logit and the probit models are the most frequently used models when the dependent variable happens to be dichotomous (Liao, 1994; Maddala, 1989; Gujarati, 1988; and Pindyck and Runbinfeld, 1981).

The logit and probit models are comparable, the main difference being that the logistic function has slightly flatter tails, that is, the normal curve approaches the axes more quickly than in the case of logistic function. The close similarity between the logit and probit model is confined to dichotomous dependent variables. In other words, the logistic and cumulative normal functions are very close in the midrange, but the logistic function has slightly heavier tails than the cumulative normal function (Maddala, 1983 and Kementa, 1986). Ignoring this minor difference, Liao (1994), Gujarati (1988), Pindyck and Runbinfeld (1981) pointed-out that the probit and logit models are quite similar, so they usually generate predicted probabilities that are almost identical. Aldrich and Nelson (1984) indicated that in practice these models yield estimated choice probabilities that differ by less than 0.02 and which could be distinguished, in the sense of statistical significance, only with very large samples. Liao (1994) reported that the logit model has the advantage that these predicted probabilities could be arrived at easily. He also indicated that when there are many observations at the extremes of the distribution, then the logit model is preferred over the probit model. The choice between these two models revolves around practical concerns such as the availability and flexibility of computer program, personal preference, experience and other facilities. In fact, it represents a close approximation to the cumulative normal distribution. Hosmer and Lemshew.

:

ΕΘΥΑΤΙΟΝ κκλλλκνβββϖϖϖϖϖϖϖϖϖϖϖϖϖϖϖϖϖϖϖϖϖϖϖϖϖϖϖϖϖ
βββββββββββββββββϕδδδδδδδδδδδδδδδδδδδδφκκκκκκκκκκκκκκκκ

∠(x) = E (y = 1/x) = 1 + e -(Bo + BiXi)----------(1)

For ease of exposition, we write (1) as:-∠(x) = 1 ----------(2)

1+e-zi Where ∠(x) = is a probability of being food secure ranges from 0 to 1 Zi = is a function of n-explanatory variables (x) which is also expressed as: Zi = Bo+B1X1 + B2X2 + ... + BnXn

Bo = is intercept

B1, B2 ..... Bn = are slopes of the equation in the model

The probability that a given household is food secure is expressed by (2) while, similarly, the probability for food insecure is :-

1- ∠(x) = 1 ----------(3)

1 + ezi

Therefore we can write:- ∠(x) = 1+ ezi = ezi ----------(4)

1-∠(x) 1+ e-zi Now ∠(x) / (1-∠(x)) is simply the odds ratio in favor of food security. The ratio of the probability that a household will be food secure to the probability of that it will be food insecure.

Finally, taking the natural log of equation (4) we obtain:-

Li =ln ∠(x) = Zi ---------- (5) 1-∠(x)

Zi = Bo+ B1X1 + B2X2 + ---------- + BnXn

If the disturbance term, (Ui) is introduced the logit model becomes

Zi = Bo + B1 X1 + B2 X2 + ...+ BnXn + Ui .....……(6).

Li = is log of the odds ratio, which is not only linear in Xi but also linear in the parameters.

Xi = Vector of relevant explanatory variables

The parameters of the model were estimated using the iterative maximum likelihood estimation procedure. This procedure yields unbiased and asymptotically efficient and consistent parameter estimates (Maddala, 1992; Gujarati, 1988 and Hosemer and Lemeshow, 1989).

Therefore, the logistic regression model was selected for this study and was specified to identify the determinants of food security. The analysis of the logistic regression model was shown that changing an independent variable alters the probability that a given individual becomes food secure, and will help to predict the probability of achieving food security.

4.3.2 Model Specification

Following the completion of the data collection, the responses were coded and entered into SPSS version 9.0 software program for statistical analysis. In this study a food secured household is defined as a household who have access at all time to enough food (calories required) for an active and healthy life. Accordingly, food security at household level is best measured by direct surveys of income, expenditure, consumption, and compare that with the adequacy norm (minimum subsistence requirement) appropriate to the household. Specifically, average income and expenses are commonly used to compute proxy indicators of food security. In this study, the total household expenditure per adult equivalent is taken to compute proxy indicator of food security. The reasons for employing total household expenditure rather than income as the dependent variable in this study were two. First consumers normally understate their incomes than their total expenditure. Second reason is based on a theoretical argument. As it may be recalled from the theoretical framework of economic theory,

traditional consumer maximizes his total utility subject to his budget constraint, i.e., his total expenditure. So if expenditure is assumed to be directly consumed, it contributes to utility directly while income contributes indirectly. The actual household expenditure in this study is considered as that of total annual expenditure incurred by the household on consumption (including own produce) as well as non-consumption items. This actual expenditure/AE /annum is calculated by summing up all the expenditure components and dividing by total AE of the household. It includes the sum of own produce consumed (cereals, pulses, oil seeds, fruits, vegetables, coffee, chat, livestock and livestock products), expenses on clothing, health care, education, farm implements, farm inputs (fertilizer, seeds and chemicals), taxes, social obligation, household utensils, labor cost, rents, fuel, transportation costs, marketing costs, farm oxen, breeding and miscellaneous. On the other hand, subsistence level of household expenditure or minimum level of income which should at least meet or required per adult equivalent is computed based on the amount of food required by an adult person, minimum expenses needed for clothes, health care, education, short term loan, taxes, and social obligations. The value of minimum amount of cereals (2100) kcal /AE/day or 225 kg/AE/year) at an average price of grain in the local markets plus the sum of estimated minimum amount of money needed to cover the above mentioned expenses per AE per annum were used as a threshold beyond which the household is said to be food secure in the study area. Once we have identified the food insecure groups of household the next step is to identify characteristics that are correlated with food insecurity and that can be used for targeting interventions. Such important household characteristics, which potentially affect the level of household food security, would be

identified using probabilistic models. In other words, the likelihood that the given household characteristics threaten the food security of the household would be searched. In light of this, it was hypothesized that there are some specific farm household and physical characteristics associated with food production or acquisition and procurement strategies responsible for determining the state of food security at household level.

In order to test the above hypothesis a multiple logistic regression model was specified with food security as a function of a series of socioeconomic, biophysical and farmer's characteristics as explanatory variables. The dependent variable in this case is a dummy variable, which takes a value of one or zero depending on whether or not a household is food secure. Thus the main purpose of a qualitative choice model is to determine the probability that an individual with a given set of attributes will make one choice rather than the alternative.

4.3.3 Definition of Variables and Working Hypotheses

Once the analytical procedure and its requirements are known, it is necessary to identify the potential explanatory variables and describe their measurements. Different variables are expected to affect household food security status in the study area.The major variables expected to have influence on the household to be food insecure or not are explained below.

The Dependent Variable of the Model (HHFSST): the household food security status, which is, the dependent variable for the logit analysis is a dichotomous variable representing the status of household food security. It was represented in the model by 1 for food secure and 0 for food insecure household. The information to categorize

households into two groups can be obtained by comparing the total household expenditure per AE per annum to the minimum level of expenses required to ensure survival per AE per annum. This minimum level of expense required per AE is computed based on the amount of calorie requirement by AE (2100 kcal/AE/day or 225 kg/AE/year) plus minimum expenses needed for clothing, health care, education, short term loan, tax, and social obligations. Accordingly, Birr 434 is computed as the sum of all these and considered as the minimum subsistence expense (threshold) beyond which the household is to be food secure or not. The Independent Variables of the model: the independent variables expected (hypothesized) to have association with food security status, were selected based on available literature. Efforts were made to incorporate demographic, biophysical and socioeconomic factors, which are feasible and relevant in the farming systems of the Western Hararghe in particular. Accordingly, the empirical model was built using the data collected on the following variables. The associated hypotheses of the study with respect to each one of the regressors is also presented below (i) Family Size (FAMSZ): in Boloso Sore, where there is a persistent drought, the expectation is that household with large number children or economically non-active family members will face food insecurity because of high dependency burden. The existence of large number of children under age of 15 and old age of 65 and above in the family could affect the food security status of the household. This is due to the fact that the working age population (i.e., 15-64 years) supports not only themselves, but also additional dependent persons in the family. Thus, it is hypothesized that the family with relatively large number of dependent family members (high dependency ratio) negatively affects household food security status.

(ii) Size of Cultivated land (CULTAR): this variable stands for the total land area cultivated. In this particular study, total cultivated land owned by the household is taken as proxy for farm size is an indicator of wealth and income and is expected to be associated with food security status. Because of this, it is hypothesized that farmers who have larger farmland are more likely to be food secure than those with smaller land area, due to the fact that there is high possibility to produce more food.

(iii) Income from Chat (INCCHAT): chat is an important source of cash income and the dominant perennial crop in the study area. Farmers who grow such crops are able to earn more cash, which enable them purchase food when they are in short of stock, and invest in purchase of farm inputs that increase food production. The larger the size of the chat farm area the higher may be the cash income. Thus, it is hypothesized that farmers growing ginger and earning more cash income are more likely to be food secure than those who don't have income from ginger crop. (iv) Herd size owned (TLU): is the total number of livestock holding of the farmer measured in livestock units. Livestock are the farmers'important source of income, food and draft power for crop cultivation in Ethiopian agriculture. Possession of livestock is expected to have a positive impact on households' food security situation. Since households with more livestock obtain more milk, milk products and meat for direct consumption, particularly during food crisis, large size livestock owners could be more food secured. Besides, a household with large livestock holding can have good access for more draft power and manure for crop production. Moreover, they can obtain more cash income from the sale of skin and hides as well as live animals. The livestock sale is also used as the major coping strategy during famine and seasonal food shortage. Therefore, it is logical to

expect that a higher value of TLU increase the probability to cope with food insecurity. (v) Number of Oxen Owned (NOOXEN): oxen are the most important means of land cultivation and basic farm assets. Households who own more oxen have better chance to escape serious food shortages in that oxen possession allows the saving of labor and spreads employment of the family labor over peak and slack period for the farm and nonfarm activities and can contribute towards ensuring food security. Moreover, oxen possession can enable good performance of crop production through improving household access to land. The number of oxen available to the household was, therefore hypothesized to enhance the probability of being food secure. (vi) Use of Chemical Fertilizer (FERTIL): It is represented by a dummy variable taking value 1, if the farmers used; 0, otherwise. Fertilizer use has often been perceived as improving yield per unit area. Therefore, it was hypothesized that households using fertilizer are expected to have better food security than the non-users. (vii) Off-Farm Income per AE (OFFIAE): This represents the amount of off-farm income (in cash or in kind) the farmer or any of the household members earned in the year. Since smallholder farmers have inadequate farm income they often look for external source of income to purchase food and farm inputs. The success of households and their members in managing food insecurity is largely determined by their ability to get access to off farm job opportunities in the study area. In this regard, households engaged in off-farm activities are better endowed with additional income to purchase food. Hence, it is expected that the availability of off-farm income is positively associated with household food security status. (viii) Total Food Aid (TOFAI): in addition to level of food production and access to productive resources, the frequency of food aid distribution and the amount obtained

in the study area is a reasonably good indicator of food insecurity. Emergency food aid creates access to food for vulnerable households. Therefore, since Bolos Sore is known to be drought prone district, households who have been receiving food aid are expected to escape serious food insecurity than otherwise food insecure during the study year. (ix) Total Annual Income per AE (INCAE): is an important variable explaining the characteristics of food secure and food insecure households, in that those who have earned relatively larger income per AE could be food secure. The larger income per AE has positive impact on the probability of being food secure. The possible explanation is that, in the study area, households who managed to earn more cash income including off –farm income had very high chance of securing access to food than those who had not. In other words, larger annual income per AE may also affect the probability of being food secure by providing the source of cash flow to buffer the risk associated with crop failure due to bad weather condition. (x) Insect and Pest infestation (INSPST): This is also a dummy variable taking value 1, if the farmer faced insect and pest infestation; 0, otherwise. It is an important biological factors limiting crop production and causes of food deficit in the study area. As a result, it was assumed that farmers with problem of pest infestation are more likely to be food insecure than those who don't have the problem. In light of this, it is hypothesized that insect and pest infestations have negatively correlated with food security status. (xi) Coffee Area (COFFAREA): coffee is an important source of cash income and the dominant perennial crop in the study area. Farmers who grow coffee are able to earn more cash, which enable them purchase food when they are in short of their stock and invest in purchase of farm inputs that mincrease food production. Thus, it is hypothesized that farmers who own large size of

coffee farm can earned more income and are more likely to be food secure than those who don't have cash income from coffee. (xii) Soil Fertility Problem (FERTPROB): this is a dummy variable taking value 1 if the farmer faced soil fertility problem; 0, otherwise. It is one of the physical factors affecting crop production. The analysis between problem of soil fertility and state of food security that they are systematically associated. Thus, it is hypothesized that farmers who have soil fertility problem are more likely to be food insecure than those who don't have the same.

(xiii) Distance from Market center (DISMAR): proximity to market centers creates access to additional income by providing non-farm employment opportunities, and easy access to extension, inputs and transportation. It is, therefore, expected that households nearer to market center have better chance to improve household food security status than who do not have a proximity to market centers. Proximity to market centers affect household food security status positively. (xiv) Food Expenditure Pattern (FODEXPT): Household expenditure Pattern on food, which includes own production consumed, has been taken to represent the major part of family's purchasing power and will be related to the size of income obtained by the household. It can be shown as the proportion of expenditure on food to total expenditure. Accordingly, those who have more purchasing power could primarily spend a substantial portion of their income on the basic necessities, particularly on food. Hence, it is hypothesized that the proportion of household expenditure on food for poor consumer as "Engel's law states" is positively correlated with the household food security status.

4.3.4 Estimation Procedure

Given that the model selected for the analysis is the logit model, the dependent variable is assigned a value of 0 or 1, representing food insecure or food secure status, respectively. To estimate the values of Bo and Bi's, of the logistic model, a set of data was fitted in to equation 6. Since the method of OLS does not make any assumption about the probabilistic nature of the disturbance term (Ui) in logistic regression, the parameters of the model are estimated using the maximum likelihood (ML) method (Maddala, 1992; Gujarati, 1988). Due to the non-linearity of the logistic regression model, an iterative algorithm is necessary for parameter estimation. In a very general sense, the method of maximum likelihood yields values for the unknown parameters, which maximize the probability of obtaining the observed set of data (Liao, 1994; Hosmer and Lemeshow, 1989). According to the same authors, the resulting estimators maximize the likelihood function, being constructed expressing the probability of the observed data as a function of the unknown parameters and those which agree most closely with the observed data. The methods of estimation are iterative and are processed in statistical software, SPSS. Before estimating the logit model, it is necessary to check if multicollinearity exists among the continuous variables and verify the associations among discrete variables. The reason for this is that the existence of multicollinearity will affect seriously the parameter estimates. If multicollinearity turns out to be significant, the simultaneous presence of the two variables will attenuate or reinforce the individual effects of these variables. Needless to say, omitting significant interaction terms incorrectly will lead to a specification bias. In short, the coefficients of the interaction of the variables indicate whether or not one of the two associated

variables should be eliminated from model analysis (Kothari, 1990). Accordingly, Variance Inflation Factors (VIF) technique was employed to detect the problem of multicollinearity for continuous explanatory variables (Gujarati, 1995). Each selected continuous variable is regressed on all the other continuous explanatory variables, the coefficient of determination (R2 j) being constructed in each case. If an approximate linear relationship exists among the explanatory variables then this result, in a 'large' value for R2 j in at least one of the test regressions. A popular measure of multicollinearity associated with the VIF is defined as: VIF(Xj) = (1 - R2 j)-1 (7)

A rise in the value of R2j that is an increase in the degree of multicollinearity, does indeed lead to an increase in the variances and standard errors of the OLS estimates. A VIF value greater than 10 is used as a signal for the strong multicollinearity (Gujarati, 1995). Similarly, there may be also interaction between qualitative variables, which can lead to the problem of multicollinearity or association. To detect this problem, coefficients of contingency were compounded from the survey data. The contingency coefficients is compounded as follows:

$C = \sqrt{x^2}/n+x^2$

Where C is coefficient of contingency, x^2 is chi-square test and n= total sample size.

5. CHAPTER FIVE: RESULTS AND DISCUSSIONS

5.1 Measuring the Food Security Status of the Household.

This study is based, on the food security definition put forward by World Bank (1986). This definition explicitly focuses on three fundamental concepts (elements) of food security i.e., food availability, food access and food utilization. Furthermore, as

illustrated in the conceptual framework and generic indicators of food security (Fig. 2), these concept consists of a number of components including resources, production, income, consumption and nutrition. Specifically, food consumption as a component or indicator of food security can be measured by expenditure technique, where by gross household's production and purchases over definite period of time usually a year are estimated. It was further assumed that, at the household level, food security is best measured by direct survey of expenditure and compares that with adequacy norm appropriate to the household.

For the purpose of this study, the concept of food security is defined as the extent to which a total household expenditure per AE meets its subsistence requirement.

Total household expenditure in this study is defined as total expenditure incurred by the household or any of its members and includes expenditure on consumption as well as non-consumption items. More specifically, total expenditure consists of expenditures on food including own produce, stimulants, clothing and footwear, household equipment, social obligation and various services. In summary the reason why the total household expenditure/AE employed in this study is justified by the fact that in survey of this kind, the income statistics reported by the households usually tends to under estimate the actual income level of households due to various reasons. Since the income of the household is not known with certainty, household expenditure is usually taken as a proxy of income (CSA, 1997). Other study further indicates that total household expenditure reflects purchasing power of the household and has been employed as proxy of total household income. On the basis of the above argument, and a conceptual framework of this study, the total household expenditure for the year 1999/2000 was

taken a best measure of food security. The average expenses, which at least be met or required per adult equivalent was computed proxy indicator of food security. In order to undertake analysis of the determinants of household food security, the household expenditure per AE has been compared with the minimum expense required to cover the minimum subsistence requirement per AE per annum that can be used as a yardstick for measuring food security. Accordingly, evaluating the extent to which the household income covers the minimum level of expense needed for subsistence can assess the extent to which the sample households are food secure or insecure.The minimum level of expenditure required per AE was computed based on the amount of food required by an adult person (a calorie requirement of 2100 kcal per day or 225 kg of cereal per AE per year), minimum expenses needed for cloths, minimum health care, the amount of money required to pay short term loan and land use tax. The estimation of the minimum staple food needed per AE was, therefore, based on the minimum calorie an adult person requires. The calorie intake result is calculated by using the standard food composition table prepared by Ethiopian Nutrition Institute (ENI, 1968). Thus, the country level calorie intake per AE per day is about 3000 kcal of which daily calorie intake from cereals constitute 70% or 2100 kcal (CSA, 1997). With the presumption that a kg of cereal provides 3400 kcal, as established by Ethiopian Nutrition Institute, 225 kg of cereals is needed per AE per year. The value of this amount of cereals at an average price of grain in the local market (i.e.,1.18 Birr/kg.) would be about 265 Birr (Table 5.1).

Moreover, information from different available sources was used to estimate the minimum amount of money needed to purchase cloths, to meet health care and other

expenses such as land use tax and minimum expenses for other food items. In line with this, CSA, (1997) had undertaken household income, consumption and expenditure survey, while Storck et al. (1997) made monitoring of the money spent by farmers of some districts of Wolaita zone for different purposes for two consecutive years. In estimating minimum expense required per AE per annum, although there is information on average per capita expenditure per annum surveyed by CSA (1997), this particular study made use of some information reported by Storck et al. (1997, p178). The reason to utilize is information from the latter source is due to the fact that this research was undertaken in Wolaita Zone, which has geographic proximity to the study area and the level of its aggregation i.e., at household level (Table 5.1). The expenditure data from (CSA, 1997),computed as per capita expenditure at national level as compared to the second source, which is based on AE. Thus, the minimum expenditure per AE is considered in this study. With regard to health care expense, in a low-income economy, the World Bank (1993, pp 9-11) as cited in Bezabih (2000) estimates the minimum expenses per person for a minimum package of essential clinical services to be $US 8 per year. This estimate is assumed to be applicable to the study area.

Table 5.1 showed the minimum level of expenditure required per AE per annum for subsistence. In order to be able to continue production in the future and to have command over its assets, the household should be able to meet minimum land use tax obligation and also settle the current loan balance. The sum of all these expenses was used as the threshold beyond which the household is said to be food-secured or not in the study area. It should, however, be noted that the minimum income required for provision of education, to pay short-term loan and expenses needed to meet social

obligation such as contribution during death of relative or neighbors, wedding and cultural holidays were not included due to lack of data, even though these can have impact on the food security status of the households. The estimated minimum level of income required for subsistence depends very much on the level of the prices of the commodities and services. For instance, a 10% increase in price of cereals would increase the minimum amount required to 461 Birr. Hence, the minimum level may oscillate between the 434 Birr and any upper level defined by change in the prices of goods and services. This implies that the higher the variation in prices, the more food-insecure the consumer who depends much on purchased food would be.

Table 5.1 Estimation of Minimum Income Required per AE per year

Expenses Category(in Birr)	Expenditure per AE	*Source of Information
1.Staple food/cereals/	265	Computed based on min. calorie requirement
2. Other Food: pulses, relish, vegetables ,Stimulants, animal products, etc.	60	Based on monitored information in stock et al.,(1997)
3.Clothes	40	Stock et al.,(1997)
4. Health Care	64	World Bank (1993)
5.Land use tax	5.35	Minimum tax,25 Birr/farm
Total	434.35	

Note: 1 US $ was 18.5 Birr in 2005 E.C

*Sources of information for expenditure per AE.

The distribution of net household expense for AE compared to the minimum subsistence amount required per AE per annum shows the severity of the food insecurity problem in the study area. The information displayed in Table 5.1 shows that a minimum of 434 Birr is required per adult person per year. This implies that about 36 Birr is needed per month to subsist an adult person and lead a healthy life .The comparison of this value with the total household expense/AE helps to assess the vulnerability of the households to food insecurity. The proportion of the households with an average total household expenditure per AE, which is less than the minimum or threshold level is 73%.

In general, if Birr 434 per AE is considered as a benchmark cut of point, beyond which household is food secure or not, 73 % of the sample farmers live below this point. If the state of food security had been limited to attainment of the caloric requirement, only 325 Birr would have been required per AE per year. With this assumption, about 51.2% would not meet the minimum requirement. If the national average per capita expenditure on the same selected expense category from household income, consumption and expenditure survey which is 497 Birr (CSA, 1997) was taken and considered as the cut point nearly 80% of the farming households live below this lowest level. Out of all the sample households of the study area, only 27% households were found food secure(Table 5.2).

Table 5.2: Distribution of Sample Households for Boloso Sore District by expenditure range per AE in 2004/2005

Expenditure range(Birr/AE)	Food secure (N = 32)	Food Insecure (N = 88)	N0 of HHs (N=120)	% total
Less than 150		6	6	5
151-325		56	56	46.7
326-434		26	26	21.7
435-600	19		19	15.8
601-1000	8		8	6.7
1001-1500	3		3	2.5
1501 and over	2		2	1.6
Below434 Birr		88	88	73
Below 325 Birr		62	62	51.7
Average	300	129.1	176.63	
St.Dev.	131.88	39.47	110.80	
Minimum	201.45	25.65	25.48	
Max	999	205.86	1017.78	

Source: Own Computation,2005

With regard to annual household expenditure per AE, in 2004/2005-productoin year the average expenditure of the sample respondents was Birr 176.63 per AE with the range lies between minimum Birr 1017,78 per AE (Table 5.2 above). The survey result shows that the average expenditure for the food secure households was 300 Birr per AE as compared to Birr 129.1 Birr per AE for food insecure. The statistical test supports the

presence of expenditure differentials between these two groups at less than 1% significant level.

5.2 Description of Socioeconomic Characteristics of the sample farmers

5.2.1 Family Size and Dependency Ratio

The overall size of the sample household members was 753 of which 52.17% and 47.83% constitutes male and female population, respectively(Table 5.3). According to the survey result, the sample population has a young population dependency ratio, i.e., the proportion of economically non active persons to economically active person within the family (the proportion of age group 0-14 to 15-64 years multiplied by 100) in the sample area was 152%. Similarly, the early dependency ratio, i.e., the population with age of 65 years and above as the proportion of population between 15-64 years multiplied by 100 was 3%. Hence, the overall dependency ratio in the study area reaches 155% (Table 5.3) This means, that every 100 person within the economically active population groups support not only themselves, but also supporting additional 55 dependent (non-productive) persons with all basic necessities. This clearly shows a high dependency burden in the study area.

The distribution of sample household members by different demographic variables (age group and sex) is given in Table 5.3. In terms of age structure, 59.7% and 1.1% of sample household members were found to constitute children of under 15 years and old age of 65 years and above, respectively. Hence, the working age population (i.e., 15-64 years old) accounted for 39.2% of the sample population and this signifies a higher reproductive potential, that seemed to follow the normal age structure of the country. In general, the age structure shows a declining trend as one ascends along each age

group. The reason for this seems that there is a high birth rate at the beginning (earlier ages) and increase in out migration and mortality with advances in ages. With regard to the sex structure, the overall sex ratio, that is the population of total males to total females in the population is 108.9 males per hundred females, which indicates a slightly excess of male population in the study area.

Table 5.3: Distribution of Sample Population by Sex, Age group

Age Grou	% Male	%Female	%Total
0-14	31.0	28.7	59.7
15-29	7.4	9.8	17.2
30-49	11.4	7.9	19.3
50-64	1.9	0.80	2.7
≥ 65	0.47	0.63	1.1
N=753	52.17	47.83	100

Source: Survey Result,2005

The average family size of the sample household was 6.24. However, it was noted that family size varied between 1 and 13 persons with standard deviation of 2.0. The largest proportion of the household, about 87% had between 4 and 9 persons per family (Table 5.4). Nearly 99% of sample farmers were Christian, who speak Wolatic with very few Amhara, Oromo, Gurage, Tigre and other people living in the urban area. With respect to the specific characteristics of food secure and food insecure households, FAMSZ was hypothesized to have a negative impact in determining the state of food security, in such a way that a household with large family size (dependency burden) tends to be food insecure than those with small numbers. In light of this the statistical

analysis showed significant difference in mean family size between food secure and food insecure farmers, which is 4.9 for food secure and 6.74 for food insecure households. This finding is in complete agreement with a priori expectation.

Table 5.4: Distribution of Sample Household by Family Size

Family Siz	Food Secure (N=32)		Food Insecure (N=88)		Total(N=120)	
	Number	%	Number	%	Numbe	%
≤ 3	7	21.88	2	2.27	9	7.5
4-6	20	62.50	40	45.45	60	50.0
7-9	4	12.50	40	45.45	44	36.6
≥10	1	3.13	6	6.82	7	5.83
Mean	4.9		6.74		6.24	
St.Dev.	1.66		1.88		2.0	
t-test val	t= -7.161, P<0.01					

Source: Survey Result,2000

5.2.2 Age and Farming Experience of the Household Head.

The average age (AGE) of the respondents was about 37.73 years. The maximum age observed was 83, whereas, the minimum was 18 years. With regard to the household head sex distribution and marital status, all 120 sampled household heads were male and married. Out of 120 respondents less than 11.7 % were less than 26 years of age whereas about 1.6% was over 61 years. The majority of the household heads about 81.5% ,were aged between 26 and 50 years (Table 5.5). On the other hand, group statistics showed that the mean age of the food secure was 35.04 as compared to 38.73

for the food insecure household heads. The t-test showed a significant difference in the mean age of the household heads between food secure and food insecure ones. This finding is contrary to a priori expectation that younger farmers are more likely to be food insecure than older farmers due to better position the older may have in terms of resource accumulation compared to that of younger farmers. Given this outcome, one might infer that farmers who are old are supposed to be more conservative and usually prefer to stay with their traditional ways of farming instead of being engaged in various off-farm and non-farm activities to cope with food crisis. This is because risk aversion is associated positively with age (Green and Ngongola, 1993) as cited by (Degnet, 1999).

Table 5.5:.Distribution of Household Head by Age groups

Age Group	Food Secure (N=32)		Food Insecure (N=88)		Total (N=120)	
	Numbe	%	Numbe	%	Numbe	%
18-25	7	21.9	7	7.9	14	11.7
26-40	18	56.2	50	56.8	68	56.7
41-64	6	18.7	30	34.1	36	30.0
≥ 65	1	3.2	1	1.2	2	1.6
Mean	35.04		38.74		37.73	
St. Dev.	11.51		9.27		10.04	
t-test value	t=-1.250,p<0.01					

Source: Survey Result, 2005 E.C

With regard to the respondents' farming experience, the most experienced farmer in the sample had 65 years of farming skill, whereas the least experienced had only a single year of farming experience. On the average, the sample respondents had about 20 years of farming experience with a standard deviation of 10.04 years. It is a fact beyond doubt that farming experience is an important factor for success in farming. This is because, as farming age increases, farmers are likely to have accumulated wealth through time than the younger farmers. This study has identified that about 16.7% of the respondents have less than 10 years of farming experience whereas around 2.5% had more than 40 years (Table 5.6). Most of the respondents (70%) have a farming experience ranging between 11 to 30 years. The findings of this study also showed that the average farming experience of food secure is about 17 years while the insecure farmers have 21 years, and this difference was statistically significant at 1% probability level. The result is contrary with the a priori expectation that older farmers with longer farming experience are more likely to be food secure than that of younger farmers with lesser farming experience. The probable justification is similar to that given above for age of household head.

Table 5.6: Distribution of Sample households by Farming Experience

Age Group	Food Secure (N=32)		Food InSecure (N=88)		Total (N=88)	
	Numb	%	Number	%	Number	%
≤ 10	10	31.3	10	11.4	20	16.7
11-20	10	31.3	32	36.4	42	35
11-20	10	31.3	32	36.4	42	35
31-40	2	6.2	11	12.5	13	10.8
≥41	1	3.1	2	2.2	3	2.5
Mean	17.04		20.74		19.73	
St.Dev.	11.51		9.27		9.27	
t-test value	t=-2.637; p<0.01					

Source: Survey Result,2005

5.2.3 Educational Status of the Household Head

With regard to the educational status, among sample respondents, illiteracy rate is found to be quite high. More than 75% of the surveyed household heads were not able either to read or write. About 2.4% household heads were reported to be literate or read and write without attending formal education (Table 5.7). Most of these farmers have only basic education, which is claimed to be acquired through some informal and religious (literacy campaigns and “Qur’An) education. Similarly, about 32% and 22% of sample farmers who can read and write (without attending formal education and those attending formal education) were food secure and food insecure, respectively. About

26% of the food secure attended between grade 1 to 8 while the proportion for food insecure is 21%. There is no statistically significant difference between the two groups with regard to educational status.

Table 5.7: Educational Status of Sample Households During 2003/2004E.C

Educational Status	Food Secure		Food Insecure		Total cases	
	Number	**%**	Number	%	Number	%
Illiterate	22	68.75	68	77.27	90	75.2
Read & write without Formal school	2	6.25	1	1.14	3	2.4
Attended: Grade 1 to 5	8	25	17	19.32	25	20.83
Grade 6 to 8			1	1.14	1	0.83
Grade 9 to 12			1	1.13	1	0.83

Source: Survey Result, 2005

5.2.4 Farming System and Resources

In farming households, productive resources, such as land, livestock and crop production, are the major variables that determine household food security. This section is, thus, devoted to the discussion of basic resources to farming households and their access and contribution to household food security. Particularly, farm land, crop production, farm inputs, draft animals, livestock resources, and household income are analyzed below.

5.2.4.1 Farm Land Holding

Farming activities, particularly crop production, require primarily the availability of suitable farmland. Farmland, as indicated elsewhere in the preceding parts of the paper, is very serious issue in Bolos Sore, as almost all the available farmland is already cultivated and there is no possibility for further expansion. The land holding of the sample farmers ranges from 0.13 to 5.0 ha. The average land holding of the respondents is 0.93 ha. Size of holdings also shows variation between the sample PA's. Relatively better land holding is observed in low land than in mid-altitude agro-ecology zones of the district. Because of the heavy population pressure in the mid-highland area (average population density of 79 person/sq.km), land is a very binding constraint for farming. The survey results indicate that nearly 71% of the respondents have a farm size of 1 ha or less while 26.6% had relatively higher possession, which ranged between 1 and 2 ha. On the other hand, only 2% of sample farmers hold more than 2 ha of land. The fact that, average land holding is bellow the nationally recommended average of 1.53 ha, which is said to be sufficient to produce household food requirement, there is no fallowing practice in use in the study area. This has a negative impact on the maintenance of soil fertility. Regarding the mean comparison of the size of cultivated land of the food secure and food insecure groups an empirical finding of this study showed that there is no significant difference among food secure and insecure households in terms of mean size of cultivated land, which is 1.0 ha for food secure and 0.91 ha for food insecure households(Table 5.8).

Table 5.8: Distribution of Sample Farmers by Land Holding

Land Holding (ha)	Food Secure (N=32)		Food Insecure (N=88)		Total (N=120)	
	Number	%	Number	%	Number	%
≤ 0.5	4	12.5	15	17.05	20	16.70
0.51-1.00	19	59.38	48	54.55	66	55.00
1.01-2.0 0	9	28.12	23	26.14	32	26.00
≥2.01			2	2.26	2	1.70
Mean	1.01		0.91			0.93
St. Dev	0.62		0.42			0.48

Source: Survey Result,2005

5.2.4.2 Crop Production

The major crops grown in the study area were maize, teff, coffee and ginger. Hundred ninety nine or 78.3% and hundred sixty four or 64.6% of the sample farmers cultivated maize and teff during the survey year, respectiveiy. In spite of the fact that maize and teff are the principal crops in the study areas, nearly 76 and 73% of the maize and teff growers cultivate maize and teff on a half or less ha of land ,respectively (Table 5.9). The average maize and teff farm size operated by the respondents is 0.40 and 0.36ha with maximum size of 2.75 and 2.25 ha, respectively. The overall total area under maize and teff crops during survey time was about 48.19 ha and 43.56 ha, respectively. Coffee and ginger are other major crops grown in the mid altitude of the study area. In terms of area coverage 17.95 and 11.48 ha of coffee and ginger,

respectively was grown during the survey period. The average coffee and ginger farm size owned by the respondents is about 0.16 and 0.10ha with maximum size of holding 0.42 and 0.35 ha, respectively.

Table 5.9: Land Holding of Sample Farmers by Major Crops and Cash crop Grown

Farm Size (ha)	Food Secure (N=32)				Food Insecure (N=88)			
	Maize	Teff	Coffee	Ginger	Maize	Teff	Coffee	Ginger
≤ 0.13	6.03	20.17	27.5	22.12	15.41	18.79	31.11	40.34
0.14 -0.5	28.52	14.24	15.54	6.54	17.84	12.32	17.17	4.80
0.51- 1.0	9.23	12.20	0.51	0.23	9.56	6.18	1.33	
≥ 1.01	1.44	1.99			3.33	2.71		
Mean	0.49	0.31	0.17	0.08	0.37	0.38	0.14	0.10
St.Dev	0.43	0.37	0.13	0.08	0.33	0.38	0.13	0.17

Source: Survey Result,2005

5.2.4.3 Livestock Holdings

Livestock production is one of the main economic activities in the study area. A vast majority of the farmers surveyed rear various kinds of animals in order to produce animal products as well as to generate income both contributing to access food for the households . The kinds of animals reared in the Bolos Sore district include cattle, sheep, goats, donkeys, mules, horses and chicken. Small ruminants and chicken were reared for meat and egg production, respectively both for home consumption and for sale. Moreover, they are the first to be sold during a serious food shortage season. The average number of livestock holding between the two groups of sample farmers differ.

In order to make comparison of the livestock size between the farmer groups, the herd size was converted into livestock units (TLU) based on Storck et al.(1991),(Appendix 2) Food secure group own relatively larger number of oxen (0.41 and 0.30 for both groups, respectively) than the food insecure, even though, the latter have relatively more cows. The food secure group had also large average size of total livestock holding when the total LU/AE is considered (i.e., 0.58 LU/AE as compared to 0.40 LU/AE for food insecure group). About 1.4% of food secures and 6% of food insecure households did not have any animal (Table 5.10).

The Majority of the sample farmers (41.7%) own between 1.01 to 3.0 LU while about 35% of food secure and 23% of food insecure groups own between 3.01and 5.0 LU, respectively. The categories of livestock size indicate the wealth status of the households and the variation in this aspect may indicate variation in vulnerability of the households to food insecurity. The food secure has mean LU of 3.67 which is larger than the mean LU of food insecure group (Table 5.11) 2.88 LU. The mean difference between the two groups is statistically significant. Similarly, when we consider livestock unit per AE the mean difference is large and statistically significant at 5% level of probability. Therefore, the LU/AE may serve as an indicator of how large resource endowment is available in the household to support adult equivalent. The LU/AE ranges from zero to 3.22 and it is higher for the food secure than the food insecure groups. It may be hypothesized that farmers with large livestock size or LU/AE are more likely to be food secure.

Oxen play a very crucial role in the smallholder subsistence farming system. Due to high scarcity of grazing land and animal feed in the study area, the problem of raising

livestock was underlined by the respondents. As a result, oxen supply for crop cultivation is a principal constraint of farming. Out of the total 120 respondents, 56 farmers (46.7%) do not have any ox, while, about 59% of food secure farmers had owned 1 to 3 oxen and 41% of food insecure also had 1 to 3 oxen, indicating that food secure group own more number oxen than the food insecure one(Table 5.12)..

Oxen (NOOXEN) ownership was a significant factor, which distinguishes food secure from food insecure households. Food secure household own average oxen slightly higher oxen than food insecure (i.e., 0.61 and 0.40, respectively).The difference is statistically significant and the result is in line with the hypothesis that a person who own more number of oxen is likely to be food secure than those with relatively small number. The mean difference between the two groups were found to be statistically significant at 0.5% level of probability. Large proportions of the sampled households reported that they faced a severe oxen constraint during the 2004/20005 cropping seasons.

Table 5.10: Average Number of livestock holding by Sample households 2004/2005

Animals Type	Food Secure (N=32)	Food Insecure (N=88)	Total Case (N=120)
Cows	0.4	0.47	0.44
Oxen	0.43	0.33	0.36
Bulls	0.11	0.17	0.15
Heifers	0.21	0.16	0.17
Calves	0.16	0.23	0.21
Sheep	0.03	0.03	0.03
Goats	0.36	0.39	0.38
Donkey	0.42	0.40	0.41
Chicken	0.17	0.23	0.21
Total LU/AE	0.58	0.4	0.44
(%)HH with 0 LU	0.6	2.8	2.2

Source: Survey Result,2005

Table 5.11: Distribution of livestock holding by Sample households 2004/2005

Size of Holding TLU/HH	Food Secure (N=32)		Food Insecure (N=88)		Total Cases	
	Number	%	Number	%	Number	%
≤ 1.00	3	9.3	16	18,2	19	15.8
1.01-3.00	11	34.4	39	44.3	50	41.7
3.01-5.00	11	34.4	20	22.7	31	25.8
≥ 5.01	7	21.9	13	14.8	20	16.7
Mean	3.67		2.88		3.10	
St. Dev	2.47		2.07		2.21	
t-value	t=1.2,p<0.01					

Source: Survey Result,2005

A Variety of traditional measures have been taken as an alternative way of solving the problem of oxen shortage. The reported measures include, pairing oxen with other person's oxen, gift (obtaining) from relatives and friends during plough seasons, resorted to mutual cooperation or entered into labor exchange programs with the ox-owner, rent or hire, sharecropped out their lands.

Table 5.12: Number of Ox Owned by sample household

N0 of Ox	Food Secure (N=32)		Food Insecure (N=88)		Total Cases (N=120)	
	Number	%	Number	%	Number	%
0	13	40.6	43	48.9	56	46.7
1	11	34.4	33	37.5	44	36.7
2	8	25	11	12.5	19	15.8
3			1	1.1	1	0.8
Mean	0.61		0.40		0.46	
St.Dev	0.58		0.48		0.51	
t-test value		t=0.90; p<0.05				

Source: Survey Result,2005

5.2.4.5 Farm Inputs and Extension Service

The availability of credit (CREDIT) sources is expected to have impact on household food security status. Two sources of credit exist in Boloso Sore district.The first one is the formal sector including government institutions and NGOs while the second and the most important one is the informal sector. The formal sector provides credit for productive purposes including provision of fertilizers, seeds, farm implements and chemicals. With regard to credit users, large proportions of food insecure farmers were found to be the users of credit mainly from friends and relatives. Friends and relatives who own money provides both cash and non cash credits. The proportions of food secure farmers who received fertilizers, improved seed, extension service and credit were 53.13%, 31.25%; 59.38% and 73.9%, respectively, while those of food insecure

farmers were 38.64%, 21.59%; 45.45% and 72.73%, respectively (Table 5.13). The chi-square analysis showed that there is no systematic association between food security and credit users as well as the users of improved seed in this study. In the survey area about 73% of the sample respondents have reported receiving credit, and used this credit for purchasing of farm inputs and food items. More than 42% and 49% of the total respondents used fertilizers and received extension services respectively during 2004/2005 crop season. The result showed that, larger proportion of food secure group was characterized by their capability of utilizing relatively more fertilizer and has better access than those food insecure groups. Food secure groups were also characterized by their high frequency of contact with the extension agents (EXTSER). The difference between the two groups with regard to fertilizer and extension use were found to be statistically significant at less than 5% probability level of Chi-square value. It can be concluded that the difference inf fertilizer use and extension contact of the food secure is larger than the food insecure. In this regard, the chi-square analysis showed a systematic association between food security, fertilizer use and extension services.

Table 5.13: Farm Inputs, Credit and Extension Users in 2004/2005 (%)

Service Category	Food Secure (N=32)		Food Insecure (N=88)		Total Cases (N=120)		X^2 value
	Users	Non users	Users	Non users	Users	Non users	
Fertilizer use	53.13	46.88	38.64	61.36	42.5	57.50	2.25**
Improved Seed	31.25	68.75	21.59	77.27	24.17	75.83	0.88
Extension Service	59.38	40.63	45.45	54.55	49.17	50.83	1.87**
Credit	73.9	25.00	72.73	27.27	73.33	26.67	0.01

Source: Survey Result,2005

5.2.4.6 Household Income

Crops, livestock and their products and off-farm activities are the main sources of income in the study area. The majority of the sample respondents (94.1%) earned a total income of less than Birr 501/AE during the 2004/2005 production year. The annual average total income/AE earned by sample households was Birr 116.9 with earnings ranging up to Birr 1315.32/AE. This income refers to the total income that farmers received from sales of crops, animal and animal products and off-farm incomes in the production season. It was observed that some of the respondents did not sell any type of farm product during the year, whereas others received a total income of more than Birr 1000/AE. With regard to the proportion of food secure and food insecure groups,

very large proportion of food secure households (75%) earned total income between Birr 201 to 1001 per AE, while only 42.05% of food insecure households earned within this range. On average food secure households earned total cash income of Birr 661.72 (188.87 Birr/AE), as compared to those of food insecure whose average earnings was Birr 444.62 (89.58 Birr/AE) in the year 2004/2005(Table 5.14)..

The statistical analysis showed that there is significant mean difference between the two groups at less than 1% level of probability.

Table 5.14: Distribution of Sample Farmers by Annual Income /AE in 2004/2005

Income Category (Birr)	Food Secure (N=32)		Food Insecure (N=88)		All Cases (N=120)	
	Number	%	Number	%	Number	%
≤200	6	18.7	51	57.95	57	47.5
201-500	20	62.2	36	40.91	56	46.67
501-1000	4	12.5	1	1.14	5	4.17
≥1001	2	6.3			2	1.66
Mean	188.87		89.56		116.9	
St.Dev	171.64		53.18		111.23	
t-test value			t=3.45,p<0.01			

Source: Survey Result, 2005

In places like Boloso Sore where drought-induced famine is endemic and food insecurity is widespread, crop and livestock production alone cannot be sufficient to fulfill households' food security. Therefore, under such conditions, off-farm activities

seem to be appropriate alternatives to improve the level of food security. If we assume that households use the off-farm income (TOFFINC) for the purchase of agricultural inputs and food items, this leads to an increase in the productivity and improves household food security. In this regard, the survey results further indicate that about 49% of the sample households have off-farm income less than Birr 50/AE earned by one or more household member from labor selling, pity trade, sale of firewood and grasses and other non- farm activities. The average off-farm income in the 2004/2005 production year was Birr 33.87/AE with the range from zero to Birr 870.9 per AE. The majority of the household members (75%) earned income less than Birr 101 per AE, while another 4.4% earned over Birr 201 per AE (Table 5.15). With regard to the group statistics of off-farm income of food secure and insecure households, on average, food secure have off-farm income of about 40.76 Birr per AE as compared to Birr 31.23 per AE for the food insecure households. The mean difference between the two groups in terms of off-farm income is statistically significant at 10% level.

Table 5.15: Distribution of Sample households by Off-Farm Income/AE in 2004/2005

Income Categor (Birr)	Food Secure (N=32)		Food Insecure (N=88)		All Cases (N=120)	
	Number	%	Number	%	Number	%
≤50	15	46.88	43	48.86	58	48.33
51-100	7	21.88	25	.28.41	32	26.67
101-200	7	21.88	18	20.45	25	20.83
≥201	3	9.36	2	2.27	5	4.17
Mean	40.76		31.23		33.87	
St.Dev	64.44		29.47		42.47	
t-test value	t=0.83,p< 0.01					

Source: Survey Result 2005

5.2.5 Biophysical Characteristics

5.2.5.1 Major Agricultural Problems

Different reasons were given concerning the declining trend in production. Infertility of land or soil infertility problem was ranked as a very serious problem of farming. Out of total respondents who cited the various problems, about 53% of them mentioned soil infertility problem. Soil fertility problem (FERTPROB) is one of the physical factors affecting crop production. The relationship between problem of soil fertility and state of food security indicate that soil fertility problem has negative impact on crop production performance, and causes a deterioration of food security status of the household. The

proportion of farmers who reported to have soil fertility problem is almost similar for both groups. About 38% of food secure and 41% of food insecure farmers reported to have soil fertility problem in their farm.

However, the chi-square tests showed that there is no statistically significant difference between food secure and food insecure households with respect to the soil fertility problem. The combination of small size of land and large family size were found to be the second and thither problems mentioned were inadequate rainfall, lack of inputs and wild beasts were also listed as problems(Table 5.16)

Table 5.16: Responses of Farmers as Major Reasons for the Decline in Crop Production

Major Reasons	Number	% of who cited the problem
In fertility of land or soil infertility problem	48	53.3
Small size of land	17	18.90
Lack of agricultural inputs	2	2.20
Large family size	4	4.50
Small size of land and large family size	14	15.60
Lack of rain/drought/	3	3.30
Small size of land and wild beast	2	2.20
N=120	90	100

Source: Survey Result,2005

Moreover, respondents had indicated that they faced many agricultural problems, among which, inadequate rainfall is the most frequently cited (by 83.9% farmers) as

agricultural problem. The study also found that about 70% and 59% of the respondents faced a serious problem of insect and pest infestation and poor quality of land. With regard to the proportion of farmers who respond on the major causes of food insecurity problems , relatively small numbers of the food secure farmers reported to have these problem as compared to those food insecure group. For instance, 33.62% and 41.91% of food secure and food insecure farmers had cited absence of rainfall, while, 25.55% and 36.25% respond on insect and pest infestation as major causes of food insecurity problem, respectively (Table 5.17). In general, the poor performance of traditional farming practice that has greatly affected the sustainability of production and productivity coupled with the inadequate and erratic rainfall has made district's rural farm households more vulnerable and food insecure. Insect and Pest infestation (INSPST) are important biological factors limiting crop production and causes of food deficit in the study area. As a result, it was assumed that farmers with problem of pest infestation were more likely to be food insecure than those who don't have the problem. In light of this, the chi-square analysis showed that the absence of rainfall, pest incidence and poor health situation of the farmers were systematically associated with the state of food security at probability level of 1% and 10%. The proportion of farmers with the problem of pest incidence is higher among the food insecure groups than the food secure groups of farmers. About 36.25% of food insecure farmers and 25.55% of food secure farmers reported to have the insect and pest infestation incidence problem (Table 5.17).

An agro-ecologic condition (AGROZ) of an area determines the type and level of production. The study area is broadly classified into mid-altitude and lowland zones.

The low land area is usually characterized by low amount and erratic distribution of rainfall and is thus vulnerable to drought. Furthermore, the lowland part has usually one cropping season as opposed to mid highland (i.e., with two seasons). As a result, it is hypothesized that farmers in the lowland zone are more likely to be food insecure than those in mid altitude. However, the chi-square analysis showed there is no systematic association between food security status and agro -ecologic zone.

Table 5.17:The proportion of farmers with Major Causes of food Insecurity(in %)

Types of Responses given	Food Secure (N=32)	Food Insecure (N=88)	All Cases (N=120)		X^2-Values
			Number	%	
Absence of rain fall	33.62	41.91	101	84.17	4.29***
Insect and Pest Infestatio	25.55	36.25	85	70.83	5.10***
Shorter of Cultivated land	19.48	17.84	46	38.33	0.205
Poor quality of land	24.21	29.30	71	59.17	0.874
Too much land	1.34	1.81	4	3.33	0.054
Animal Diseases	11.41	13.60	33	27.50	0.191
Poor health situation	4.68	9.51	21	17.50	1.611*
Absence of farm inputs	6.03	6.47	16	13.33	0.006
Lack of oxen	8.07	11.84	27	22.50	0.753

Source: Survey Result, 2005

5.2.5.2 Summary of Major Variables

Table 5.18 and Table 5.19 below provide the summary of means and standard deviations of the continuous variables and household scores of the two groups on some hypothesized qualitative attributes (discrete variables). As indicated in Table 5.18, food secure and insecure households differ appreciably with respect to various interval-scaled socioeconomic variables. Out of 11 hypothesized continuous variables, food secure and insecure households differ significantly in 7 of them (probability level less than 10%) (Table 5.18). On the other hand, Table 5.19 indicates that out of 3 hypothesized discrete variables, food secure and insecure groups were differentiated with 2 of them. Accordingly, t-tests and chi-square (χ^2) tests were used to substantiate the presence or absence of differences between the two groups of farmers and the value for each variables were presented in the respective tables.

Table 5.18: Summary of Means of continuous Variables

Variables	Total Sample (N=120)		Food Secure (N=32)		Food Insecure (N=88)		t-Values
	Mean	St. Dev	Mean	St. Dev	Mean	St. Dev	
FAMILY SIZE	2.95	0.94	2.27	0.77	3.21	0.89	3.38***
CULTIVATED AREA	0.44	0.23	0.47	0.29	0.43	0.20	0.67
TOTAL TLU	1.47	1.05	1.70	1.15	1.37	0.99	1.23***
No OF OXEN	0.34	0.37	0.40	0.39	0.32	0.35	0.89**
FOOD EXPENDITURE PATTERN	449.57	245.63	605.56	330.11	389.81	164.67	3.44***
FOOD AID	0.03	0.20	0.03	0.22	0.03	0.19	0.03
INCOME FROM GINGE	14.49	31.21	17.73	32.77	13.24	30.55	0.53
COFFEE AREA	0.07	0.07	0.08	0.07	0.07	0.06	0.84*
DISTANCE FROM MARKE	2.65	4.06	3.01	4.68	2.52	3.79	0.46
INCOME PER AE	116.9	111.23	188.87	171.65	89.58	53.18	3.45***
OFF-FARM INCOME/A	41.52	65.65	30.45	28.74	34.11	42.76	0.83*

*,** and *** represent significant at 10%,5% and 1% probability levels, respectively

Source: Own Computation,2005

.

Table 5.19: Summary of Households' Scores on some Hypothesized Discrete Variables

Variables	Scores	Food Secure		Food Insecure		X^2-Values
		Number	%	Number	%	
FERTIL	1	17	53.18	31	38.6	2.25**
	0	15	46.90	54	61.4	
INSPST	1	18	56.30	67	76.1	5.10***
	0	14	43.70	21	23.9	
FERTPRO	1	12	37.50	36	40.9	0.11
	0	20	62.50	52	59.1	

** and *** represent significance at 5% and 1% probability levels, respectively.

Source: Survey Result, 2005

5.3 Econometric Results

In the preceding parts of this thesis the descriptive analysis and univariate analysis of important explanatory variables, which are expected to have impact on food security status of households were presented. In this section, selected explanatory variables were used to estimate the logistic regression model to analyze the determinants of household food security. A logit model was fitted to estimate the effects of the hypothesized explanatory variables on the probabilities of being food secure or not. SPSS for WINDOWS was used for the econometrics analysis. Prior to the estimation of the model parameters, it is crucial to look into the problem of multicollinearity or association among the potential candidate variables. To this end, the variance inflation factor (VIF) was used to test the degree of multicollinearity among the continuous

variables (Table 5.20) and contingency coefficients were also used to check for the degree of association among the discrete variables (Table 5.21).

Table 5.20: Variance Inflation Factors (VIF) of the Continuous Explanatory variables

Variables	R_j^2	VIF (X_J)
FAMSZ	0.08	0.57
NOOXEN	0.14	0.67
INGINGER	0.01	0.47
EXPFOD	0.10	0.60
TLU	0.13	0.65
TOFAI	0.01	0.49
CULTAR	0.19	0.80
DISMAR	0.09	0.59
COFFAREA	0.01	0.47
INCAE	0.10	0.60
OFFIA	0.01	0.47

Source: Own computation,2006

The values of VIF for continuous variables were found to be small (i.e. VIF values less than 10). To avoid serious problem of multicollinearity, it is quite essential to omit the variable with value 10 and more from the logit analysis. Based on the VIF result, the data have no serious problem of multicollinearity. As a result, all the 11 explanatory variables were retained and entered into logistic analysis. Similarly, the contingency coefficients, which measure the association between various discrete variables based on the chi-square, were computed in order to check the degree of association among

the discrete variables. The values of contingency coefficient ranges between 0 and 1, with zero indicating no association between the variables and values close to 1 indicating a high degree of association. Accordingly, the results of the computation reveal that there was no serious problem of association among discrete explanatory variables. Hence, all the 3 discrete variables were entered into logistic analysis.

Table 5.21: Contingency Coefficients for Discrete Explanatory Variables

	FERTIL	FERTPROB	INSPST
FERTIL	1		
FERTPROB	0.026	1	
INSPST	0.239	0.002	1.00

Source: Own computation,2006

The variable HHFSST (Household Food Security Status) was used as a dichotomous dependent variable, with an expected mean value of 1 indicating the probability of being food secure and 0 otherwise. Eventually, a set of 14 explanatory variables (11 continuous and 3 discrete) were included in the model and used in the logistic analysis. These variables were selected on the basis of theoretical explanations and the results of various empirical studies. To determine the best subset of explanatory variables that are good predictors of the dependent variable, the logistic regression were estimated using enter method of Maximum Likelihood Estimation, which is available in statistical software program (in this case SPSS version 9). In this method all the above mentioned variables were entered in a single step. Through estimation of the logistic regression model, some of the explanatory variables that improved the model result were selected and included in the model analysis. The definition and unit of measurement of the variables used in the model are presented in Table 5.22.

Table 5.22: Definition and Units of Measurement of the Variables in the Logistic Regression

Variables Code	Variable Type	Description	% with a value 1	Mean	St. Dev
FAMSZ	Continuous	Family size of the household		2.95	2.00
NOOXEN	Continuous	Number of oxen owned		0.34	0.77
INGINGER	Continuous	Income from sale of ginger in2004/2005		14.49	66.06
FODEXPT	Continuous	Food expenditure pattern of the household		449.57	245.63
TLU	Continuous	Total livestock in TLU		1.46	104.08
TOFAI	Continuous	Total food aid obtained by the house in 2004/2005(Qt)		0.03	0.03
CULTAR	Continuous	Cultivated area(hectare)		0.44	0.23
DISMAR	Continuous	Distance from the market the market centre		2.66	2.66
COFFAREA	Continuous	Coffee farm area in ha in 2004/2005		0.07	0.07
INCAE	Continuous	Total income per Adult equivalent in 2004/05		116.90	91.76
OFFIAE	Continuous	Off-farm income per AE in 2004/2005		33.87	42.46
FERTIL	Binary	1,if the farmer used fertilizer,0, if not	42.50		
FERTPROB	Binary	1,if the farmer faced soil fertility problem,0,otherwise	53.70		
INSPST	Binary	1,if the farmers faced insect and pest infestation,0,otherwise	70,50		

Note: Sample Size, N=120

Source: Survey Result

The logit model required seven iterations to generate the parameter estimates. The results of the maximum likelihood estimates are presented in Table 5.23 below.

Table 5.23: The Maximum Likelihood Estimates of the Logit Model

Variables	Estimated Coefficients	Odds Ratio	Wald Statistics	Significanc Level
CONSTANT	-0.7342	0.2337	0.4008	0.5267
FAMSZ	-1.4383	1.9443	33.8809	0.000***
NOOXEN	0.6649	2.6531	3.6984	0.0545*
FERTIL	0.9757	1.0008	3.1739	0.0748
INGINGER	0.0008	0.4291	0.0671	0.7956
FERTPROB	-0.8461	0.5496	2.6357	0.1045
INSPST	-05985		1.3055	0.2532
FODEXPT	0,0036	1.0036	27.2411	0.000***
TLU	0,5213	1.6842	10.8667	0.0010***
OFFIAE	0.0056	1.0057	3.1946	0.0739*
TOFAI	-1.4181	0.2422	1.5411	0.2145
CULTA	0.9745	2.6499	2.6482	0.1003*
DISMAR	-0.0288	0.9716	1.0615	0.3029
COFFAREA	6.7932	89.7530	0.9826	0.3216
INCAE	0.0069	1.0070	10.5321	0.0012***
-2 log Likelihood Ratio			121.81	
Pearson chi-square(X^2)			175.32***	
Correctly Predicted [*] (Count R^2)			91.34	
Sensitivity [*]			81.16	
Specificity [*]			95.14	

***,**and * significant at 1%, 5% and 10% probability level, respectively.

[a] Based on a 50-50 probability classification scheme

[b] Correctly predicted food secure groups based on a 50-50 probability classification scheme

[c] Correctly predicted food insecure groups based on a 50-50 probability classification scheme

Source: Model output,2006

The various goodness of-fit measures validate that the model fits the data well. The likelihood ratio test statistics exceeds the Chi-square critical value with 14 degree of freedom at less than 1% level of significance, indicating that the hypothesis that all coefficients except the intercept are equal to zero is rejected. The value of Pearson Chi-square test shows the over all goodness of-fit of the model at less than 1% probability level. Other summary statistics for goodness of fit, which are not based directly on the distance between the observed and fitted values, are the various measures of classification accuracy. An intuitively appealing way to summarize the result of a fitted logistic model is via a classification table.This classification is the result of cross-classifying the outcome variable, y, with a dichotomous variable whose values are derived from the estimated logistic probabilities. In this approach, estimated probabilities are used to predict group membership. Presumably, if the model predicts group membership accurately according to some criterion, then this is thought to provide evidence that the model fits. The model results show that the logistic regression model correctly predicted 91% (110) of the total sample farmers, 81% food secure and 95 % food insecure groups. Multivariate logistic regression model as shown in the above parts was used to estimate the effects of factors determining the state of household food security in SNNPRS Boloso Sore district. As a result, most of the outcomes of the model analysis are quite relevant and indicative of the existing reality. Among the 14 factors considered in the model, 8 variables were found to have a significant impact on determining the state of food security with less than 10% of the probability level. These variables include family size of the household (FAMSZ), number of oxen owned (NOOXEN), the use of fertilizer (FERTIL), food expenditure pattern

(FODEXPT), number of livestock owned (TLU), cultivated area (CULTAR), off-farm income per AE (OFFIAE) and income per adult equivalent (INCAE). Whereas, the rest 6 of the 14 explanatory variables (Table 5.23) were found to have no significant influence on food security status of the household. In what follows, the effect of the significant explanatory variables on food security status of the household in Boloso Sore district will be discussed; Family Size: among the demographic variables, FAMSIZ appeared to be highly significant in determining household's food security status in the district. This variable is significant at 1% probability level and negatively associated with the state of food security. The negative relationship indicates that the odds ratio in favor of the probability of being food secure decreases with an increase in the family size. The odds ratio of 0.24 for family size implies that, other things being constant, the odds ratio in favor of being food secure decreases by a factor of 0.24 as family size increase by one person. The possible explanation can be those households with many children could face food insecurity because of high dependency burden. This shows that those farmers with large economically non-active members in family tend to be food insecure than those with small family size. This is in agreement of the hypothesis that the family size is likely to play a role in determining the state of food security at household level. Number of Oxen owned (NOOXEN): this variable is significant at 10% probability level and has a positive association with household's food security. This variable as hypothesized affects the household's food security in such a way those households who owned oxen have better chance to escape serious food insecurity than those who don't own. The positive effect of this variable indicates the importance of this resource in influencing food security. The interpretation of the odds ratio implies that, if other factors

are held constant, the odds ratio in favor of the probability of being food secure increases by a factor of 1.94 as the farmer's oxen holding increase by one extra ox. Use of Chemical Fertilizer (FIRTIL): have come out to be significant and positive influence on the food security status of the household. The positive sign is an indicator of its influence in affecting food security status. The possible explanation is that those farmers who have access to fertilizer use are more likely to be food secure than those who have no access to it. The odds ratio of 2.65 for this variable indicates that, if other factors are kept constant, the odds ratio in favor of being food secure increases by a factor of 2.65 as a farmer gets access to the use of fertilizer. Food Expenditure Pattern (FODEXPT): is a variable which includes own production, and has been taken to represent the major part of family's purchasing power which in turn is the main determinant factor of total expenditure (FNU/MoPED, 1992) and will be related to the size of income obtained by the household. It can be shown as the proportion of expenditure on food to total expenditure. As expected this variable has a positive sign and highly significant (at 1% probability level) impact in determining the state of food security. The probability of households to be food secure increases as the odds ratio in favor of indicates an increase by factor of 1.0 as the farmer's expenditure on food increases. The possible explanation for this is that farmers, who have good purchasing power or spend high proportion of income on food, have the likelihood of becoming food secure than those whose expenditure on food is relatively small.

Total Livestock Owned (TLU): herd size is positively and significantly related to the probability of being food secure in Boloso Sore district. The positive relationship is explained by the act that herd sizes being a proxy for farmer's resource endowment,

those sample farmers with large herd size have better chance to earn more income from livestock production. This in turn enables them to purchase food when they are in short of their stock, and invest in purchase of farm inputs that increase food production, and thus ensuring food security at household level. This empirical finding suggests that total livetock holding is important in explaining the probability of being food secure in Boloso Sore district. The odds ratio for total livestock holding indicates that, other things being constant, the odds ratio in favor of being food secure increases by factor of 1.68 as the total livestock holding increases by one TLU. Total Size of Cultivated Land (CULTAR): the model result reveals that this variable has a significant (at 10% level) and positive influence on the food security status of the household in the Boloso Sore district. The implication is that the probabilities of being food secure increases with farm size. This is possibly because that the size of land holding is a surrogate for a host of factors including wealth, access to credit, capacity to beer risk and income. Larger farms are associated with greater wealth and income and increased availability of capital, which increase the probability of investment in purchase of farm inputs that increase food production and insuring food security. The odds ratio of 2.65 for total farm size implies that, other things kept constant, the odds ratio in favor of being food secure increase by a factor of 2.65 as the total farm size increases by one hectare. Off-farm income per AE (OFFIAE): this represents the amount of off-farm income (in cash or in kind). the farmer or any of the household members earned in the year. Since smallholder farmers have inadequate farm income they often look for external source of income to purchase food and farm inputs. The success of households and their members in managing food insecurity is largely determined by their ability to get access to off-farm

job opportunities in the study area. In this regard, households engaged in off-farm activities are better endowed with additional income to purchase food. As expected the availability of off-farm income is positively and significantly (10% probability level) associated with household food security status.

The probability of the household to be food secure increases by factor of 1.01 as the household earned more off-farm income per AE. Total Annual Income per Adult Equivalent (INCAE): this variable is found to have positive impact and highly significant (at1% probability level) influence on the probability of being food secure. The result of this study supports the hypothesis that the larger income per AE has positive impact on the probability of being food secure. The possible explanation is that, in the study area, households who managed to earn more cash income had very high chance of securing access to food than those who had not. In other words, larger annual income per AE may also affect the probability of being food secure by providing the source of cash flow to buffer the risk associated with crop failure due to bad weather condition. The interpretation of the odds ratio implies that, if other factors are held constant, the odds ratio in favor of the probability of being food secure increases by a factor of 1.01 as the farmers get unit of income. Food insecurity, as found out from this study using the logistic regression model revealed that among other determinants family size, fertilizer use, food expenditure pattern per AE, income per AE, number oxen, total livestock holding, size of cultivated land and off-farm income per AE as hypothesized were found out to have coefficients with expected sign and has significant impact on the household food security status (Table 5.23).Although it was not significant, food aid has shown negative sign, which is contrary to the a priori expectation. This may be due to the fact

that the amount of food aid given to the vulnerable groups is insignificant to curve the problem of food insecurity.

5.4 Household Coping Strategies

As indicated in various parts of the thesis so far, farmers in Boloso Sore district have been affected by various biophysical and socioeconomic problems which cause tremendous decline in crop yield, poor assets possession and drought induced food insecurity. In the face of such adverse conditions, farmers in a vulnerable area like Boloso Sore engage themselves in several activities in order to avoid food insecurity or used various local coping strategies to survive severe food crisis. In section 2.2.3 several coping strategies to smooth consumption have been identified. Farmers were asked how they managed to minimize food supply shortages or how they can cope with food insecurity. This part of the thesis describes the result of the interview and the responses of the farmers on actual activities. .

The principal strategy used by significant number sample farmers in Boloso Sore district to reduce food supply shortfall include production diversification by allocating resources to crops of different production cycles (annual and perennials) and livestock activities(Table 5.24). This diversification has different objectives including production of various crop varieties such as sweet potato, barely, maize, haricot been and potato during short rainy season to meet their subsistence needs. Changing cropping system and cropping pattern enables the farmers to produce food over several months of the year due to the different length months of the year due to the different length of maturity time of various crops, while cash crops such as coffee, chat and ground nut are grown for households cash need.

The most commonly practiced coping strategies at household level that are sequentially used during the severe food crisis time, according to the responses of the farmers, consisted of giving more emphasis and increased shift of household activities to off-farm and non-farm jobs. Accordingly, 75.2% of all respondent households, out of which 69.6% of food secure and 77.3% of food insecure households were involved in off-farm and non-farm jobs. Even though, there is limited access to off-farm work opportunity in the district, resource poor farmers work in farms of better off for wage in kind or cash. Livestock, besides their complimentary relationship with crop production, provide sound hedging against risk of food insecurity. To this effect, when food produced is fully consumed and or no cash reserve is available to purchase more of it, animal products and live animals are sold to buy food for the household. Accordingly, among the sample households, 61.8% of all cases, 63.8% of food secure and 61.1% of food insecure households involved in the sales of animals (mostly small ruminants) to acquire food whenever there is a shortfalls in food supply. This mechanism is ranked as the second most important coping practice, followed by borrowing cash and /or food from better off neighbors, friends and /or relatives. The proportion of food secure and food insecure households who practiced borrowing cash and /or food during food supply shortage were 42.0% and 60.0%, respectively. Other less mentioned and practiced coping strategies in order of importance have been shown in Table 5.24.

The survey results further revealed that food insecure households in the study area practice changing cropping and planting pattern; sales of firewood, grass and handcrafts; sales of key productive assets; and other various means. These categories were reported by fewer respondents and often practiced as a last resort. The analyses

of the coping strategies of the respondents have shown that, coping strategies have distinct patterns. All farmers were not equally vulnerable to drought or food insecurity, they responded in different ways. Some households implement some coping strategies after all other options have been pursued and exhausted, while other households (especially those who are easily vulnerable) often collapse immediately and thus engaged in unusual activities. For instance, among the sample households a few of them were found to have been practicing such critical coping mechanisms of vulnerable households. Only, 2% all cases respond to cope serious food crisis by reducing frequency and size of meals (usually adults receive two meals, one in the morning and one in the evening) and they drink "coffee" to stimulate and enables themselves abandoning a practice of eating during the daytime. About 9.1% were receiving relief food aid assistance from the locally operating DPPC office. While 6.3%, 1.2%, and 4.0% were collecting and eating wild food; involve in sale of firewood and grass; and temporary migration in search of food and /or cash, respectively almost every year. On the other hand the relatively better-off farmers did not use these strategies immediately after a crisis. With respect to the period of severe food shortage when these practices are implemented, the largest proportion of farmers was reported to have severe food shortage during certain months of the year. These categories of months with order of importance ranked in such a way that about 40% of total farmers reported that they face serious food shortage during June to September, while 26.4% and 20% of the total farmers reported that they face this problem during June to August and May to August, respectively. Few farmers (4%) said that months between April to September are tough time for them in terms of food shortage. The rest of sample farmers mentioned one to

two months as a period when food shortage reaches its highest peak. This implies that there is high seasonal variation with respect to the food supply shortage. Finally, the local coping pattern and strategies practiced in the study areas suggests, how most of the district's farmers are vulnerable and how food insecurity is serious. In this context, the factors like poor marketing infrastructure, lack of off-farm job opportunities, lack of irrigation support and lack of credit facilities aggravated food insecurity and made households more vulnerable. With increased vulnerability, farmers shift to the consumption of the cheapest, and less quality food items such as sweet potato, which is commonly used during risk of food insecurity, although, it is the poorest source of minimum nutrient intake. Accordingly, farmers who meet the minimum subsistence requirement, as per the basic definition of food security for the purpose of this thesis, have better access to food and are not subject to the extreme adjustment mechanisms mentioned above.

Table 5.24: Types of Coping Strategies and proportion of farmers Practicing them (%)

Strategies Practiced by Farmers	Food Secure (N=32)	Food Insecure (N=88)	All Cases (N=120)
Change cropping and planting pattern		1.6	1.2
Purchasing food on cash	24.6	36.2	33.1
Sales of animals	63.8	61.1	61.8
Reducing number and size of meal	4.3	1.1	2.0
Collecting and eating wild food	1.4	8.1	6.3
Receiving relief food aid	2.9	11.6	9.1
By borrowing cash and/or food from others	42.0	60.0	55.1
Involve in off-farm and non-farm jobs	69.6	77.3	75.2
Receiving gifts and remittances	1.4	2.2	2.0
Sales of fire wood, grass and handcrafts	10.1	14.1	13.0
Temporary migration, and other means		1.6	1.2
Sale of key productive assets	2.9	1.1	1.6

Source: Survey Result,2005

CHAPTER SIX: SUMMARY AND CONCLUSION

6.1 Summary

This study was conducted in Wolaita zone of SNNPRS, where food insecurity is becoming virtually a continuous concern of most households. Food insecurity is now a crucial problem in Boloso Sore district. Most of the farming households in the district

have difficulties to cope with the situation even during normal seasons. Drought induced food insecurity has been a recurrent phenomenon exacerbating the vulnerability of the resource poor farming households in the district. The major objectives of this study were to assess the determinants of food security at household level and identify the local coping strategies of rural households in Boloso Sore district of Wolaita zone. To this end, investigation of the bio-physical, demographic and socioeconomic characteristics of food secure and food insecure groups of farmers; identification and examination of major causes of food insecurity and measuring food security status of households; identifying food insecure households; as well as assessment and analysis of the local coping strategies of the households in the district has been made. This study made use of the primary data collected by WBoPED and BSF/UNICEF program during March to April of the year 2000. A two stage random sampling procedure was followed to select 3 PAs from a total of 27 and 120 households from the selected PAs. Primary data referring to the year 2003/2004 were collected from sample respondents through personal interview using structured questionnaire. Furthermore, the study was supplemented by group discussions with several community representatives and key informants using PRA technique, and secondary data collected from various sources. The survey result revealed that about 72.8% of sample farmers were food insecure in Boloso Sore district.The data collected were presented, organized and discussed using descriptive statistics and multivariate econometric model analyses. In the first stage, attempts were made to explore data and information pertaining to the general set of sample farmers and the raw data were organized and discussed using means, percentage, and standard deviations. The student's t-statistics and chi-square (χ^2) tests

of significance were employed, respectively, for screening continuous and discrete potential candidate variables capable of differentiating food secure from food insecure households. The result shows food insecure households differ appreciably with 7 continuous variables out of 11 hypothesized and with 2 out of 3 discrete variables at less than 10% probability level. Thus, the analysis of the survey data was carried out for the intended purpose.

The comparison of selected characteristics of food secure and food insecure groups revealed difference between the two groups of sample respondents regarding all the above significant continuous and discrete variables. For instance, food secure groups are characterized by having relatively smaller age, smaller family size, larger livestock size, and more number of oxen than the food insecure groups. Similarly, the food secures have larger expenditure on food and income per adult equivalent than the later. The food insecure groups have relatively lesser access to the use of fertilizer and extension services, while at the same time they more frequently face problem of insect and pest infestation. Furthermore, the food secures have better access to off-farm Income and have larger income from the sale of coffee as compare to the food insecure groups. With regard to the household coping strategies, the most commonly practiced coping strategies at household level in the district showed about 75% of respondent households involved in off-farm and non-farm jobs. Sales of animals (mostly small ruminants) ranked as the second important coping practice with 62% followed by borrowing cash and /or food from better off neighbors and /or relatives 55% and purchasing of food on cash 33% ranked as third and fourth most important strategies respectively. The overall analysis of actual household income per AE in Boloso Sore

district during 2004/2005 cropping season clearly shows that the minimum subsistence requirement of an average household was not met. The distribution of net household expenses per AE compared to the minimum amount required has shown the prevalence and the severity of the food insecurity problem in the study area. The result revealed that the minimum of 434 Birr is required per adult person per year in order to ensure survival. The comparison of this value with the net household expense helps to assess the vulnerability of the households to food insecurity. Accordingly, if Birr 434 per AE is considered as a benchmark cut of point, beyond which household is food secure or not, 73 %of the sample farmers live below this point. To identify the continuous and discrete potential candidate variables capable of affecting the food security status in the district, logistic regression model was used. The model results reveal that among 14 explanatory variables included in the logistic model, 8 were found to be significant at less than 10% probability level in the district. The results from logit model reveal that family size of the household (FAMSZ) is found to be the most important determinants affecting the state of food security and has shown negative impact on the probability of being food secure (at 1% significant level) for farmers' in Boloso Sore district. Food expenditure pattern (FODEXPT) has shown positive correlation and highly significant (1% level of probability) in determining the probabilities of being food secure at household level. The total livestock owned (TLU) was found to be significantly and positively related (1% probability level) to the probability of being food secure. Total annual income per adult equivalent (INCAE) is found to have positive impact and highly significant (1% probability level) influence on the probability of being food secured. This implies that the larger income per AE has positive impact on the

probability of being food secure. Off-farm income (OFFIAE) is found to have positive impact on food security. As expected off-farm income is positively and significantly (at probability level of 10%) associated with household food security status. The probability of the household to be food secure increases as the household earns more off-farm income per AE. Number of oxen owned (NOOXEN) is significant and has a positive association (at 10% probability) in affecting household's food security situation. This implies that the existence of more oxen affects the household's food security in such a way that households who owned oxen have better chance to escape serious food insecurity than those who don't owned. The use of chemical fertilizer (FIRTIL) has come out to be significant (10% probability level) and positive influence on the food security status of the household. The positive sign is an indicator of its influence in affecting food security status. Size of cultivated land (CULTAR) has positive influence (10% probability level) on the likelihood of farmers' food security status in the district. This implies that large farm size indicates the wealth of the farmers and increases farmers' capital resources, which enables the farmers to invest on purchase farm inputs and food to ensure food security.The logistic regression model correctly predicted the over all probability of being food secure and food insecure in about 91% while, correctly predicted food secure and insecure groups based on a 50-50 probability classification scheme is 83% and 94% ,respectively.

The findings of this study in general, recognized that the food insecurity in the Boloso Sore district is largely manifested by the combination of continuous drought, decline in productive resource endowment and lack of off-and non-farm job opportunities for resource poor and vulnerable households. Food insecurity, as found out from the study using the logistic regression model revealed that among other determinants family size,

fertilizer use, food expenditure pattern and income per AE, number oxen and total livestock holding, and size of cultivated land and off-farm income per AE as hypothesized were found out to have positive coefficients (except family size) and highly significant impact on the household food security status.

6.2 Conclusion and Recommendation

The result of this study, as discussed in the foregoing parts of this paper underlines that the determinants of household food insecurity are complex and interrelated, requiring a multifaceted and all round interventions for improving the severity and ultimately alleviating the problem. Therefore, this study undoubtedly accepts that food insecurity could be eliminated by broad based and multi-pronged efforts against poverty, which is through development programs in all sectors. Shortage and lack of farmlands was found to be very serious problem in the district as a whole. As a result, households were forced to cultivate the marginal lands for survival, but this alternative has negative consequences on the environment and long term sustainability. Soil infertility problem is also the most important problem attributed to the food insecurity in the district. Due to constant drought and severe decline in soil fertility, the sustainability of production and productivity also showed a very poor performance particularly in mid-highland areas of the district. Thus, in addition to physical and biological conservation measures for the degraded farmland, the use of inorganic and organic fertilizer should be the one widely promoted to enable the households to maintain their food security status. This implies that research and extension have to look for the better access of input (fertilizer) supplies and strengthening conservation practices in the district so as to improve the farmer's food access. Agriculture, in this district, seems almost impossible to sustain the

livelihood of the farming households without the involvement of livestock production. As an integral part of farming system, livestock activity contribute meat, milk, manure, and traction as well as acting as a reserve to be converted in to cash in time of need. Thus, this challenge calls for policy instruments aimed in supporting the livestock sector development in the district. To this effect, proper forage development programs should be introduced to increase livestock production and productivity and expanding veterinary service and disease control programs in the district. This recommendation will have multiple results: by increases in livestock feed and production will increase manure production to fertilize the farm fields, increase traction power, and increase household income from the sale and ultimately improve household's food security. The crop production system and output, agro-ecology, rainfall distribution and cropping calendar has strong relationship which seems very complex, should be supported by agricultural research. The locally existing extension centers should disseminate and transfer appropriate agro-ecologically viable, drought resistant, and short maturing crop varieties and improved farm implements, introducing improved livestock breeds and conservation-based trees and forage development that can rescue the vulnerable households from recurrent food shortfalls. Other area of interventions should focus at improving households' income and employment opportunities. This will have greater impact in improving the state of food security in Boloso Sore district, where expansion of agriculture has no more hope and coping possibilities are very limited and affected by recurrent drought. Therefore, intervention areas such as promoting credit access and creating diversified off-and non-farm activities would serve in reinforcing the existing local coping strategies and absorb those who are resource poor households. In this

regard, government and NGOs operating in the district and surrounding areas should closely relating their financial services to household food security by diversifying their credit schemes in to off -farm income generating activities. The current rate of population growth in such a drought stricken district is frustrating phenomenon. As already discussed in the foregoing part of this paper, households with large (dependent or inactive) number of family member will most likely face food insecurity problem because of high dependency burden. Thus, the government and NGOs, particularly operating at the local levels should design sound implementation program to put the already endorsed and existed population policy in to effect. To this end, a focus on family planning and integrated health service and education provisions must catch the attention of decision-making bodies. One area of intervention hypothesized to improve the state of food security at household level is promoting the production of cash crops (ginger and coffee). This implies that efforts has to be made to improve income from cash crops production to ensure food security through promoting and developing small scale and traditional irrigation programs which in turn reduce rainfall dependability and enhance the level of household food security. The low farm productivity, the lack of household assets, the very low-income levels and a dramatic shortage of caloric availability in the study areas do reflect partly as a lack of adequate investment in rural development.

In Boloso Sore there must be concerted efforts in addressing the rural development programs, particularly, these efforts among other things will have substantial effect on households' food security. It can facilitate growth in the rural area and create employment opportunity for the households. Developing market infrastructure, improv-

ing transport and communication system can offer also possibilities of increasing access to availability cheaper food (or means of livelihood) for the resource poor households in the district. Lastly, the livelihood of many households in the district was and is seriously affected by drought. Thus, although food assistance may not be long-term solution to the underlining causes of household food security, it seems imperative to continue the relief handout for some time to keep alive those who have no access either to produce or buy food. But, the link with the employment generating system would help both in reducing dependency syndrome and contributing to local development.

REFERENCES

Abassa, K.P. 1995. Improving Food Security in Africa: The Ignored Contribution of Livestock. Joint ECA/FAO Agricultural Division Monograph No. 14. Addis Ababa.

Alderman, H., and Garicia, M. 1993. Poverty, Household Food Security, and Nutrition in Rural Pakistan. Research Report No 96, IFPRI, Washington, D.C, USA.

Aldrich, J., and F.D. Nelson 1984. Linear Probability, Logit and Probit Models: Quantitative applications in the Social Science: Sera Miller McCun Sage pub Inc., University of Minnesota & Iowa.

Asres Workineh 1995. Food Security: Concepts, Policy and Planning Issues with Particular Reference to Ethiopia. A Paper Prepared for the Workshop on “Regional Development Planning and Policy Issues” Organized by MOPED & UNDP, Awasa, Ethiopia.

Awasa Agricultural Research Center. 2000. Determinant of Food Security in Southern Ethiopia at Micro Level. (Unpublished Document). Awasa, Ethiopia.

Bazabih Emana. 2000. The Role of New Varieties and Chemical Fertilizer Under Risk: The Case of Small Holders in Eastern Oromia, Ethiopia. Ph.D. Dissertation. University of Hanover. Shaker Verlung, Germany.

Braun, J.V., Bouis, H., Kumar, S., and Pandiya- Lorch, R. 1992. Improving Food Security of the Poor: Concept, Policy and Programmes. IFPRI, Washington D.C.

BSF/UNICEF. 2000. Improvement of Household Food Security and Woreda Integrated Basic Service Programme: Boke Woreda of Oromiya Region, Ethiopia. Technical Document for The Belgium Survival Fund. (Unpublished Document). Addis Ababa, Ethiopia.

Chung, K., Haddad, L., Rama Krishna, J. and Riely, F. 1997. Identifying The Food Insecure: The Application of Mixed-Method Approach in India. IFRPI, Washington D.C.

CSA. 1992. Basic Report on National Nutritional Surveillance: Module Nutritional Survey of Rural Areas. Addis Ababa.

_____. 1997. Report on the 1995/96 Household Income, Consumption and Expenditure Survey, Vol. I Statistical Bulletin 170, Addis Abeba.

_____. 1998. Agricultural Sample Survey 1997/98:Report in Area and Production for Major Crops for Private Peasant Holdings, Statistical Bulletin 189, Addis Abeba.

Cutler, P., and Stephenson, R. 1984. The State food Emergency Preparedness in Ethiopia. Mimeo, International Disaster Institute. London, UK.

Dagnew Eshete. 1993. Food Shortages and Households Coping Strategies by Income Groups; A Case Study of Wolaita district in Southern Ethiopia.

Degnet Abebaw. 1999. Determinants of Adoption of High Yielding Varieties of Maize in Jimma Zone: The case of Mana and Kersa Woredas. M.Sc. Thesis. Alemaya University of Agriculture, Ethiopia.

Dejene Aredo and Mulat Demeke (eds.).1994. Ethiopian Agriculture. Problem of Transformation. Proceeding of the Fourth Annual Conference on the Ethiopian Economy. Addis Abeba Ethiopia, pp: 87-109.

_____. 1995. Seasonal and Exceptional Food Shortage Their Causes and Socio-Economic Consequences: A Case Study of Wolaita Woreda in Southern Ethiopia.

Debebe Habtewold. 1993. Rural Vulnerability in Ethiopia: The Need for Micro-level Assessment. In: the proceeding of Incorporating food and nutrition issues in to development plan, projects and programmes, Nazerate Ethiopia.

_____. 1995. Food Security: A Brief Review of Concepts and Indicators .In: Mulat Demeke et al.(eds.), Food Security, Nutrition and Poverty Alleviation in Ethiopia:

Dericon, S. and Krishnan, P. 1998. Changes in poverty in rural Ethiopia 1989-1995: measurement, Robustness Tests and Decomposition. Center for the study of African economies and katholieke Universitieit Leuven. (Un published documents).

EC, (European Commission). 1997. Food for Development . Food Security in Ethiopia. No. 3. Brussels, Belgium.

Eele,G., Hay, R., and Hoddinot, J. 1993. Household Food Security And Nutrition. In: Demery, L. et al.(eds.), Understanding the Social Effects of Policy Reform. The World Bank, Washington, D.C.

Eshetu Bekele. 2000. The Underlying Causes of Household food Security and Coping Strategies: The Case of Legambo Wereda, South Wollo Zone, Amhara Region, North Eastern Ethiopia. M.sc. Thesis, Addis Abeba University, Ethiopia.

FAO. 1974. World Food Conference Proceeding, Rome, Italy.

FDRE, (The Federal Democratic Republic of Ethiopia). 1996. Food Security Strategy. Prepared for the Consultative Group Meeting of Dec., 1996, Addis Ababa.

FDRE, (The Federal Democratic Republic of Ethiopia). 1996. Food Security Strategy. Prepared for the Consultative Group Meeting of Dec., 1996, Addis Ababa.

Feder, G., Just, R.E., and Ziberman, D.1985.Adoption of Agricultural Innovation in Developing Countries: A Survey World Bank Staff Working Papers, No. 542. Washington D.C.

Frankenberger,T.R.1992. Indicators and Data Collection Methods for Assessing Household Food Security. In: Maxwell,S. and T.R Frankenberger (eds.), Measuring Food Insecurity: The Frequency and Severity of Coping Strategies. IFPRI, Washington, D.C.

Frankenberger,T.R.1992. Indicators and Data Collection Methods for Assessing Household Food Security. In: Maxwell,S. and T.R Frankenberger (eds.), Measuring Food Insecurity: The Frequency and Severity of Coping Strategies. IFPRI, Washington, D.C.

Foster, P., 1992. The World Food problem: Tackling the Causes of Under Nutrition in the Third World, Boulder, Colo: Lynne Rienner Publisher, London.

Getachew Diriba. 1991. Implementing Food for Development, A Baseline Study of Household Food Security: The Case of Wobera and Merti-Jeju Awraja, Ethiopia, WFP, Addis ababa.

_____. 1994. After Famine: Rural Resource Recovery and Development, Volume I: Summery of the Major Findings: A case Study of Adama Boset and Habro, (CARE Ethioipia's Food Information Systems) (CEFIS), Addis Ababa.

Gujarati, D.N. 1988. Basic Econometrics. Second Edition. McGraw Hill, Inc.,New York.

_____. 1995. Basic Econometrics. 3rd Edition. McGraw-Hill Inc, New York.

Hardaker, J.B., Huirne, R.B.M. and Anderson, J.R. 1997. Coping with Risk in Agriculture. CAB International, Wallingford, UK.

Hosmer, D.W., and Lemeshow, S. 1989. Applied Logistic Regression. A Wiley–Inter science Publication, New York.

In;Mulat Demeke et al. (eds.), Food Security, Nutrition and Poverty Alleviation in Ethiopia: Problems and Prospects. Proceedings of Inaugural and First Annual Conference of the Agricultural Economics Society of Ethiopia. Addis Abeba, Ethiopia, pp: 303-335.

Kmenta, J. 1986. Element of Econometrics. Sec. Ed. McMillan Pub. Co., New York.

Kotari, C.R. 1990. Research Methodology: Methods and Techniques. Second Edition. Washwa Prakashan Pub., New Delhi, India.

Lio, T.F. 1994. Interpreting Probability Models: logit, Probit and Other Generalized Models. Sage University Paper Series on Qualitative Applications in the Social Sciences, 07-101. Thousand Oaks, CA: Sage, California.

Maddala, G.S. 1983. Limited Dependent and Qualitative Variables in Econometrics. Cambridge University Press, New York.

Maxwell, D. G. 1996. Measuring Food Security: The Frequency and Severity of Coping Strategies. Food Policy, Vol. 21, No. 3, pp 291-303. IFPRI, Washington D.C.

Maxwell, S., 1990. Food Security in Developing Countries: Issues and options for the 1990s, IDS Bulletin 21, pp. 2-13.

Maxwell, S. and Debebe Habtewold. 1992. Vulnerability Profiles and Risk Mapping in Ethiopia, Food and Nutrition Unit MOPED, Addis Ababa, Ethiopia.

Maxwell, S. and Frankenberger, T.R. 1992. Household Food Security: Concepts, Indicators, Measurements: A Technical Review, UNICEF, New York and IFAD, Rome.

Maxwell, S. and Smith, S. 1992. Household Food Security: A Conceptual Review. In Maxwell, S. and T.R. Frankenberger (eds.) Household Food Security: Concepts, Indicators, Measurements (A Technical Review), UNICEF and IFAD, Rome.

MEDaC. 1997. Ethiopian Economy in figures and selected Indicators. Addis Abeba, Ethiopia.

MOA. 1997. Agricultural Extension Department Interim Report, Addis Abeba.

MoPED (Ministry of Planning and Economic Development). 1992. Analysis of Household Food Expenditure Patterns in Ethiopia, Food and Nutrition Unit, Addis Ababa.

_____. (Ministry of Planning and Economic Development). 1992. The Social Dimension of Adjustment in Ethiopia: A Study on Poverty Alleviation, Addis Ababa.

_____. (Ministry of Planning and Economic Development). 1994. Report on Household Food Security Study of Four Towns: Food and Nutrition Unit, Addis Ababa.

Mulat Demeke, Wolday Amha, Simeon Ehui and Tesfaye Zegeye. Food Security, Nutrition and Poverty Alleviation in Ethiopia:

.Riely, F. and Mock N. 1995. Inventory of Food Security Impact Indicators. Food Security Indicators and Framework:A Handbook for Monitoring and Evaluation of Food aid Programs. Arlington, USA.

RRC (Relief and Rehabilitation Commission). 1990. Guidelines on Nutritional Status Data and Food Relief. Early Warning and Planning Service, RRC, Addis Ababa.

Sen, A. 1981. Poverty and Famines: An Essay on Entitlement and Deprivation, Oxford, UK.

Shawel Consultant-International. 1993. Vulnerability Profile in Famine Prone Areas of Ethiopia: An In-depth Study of Five Awrajas, Final Report, The Relief and Rehabilitation Commission-Ethiopia, Addis Ababa.

Storck, H., Berhanu Adenew, Bezabih Emana, R. Begander and Getu Hailu. 1997. Management strategies for Farming Systems in an Uncertain Environment and Approaches for their Improvement. Farming Systems and Resource Economics in Tropics, vol. 27, Wissenschaftsverag Vau Kiel KG, Germany.

Takele Gebre. 1996. Sasakawa-Global 2000 project. In: Mulat Demeke et al (eds.). Sustainable Intensification of Agriculture in Ethiopia. Proceedings of the Second Conference of Agricultural Economics Society of Ethiopia. Addis Abeba, Ethiopia.

Tegegne G/Egziabher, Mulate Demeke and Michael Roth. 1999. Food Availability and Resources: A Micro Perspective: The Case of South Wollo and East Gojjam in Ethiopia. Addis Ababa.

Tesfaye Tilahun. 1999. An Assessment of the Food Security Situation in Ethiopia. M.Sc. Thesis, University of Queensland, Australia.

Tesfaye Zegeye and Debebe Habtewold. 1995. Food Security in Ethiopia: A Situation Analysis.

TGE, (Transitional Government of Ethiopia). 1994. National Policy of the Resource Base, its Utilization and Planning for Sustainability, National Conservation Strategy, Vol. 1, Addis Abeba.

The World Bank. 1984. Poverty and Hunger. Issues and Options for Food Security in Developing Countries. Washington, D.C.

____ 1988. The Challenge of Hunger in Africa: Call to Action. Washington, D.C.

UNWFP. 1999. Chronic food Insecurity in Crop-Dependent Areas of Ethiopia. Vulnerability Analysis and Mapping Unit. Addis Abeba, Ethiopia.

Upton, M. 1973. Farm Management in Africa: The principles of production and planning: Oxford University Press.

USAID, (U.S. Agency for International Development).1992. Definition of Food Security. Policy Determination PNAV468.Washington,D.C.

Webb, P. and Braun V.J.1994. Famine and Food Security in Ethiopia: Lesson for Africa. John Wiley and Sons Ltd., England.

Wolday Amha. 1998. Addressing Food Security Constraints in Rural Ethiopia. FAO's Special Program for Food Production (SPFP) and Ministry of Agriculture. Addis Abeba, Ethiopia.

World Bank. 1992. Ethiopia: Food Security Study, A World Bank Report, Draft, Washington D.C.

_____. 1986. Poverty and Hunger: Issues and Options for Food Security in Developing Countries, a World Bank Policy Study, Washington, D.C., USA.

APPENDICES

Appendix 1: Conversion Factors Used to Compute Adult-Equivalent (AE)

Age Group(years)	Male	Female
<10	0.6	0.6
10-13	0.9	0.8
14-16	1.00	0.75
17-50	1.00	0.75
>50	1.00	0.75

Source: Storck, et at. (1991)

Appendix 2 : Conversion Factors that used to Estimate Tropical Livestock Unit (TLU) Equivalents

Animal Category	TLU	Animal Category	TLU
Calf	0.25	Donkey(young)	0.35
Weaned Calf	0.34	Camel	1.25
Heifer	0.75	Sheep and Goat(adult)	0.13
Cow and Ox	1.00	Sheep and Goat(young)	0.06
Horse	1.10	Chicken	0.013
Donkey(adult)	0.70		

Source: Storck, et at. (1991)

Appedix 3. Survey Questionnaires

Part I. Identification Particulars.

1.Zone…… 2.Woreda/District……..

3.Peasant Association name(PA)……..

4. Selection Number of the Household……5.Name of the household…….

6.Enumerator"s name…… 7.Supervisor's name…….

8. Date of Interview …… 9. Signature……..

Part ll. Demographic, Economic and Social Characteristics of the Household

2.1 Household Information

01	02	03	04	05	06	07	08	09
Serial Numbers	Name of the household members	Relationship to HH head	Age (years)	Sex	Marital Status	Age at First Marriage	Religion	Ethnic group
01								
02								
03								
04								
05								

Co codes for 03: 1.head 2.wife/husband 3. Son/daughter 4.parent
5.Grand child
6. 6.Brother/sister 7. Other relatives 8. Not related
Codes for 06: 1. Never married 2. Married 3. Divorced 4. Widowed
Codes for 09: 1. Oromo 2. Amhara 3. Somali 4. Others
2.2 Labor force status (for those ten years and over): Have you engaged pro inductive work in most of the last 12 months?____ 1. Yes 2.no.
2.3 If no what are the reason?_____1. Disabled 2. Didn't want to No3.No job/ No one to employ me /No employment 4. Scarcity of agricultural 5. Sic5.sick 6. Old 7. Others (specify)
2.4. Current Occupation: What is your main job? ____1 Agriculture
2. Merchant/trader 3. Construction 4. Handcraft 5. Others (specify)
2.5 What is your employment status?_____ 1. Employer 2. Employee
3.3. Own worker 4. Unpaid family member 5.others
2.6 Literacy status (for those 5 years and over) ____ 1. Literate 2. Illiterate
2.7 If literate, what is the highest completed grade?_____
2.8 If literate what is the status of school attendance?____ 1. Attending regularl
2. Attending in the past 3. Never attended school.

Part III. Land Resources

3.1 Do you have your own land?_____ 1. Yes 2. No
3.2. If yes, what is the total size of your land holding ?.....in "timad"
1. Cultivated area_____ 2. Grazing area_____
3. Fallow area_____ 4 Forest area _____5. Others (specify)___
3.3 What is the total area of land you cultivated last year ? in" timad"
1. Owned _____ 2. Rented _____in "timad"
3. Share cropped _____4 Received as a gift_____5. Others (specify)_____
3.4 Do you think that your piece of land is enough to support your family?_____ 1. Yes 2. No
3.5 If no state your reasons_____1. Infertility of land 2. Small size of land 3.Lack of agricultural inputs to increase productivity
4. Large family size 5. Others(specify)

3.6. What proportion of your cultivated land is allotted to?.....in 'timad'

1. annual crops _____ 2. Perennials_____

3.7 List the type of crops you cultivated and their average production (including g den crops) for the last two years.

Types of crops	2003 E.C		2004 E.C	
	Area/Timad/	production(Qt)	Area/Timad/	production(Qt)
Annual crops				
1				
2				
perennial				

3.8.Is what you produced last year enough for your family?_1. Yes 2. No

3.9. if yes what amount of grain stock was transferred to this year?.....Qts

3.10 If no, for how long does it last?.....months.

3.11 What do you think are the main causes of food deficit in order of importance?

1. absence of adequate rainfall 2. Insect or pest infestation 3. Shortage of Cultivated land 4. Poor quality of land 5. Too much rain 6. Animal disease 7. Poor health situation of the farmers 8. Others (specify)

3.12 During which months is food shortage sever? _____month(s)

3.13 How did you cover (cope) the deficit?_____ 1. Purchased food on cash . 2. Sale of animals 3. Relief food aid 4. Borrow from neighbors 5. Income from off-farm work in the locality 6. Received gifts or remittance 7. Eating wild food 8. Migration to other areas

3.14 If relief food is a means to cover the deficit for how long have you been getting food aid?.....

3.15 Indicate the amount of food aid your household received in the past two years? If any.

Type of food	Unit	2004E.C	2005E.C
1.----------	--------	----------	----------
2.----------	---------	----------	----------

3.16 Describe the problems you encountered in your farm operation in order of importance.

1. shortage of oxen 2. Shortage of labor 3. Shortage of livestock feed
4. shortage of seed 5. Shortage of fertilizer 6. Inadequate shortage of Facilities 7. poor transportation 8. Weeds and pest problem
9. shortage of rain 10. Low price for the produce

3.17 Do you use any irrigation scheme? 1. Yes 2. No

3.18 If yes what type of it?_____ 1. Modern 2. Traditional 3. Both

3.19 If yes what types of crops did you produce using irrigation?

Types of Crops	2003 E.C		2004 E.C	
	Area/Timad/	production/Qt/	Area/Timad/	production/Qt/
1				
2				

Part IV. Use of modern Agricultural Inputs

4.1 Do you use chemical fertilizers?_____ 1. Yes 2. No

4.2 If no state your reasons_____1. Not necessary for cultivated crops
2. Too expensive 3. Not available 4. Harmful to the soil 5. Others (specify)

4.3 If yes for how many years have you been using fertilizer? _____ years.

4.4 have you been using fertilizer?_____ 1. Yes 2. No

4.5 If no to question 4.1 why?____ 1. No regular supply 2. Shortage of income
3. Lack of credit 4. Specify other reasons (if any)_____

4.6 If yes to 4.1 indicate the amount of fertilizer used in 2004 and 2005 E.C

Types of Crops	2003 E.C		2004 E.C	
	Area/Timad/	production/Qt/	Area/Timad/	production/Qt/
1				
2				
3				

4.7 Do you use improved seed on your farm?_____ 1.yes 2. No

4.8 If no state your reasons: 1. Not heard about it 2. Not available (no supply)

3. Too expensive 4. Other reasons (specify)

4.9 Have lost your crop during the last year?_____ 1. Yes 2. No

4.10 If yes, what were the causes?__1. Diseases 2. Pest 3. Weeds 4. Flood

5. Drought 6. Others

4.11 If yes to question number 4.9, specify the type of crops lost along with extent lost?___

Types of crops	Area/timad/	Cause of loss	Amount of loss/Qt/
1			
2			
3			

4.12 Do you apply chemicals on your crops?_____1. Yes 2. No

4.13 If no, why?_____1. Does not help 2. No problem of weed or pest

3. Too expensive

4. Not available 5. Not heard about it 6. Others (specify)

Part V. Livestock Production

5.1 Do you own livestock?_____1. Yes 2. No

5.1 If yes, indicate the number of livestock owned:

S/No	Types of Livestock	Number Owned
1		
2		
3		

5.2 Do you use oxen for your farm operation?_____ 1. Yes 2. No

5.3 If yes, are your oxen enough for your farm operations?_____1. Yes 2. No

5.4 If you don't have enough oxen, how do you get additional oxen you need?_____

1. Hire from someone 2. Coupling with other farmer 3. Borrow from friends

4. By contributing labor to a person who has oxen. 5. Others (specify)

5.5 Did you sell any of your animals in the past two years?_____1. Yes 2. No

Type of animals Number Reasons for sale Time (month)of sale

Types of Animals	Number	Reasons for sale	Time /months/ Of Sale

Possible reasons for sale of animals: 1. To purchase food 2. To purchase clothes

3. To purchase agricultural inputs and implements 4. To pay taxes and other debts

5. Social obligations 6. To purchase farm oxen 7. To cover health and education expenses 8. Others (specify)

5.6 Do you have enough feed for your animals?_____1. Yes 2. No

5.7 If yes to question 5.10 what are the sources? (multiple answers possible)

1. own grazing land 2. Communal grazing land 3. Crop by-products 4. Others (specify)

5.8 If no how do you cover the deficit?___ 1. Purchase of pasture land 2. Give out the livestock temporarily to relatives 3. Do nothing 4. Others (specify)

5.9 Do you have exotic animal breeds?_____1. Yes 2. No

5.10 If yes indicate the type and number of the animals:

S/N	Types	Number
1		
2		
3		

5.11 Is animal disease a problem to you? _____1. Yes 2. No

5.12 If yes , do you get enough drugs to treat your animals?____1. Yes 2. No

5.13 If yes, from where do you get the drugs? (multiple answer possible) _____

1. veterinary clinic 2. Open market/shops 3. Others (specify)

5.14 How far or how long do you travel to the nearest animal health post/clinic?_____

5.15 Have you lost any of your animals to death in the last year?___1. Yes 2. No

5.16 If yes state the reasons and numbers of animals you lost:

S/ N	Reasons	Number lost	Reasons	Number lost
1	Diseases		Drought	
2	Lack of feed		Accidental death	
3	Beast attack		Others/Specify/	

Part VI Agricultural Extension Services

6.1 Has your household received any type of extension from any government and/ NGOs ?__ 1. Yes 2. No

6.2 Is there development agent in your PAs.?_____1. Yes 2. No

6.1 If yes, how far is it from your house?_____

6.2 Has development agent visited your farm during the year 2003 E.C?____

1. Yes 2. No

6.3 If yes for how many time?_____

6.4 What were the purpose of the visits?_____(multiple answers possible)

1. to give advice on crop production 2. To give advice on animal production

3. To give advice on soil conservation 4. To collect taxes 5. To collect other debts

6. Others(specify)

6.5 Have you participated in the agricultural extension package program?-------

1. Yes 2. No

6.6 If yes for how long?_____

Part VII. Marketing and Credit Services

7.1 Have you received any type of credit in 2003 E.C?_____1. Yes 2. No

7.2 If yes, for what purpose (s)? _____(multiple answers possible)

1. purchase of seeds 2. Purchase of fertilizer 3 Purchase of chemicals

4. Purchase of oxen 5. Purchase of farm implements 6. For family consumption

7. For social obligation

7.3 At what time do you usually take credit? During……months

7.4 What are the Sources of credit? (In order of importance)_____

1. Service cooperative 2. Commercial banks 3. Development bank 4. Friends and relatives 5. Local money lenders 6. NGOs 7. Others

7.5 If no why? (multiple answers possible)_____

1. fear of inability to pay 2. Lack of asset for collateral 3. No one to give credit

4. High interest rate 5. No need for credit 6. Others (specify)

7.6 where do you sell your farm products?_____ (multiple answers possible)

1. On farm(local assembler) 2. Taking to the local market 3. Through service cooperatives 4. Others (specify)

7.7 what is the nearest distance to the main market?_____

7.8 what means of transport do you use to transport your produce to the market?_____

1. Trucks 2. Animal power 3. Human power 4. Others

7.9 When do you sell most part of your produce?_____ months

7.10 Do you get reasonable price for your produce at this particular time?_____

1. Yes 2. No

7.11 If no, what are the reasons ? (multiple answers possible)_____

1. No(demand) for the produce 2. More supply of the produce 3. Lack of access to potential market 4. Others (specify)

7.12 why did you sell at that particular time of lower (unreasonable) price?_____

1. to settle debts 2. To pay tax 3. Social obligations (weeding, funeral, iddir, etc.)

4. To meet family requirements 5. Others (specify)

Part VIII. Household Income

8.1 Do you or any member of your family have off-farm job?_____1. Yes 2. No

8.2 If yes, indicate the type of work and annual income:

Family Member"s Name	Types of jobs/see below/	Annual income/Birr/
1		
2		
Total		

* if payments were made in kind, convert them to Birr at price prevailing at time.

1. weaving/spinning 2. Milling 3. Other handcrafts (pottery, metal works, etc.

4. Livestock trade 5. Sale of local drinks 6. Agricultural employment

7. Pity trade (grain, vegetables, fruits, etc.) 8. Sell of fire wood and grass

9. Others (specify)

8.3 Have the household received any other income (such as remittances, gifts, aid or other transfers) in 2003 E.C._____1 . Yes 2. No

8.4 If yes complete the following table.

Types of receipt	Person who received income	Amount received/Birr/
1		
2		
3		
Total		

8.5 would you please state how the household has earned annually from the follow ing income sources (in2004E.C)?

Source of income	Unit	Quantity/Qt	Total Sales/Birr/
Crop sales /by type/			
Animal sales /by type/ 1			
2			
3			
Sales of animal product			
4 Honey			
5 Others/specify/			
Total			

Note: crop sales include :1 cereals 2 pulses 3 Oil seeds 4 Vegetables 5 Fruits 6. Coffee 7. Ginger

Animals sales include: 1. Cows 2. Oxen 3. Heifers and bulls 4. Equines 5. Poultry

Animals product include 1. Milk 2. Butter 3. Egg 4. Hides and skins

Part IX. Access to Various Services

9.1 How far do you travel to get the services of primary school?_____ km

9.2 How far do you travel to get the services of secondary school? _____km

9.3 How far do you travel to get the services of clinic/health post?_____ km

9.4 How far do you travel to get the services of health center ?_____km

9.5 How far do you travel to get the services of hospital? _____km

9.6 How far do you travel to get the services of grain mill?_____ km

9.7 How far do you travel to get the services of all weather road?_____ km

9.8 How far do you travel to get the services of telephone? _____km

9.9 How far do you travel to get the services of post office? _____km

Part X. Household Expenditures

10.1 indicate the type and amount of expenditures of your family for the year 2004E.C

Types of Expenditure	Amount/Birr/
1.Food items(crops, animal products, sugar, salt, Coffee, cooking oil, etc.	
2. Own produce consumed(utilized) by family	
2.1 crops /by type/maize, teff, enset, h/bean, ot 2.2 Livestock and Livestock products/ox, cow, butter, milk,etc.	
Other Expenses	
Tot Total Expenditure	

Note: * Expenditures of Own produced Consumed include: Crops by type

1. Cereals 2. Pulses 3. Oil seeds 4. Fruits 5. Vegetables 6. Coffee 7. Ginger 8. Others (specify). Expenditures on Livestock and livestock products include:

1. Animals slaughtered 2. Other products 3. Honey

** other household expenses include: 1. Clothing 2. Medical expenses 3. Education 4. Farm implements 5. Farm inputs (fertilizer, seeds and chemicals) 6. Taxes 7 social obligation 8. Household utensils 9. Labor cost 10. Rents 11. Fuel 12. Transportation costs 13. Marketing costs 14. Farm oxen 15. Breeding 16. miscellaneous

Part XI. Household Assets

11.1 does anyone of the household currently own any of the following items?------ if yes complete:

a) Grain storage facility b) Beds (wooden/metal) c) Tables and chair d) Lumps /gas stove e) wrist watch f) radio