COLLEGE OF AGRICULTURE AND NATURAL RESOURCE

DEPARTMENT OF AGRICULTURAL ECONOMICS

SENIOR RESEARCH PAPER ON ANALYSIS OF FOOD INSECURITY AND ITS DETERMINANT INCASE OF SANKURA DISTICT

A SENIOR RESEARCH SUBMITTED TOTHE DEPARTMENT OF AGRICULTURAL ECONOMICS IN PARTIALL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF BSCIN AGRICULTURAL ECONOMICS

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ABBREVIATIONS AND ACRONYMS

AE	Adult Equivalent
FAO	Food and Agriculture Organization
FGT	Foster Greer Thorbeke
FSB	Federal Food Security Coordination Bureau
GDP	Gross Domestic Product
GNP	Gross Nation Product
GOE	Government of Ethiopia
HFI	House Hold Food Insecurity
HYV	High Yield Variety
MOFED	Ministry of Finance and Economic Development
SNNPR	Southern Nation Nationality People Region
USAID	United States Aid for International Development
USD	United States Dollar

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ABSTRACT

Agriculture is a key driver of Ethiopia's long-term growth and food security. Most the people are vulnerable to food insecurity and ensuring food security remains a key issue for the Government of Ethiopia. In order to combat threats of famine and persistent poverty and thereby ensure food security for its population, the government has rested on increasing the availability of food grains through significant investments in agricultural technologies. The impacts of these policies, however, have been shadowed as there are still millions of people who experience extreme hunger in the country. Ethiopia has experienced long periods of food insecurity which may be ascribed to several factors which include occasional droughts and also degradation of farm lands. These factors have limited the "physical, social and economic access to sufficient, safe and nutritious food necessary to meet the dietary needs and food preferences for leading an active and healthy life" for majority of the residents. The objectives of this study was to analysis food insecurity status, determinants of food insecurity and range of coping strategies in the study area. Multistage sampling technique has been used to select both Barcho and kore kebele for this study and a total of 99 households were selected purposively from the study area. Both qualitative and quantitative data were employed for this study. Primary data was collected by direct interview of sample respondents; whereas, secondary data collected from published and unpublished documents. Both descriptive and regression analysis were also employed to analyze the collected data.Binary probit model was used to test hypothesis and reveal the effect of different variables on house hold food insecurity.The researcher recommended to Government should Enhance access to micro-credit for rural farmers through supportive policies and financial literacy programs. Promote off-farm activities by providing technical and financial support for skill development. Implement community awareness programs on family planning to manage household size and strengthen extension services for better resource management. Improve agricultural practices by ensuring access to quality inputs and offering training on modern farming techniques. Invest in rural infrastructure for better market access and develop irrigation systems to combat drought. Engage local communities in decision-making and encourage support groups to share resources and coping strategies.

Key words: Binary Logic, Determinant, Food insecurity, Sankura district, Rural

CHAPTER ONE: INTRODUCTION

1.1 Background and Justification

Food insecurity is increasing in the world where 925 million people are undernourished. Out of them, about 900 million people are living in developing countries (FAO, 2010). More than 70% of these people live in rural areas and depend, directly or indirectly, on agriculture for their living. The majority of the developing countries invest in the agricultural sector due to which these households are more vulnerable to price instability. The main focus of agricultural investment remained on exportable crops to generate foreign exchange that forced countries to rely on continued low international food prices to meet national food demand (IAASTD, 2008).The majority of food insecure and hungry people in the global context live in Asia and the Pacific (16%), Sub-Saharan Africa (30%), and near East and North Africa (8%), and Latin America and the Caribbean (9%). Among this the proportion of food insecure and hungry people in Sub-Saharan Africa is showing fast increment as compared to early 1990s (FAO, 2010).The gap between food production and consumption in most SSA countries is induced by the slowdown of the agricultural production growth rates. The major causes for the slow growth rates of agriculture include various factors such as unfavorable climatic conditions, undeveloped infrastructures, inappropriate agricultural policies and predominantly traditional production systems (Mohamed, 1995).

Most of the world's poorest countries are in Africa and many of these face chronic poverty and food insecurity. Agriculture, of which 85-90 percent is rain-fed in Sub-Saharan Africa, accounts for 35 percent of the region's gross national product (GNP), 40 percent of exports and 70 percent of employment Babatunde et al (2007).

Agriculture is a key driver of Ethiopia's long-term growth and food security. Agriculture directly supports 85 percent of the population, constitutes 43 percent of Gross Domestic Product (GDP), and 80 percent of export value. Nearly 16 percent of

Government of Ethiopia (GOE) public expenditures are committed to the sector (Bill & Melinda Gates Foundation, 2010). Agriculture is the predominant and an important economic sector in Ethiopia.

With a population projected to reach 80 million in 2010 and about 45 percent living below the poverty line and most vulnerable to food insecurity. Ensuring food security remains a key issue for the Government of Ethiopia. In order to combat threats of famine and pervasive poverty and thereby ensure food security for its population, the government strategy has rested on increasing the availability of food grains through significant investments in agricultural technologies (high yielding varieties of seeds, fertilizer), services (extension, credit, inputs), and rural infrastructure (roads, markets). The impacts of these policies, however, have been shadowed as there are still millions of people who experience extreme hunger in the country (Bogale and Shimelis 2009).According to the Food and Agriculture Organization of the United Nations (FAO, 2010), reported that,41 percent of the Ethiopian population lives below the poverty line and more than 31 million people are undernourished. However, the latest undernourishment numbers show a positive trend (1990-92: 71% of the population; 1995-97: 64%; 2000-02: 50%; 2004-06: 44%).

A report on the dynamics of poverty revealed that about 38.7% of the people in Ethiopia were under the national poverty line in 2004/2005, and the poverty level in rural areas (39.3%) was slightly higher than that of urban areas (35.1%)(MoFED,2012).Between 2004/2005 and 2010/2011, the average headcount of poverty decreased in both urban and rural areas of the country with the national headcount poverty standing at 29.6% in 2010/2011.Concentrations of food insecurity and malnutrition are prevalent in rural areas, with a population of six to seven million chronically food insecure, and up to 13 million seasonally food insecure(Bill & Melinda Gates Foundation, 2010).The performance of agriculture, however, in terms of feeding the country's population, which is growing at about 2.9 percent per annum, is poor. Currently in Ethiopia, there are more than 10 million people who have been affected by drought. Some 4.6 million people are threatened by hunger and malnutrition and require urgent food assistance. The deteriorating situation is compounded by high food prices, the cost of cereals has more than doubled in many markets since the beginning of the year, hampering the ability of many people to meet their most basic food needs and impoverishing them further (WFP2009).

1.2 Statement of the Problem

Several studies in the past have indicated that people of Ethiopia have experienced long periods of food insecurity which may be ascribed to several factors which include occasional droughts and also degradation of farm lands. These factors have limited the "physical, social and economic access to sufficient ,safe and nutritious food necessary to meet the dietary needs and food preferences for leading an active and healthy life" for majority of the residents(Gilligan *et al,* 2008*).*

According to (WFP, the 2011) Horn of Africa drought left 4.5 million Ethiopians in need of emergency food assistance. Pastoralist areas in southern and southeastern Ethiopia were the worst affected. In addition, cereal markets experienced a supply shock and food prices were rose and resulting in high food insecurity among poor people. By the beginning of 2012, the overall food security situation had stabilized thanks to the start of the harvest season and sustained humanitarian assistance. Still, even the Humanitarian Requirements Document issued by the government in early 2012 estimates that 3.2 million people will require relief food assistance from January to June 2012. This number is likely to increase following the extended dry conditions and erratic start of the rain season.

Both transitory and chronic food insecurity are severe in Ethiopia. Moreover, food insecurity is one of the defining features of rural poverty affecting millions of people particularly in moisture- deficit and pastoral areas. Even in years of adequate rainfall and good harvests, these people remain in need of food assistance (FDRE, 2001).

Land degradation coupled with unpredictable rainfall, drought causes a serious threat on households' food security in Ethiopia. Besides, overgrazing, improper cultivation practices, mismanagement of land resource are the main causes for land degradation (Bill & Melinda Gates Foundation, 2010). Poor soil fertility, land shortage, frost attack, chronic shortage of cash income, poor farming technologies, weak extension services, high labor wastage, and poor social and infrastructural situation have caused the problem of food insecurity. Hence, a combination of factors has resulted in serious and growing problem of food insecurity in Ethiopia (Hussein, 2006). These will have cumulative effects on household level food security status.

Through time, poor and hungry populations become less flexible to stress and disasters as they rely a great deal on the natural environment and lack the capacity and the resources required recovering from disasters (Oluoko *et al*, 2011). For Ethiopia to

achieve middle-income status by 2025 and to found solution for food insecurity, concentrated and strategic investment and strategic choices in the agricultural sector are vital. Over 90 percent of agricultural output is driven by smallholder farmers. Without expanding cultivated land, and given forecast population growth, the average land holding size in highland areas will be reduced to 0.7 hectares by 2020, placing further pressure on rural incomes and food security. Agriculture contributes substantially to the overall Ethiopian economy. On a nominal GDP of USD 25.6 billion 43 percent was driven by the agricultural sector; crop production accounts for 29 percent, with livestock at 12 percent, followed by the forestry sector with 4 percent.

In Ethiopia, the seriousness of food shortage problem varies from one area to another, depending on the state of the natural resources and the extent of development of food shortage (Webb *etal*, 1994) as cited in (Amsalu *et al,* 2012). Different factors aggravated the growing problem of food security in this country. Among the major challenges of food security in Ethiopia are backward agriculture, unstable weather recurrent drought, pests and disease, population pressure, weak institutional capacity, and inadequate infrastructures and social services (FSB, 2007).

Few case studies have been conducted at household levels and food insecurity studies at the national level fails to articulate household's availability and access to needed food (Hart, 2009).The majority of Ethiopians lives in rural areas tackle similar challenges in securing sufficient food at household level due to the topographic and biophysical variation throughout Ethiopia, transitory food insecurity varies across geographic space and time.

Rationales to undertake the research on food insecurity are the issue of food insecurity in today's world, to address food security issue in the study area, the researcher desire to know about food security concept and measurement practically, to know the analyses of food insecurity and its determinant in the researcher study area (Sankura district), and to share experience from food insecurity researcher to apply in the future since the researcher career is mostly involved in this issue.

1.3 Objective

1.3.1 General Objective

The overall objective of the study is to analyze food insecurity and its determinant in Sankuradistrict.

1.3.2 Specific Objective

The specific objectives of the study are

- Assess food security status in Sankura disrict.
- Identify major determinants of food insecurity in the study area.
- To analysis coping strategies among food insecure households.

1.4 Research Question

This study would answer basic research questions like

1. How does food insecurity status looks like in Sankura district?
2. What are the major determinants of food insecurity in the study area?
3. What are the coping strategies of food insecure?

1.5 Significance of the Study

This study provides information that would enable effective measures to be undertaken so as to improve food security status in the study area. And it provides information about the study area in relation to food security status, location, farming system and other demographic data. This research is not only essential for the society of that kebele but also for the researcher to understand food insecurity determinant, concept and measurement clearly in addition to the course rural development and food security.

1.6 Scope and Limitation of the Study

The study would be conducted in sankura district of silte zone, central ethiopia. This study would focused on identifying food insecurity status, determinants of food insecurity and coping strategies practiced by food insecure households would also assessed at different levels at the time of food shortage. This study would be conducted in only both on kebele because of lack of budget, time and other

opportunity costs (resource) to accomplish the study. Moreover, the study deals with a limited number of households and focused on the status and determinants of food insecurity. Besides to this, the data were collected at one time period and during the time of enough food is available.

CHAPTER TWO: LITERATURE REVIEW

2.1 Theoretical Review

2.1.1 Food Security Concept and Definition

Food security concept originated in the mid-1970s during the international discussion on global food crisis. The initial focus of food security attention was primarily on food supply problems- of assuring the availability and to some degree the price stability of basic foodstuffs at the international and national level (Clay, 2002 and FAO, 2005). Thus, in the 1970s the issue of food security referred to the national food supply's capacity to meet the population's energy and nutrient needs. The concept of household food security has been understood by many development workers as the availability of food in the world marketplace and on the food production systems of developing countries (Fanta, 2003 and Bedeke, 2012).

Since the World Food Conference in 1974 due to food crises and major famines in the world, the term Food Security was introduced, evolved, developed and diversified by different researchers. Food security and insecurity are terms used to describe whether or not households have access to sufficient quality and quantity of food. Food security issues gained prominence in the 1970s and have since been given considerable attention. Food security is perceived at the global, national, household and individual levels. Food security at global level does not guarantee food security at the national level. Moreover, food security at the national level does not guarantee food security at the household or even the individual level (Duffour, 2010). Afterwards, worldwide observations of different access to available food within nations shifted interest and concern from food security from the national to the household level. At the same time, the unit of analysis shifted from the global and national level to the household and individual level (Hart, 2009).

In 1983, FAO analysis focused on food access, leading to a definition based on the balance between the demand and supply side of the food security equation: “Ensuring

that all people at all times have both physical and economic access to the basic food that they need"(FAO, 1983). In the World Bank (1986) report, Poverty and Hunger, this concept of food security is further elaborated in terms of: 'access of all people at all times to enough food for an active, healthy life.'

Food security is a condition that exists when all people at all times have sufficient physical and economic access to safe and nutritious food to meet their dietary needs including food preferences, in order to live a healthy and active life (USAID,2008, FAO ,1983).

In the present study, food security is defined as adequate availability of and access to food for households to meet the minimum energy requirements as recommended by the Ethiopian government for an active and healthy life (Wali and Penporn, 2013).

2.1.2 Dimensions of Food Security

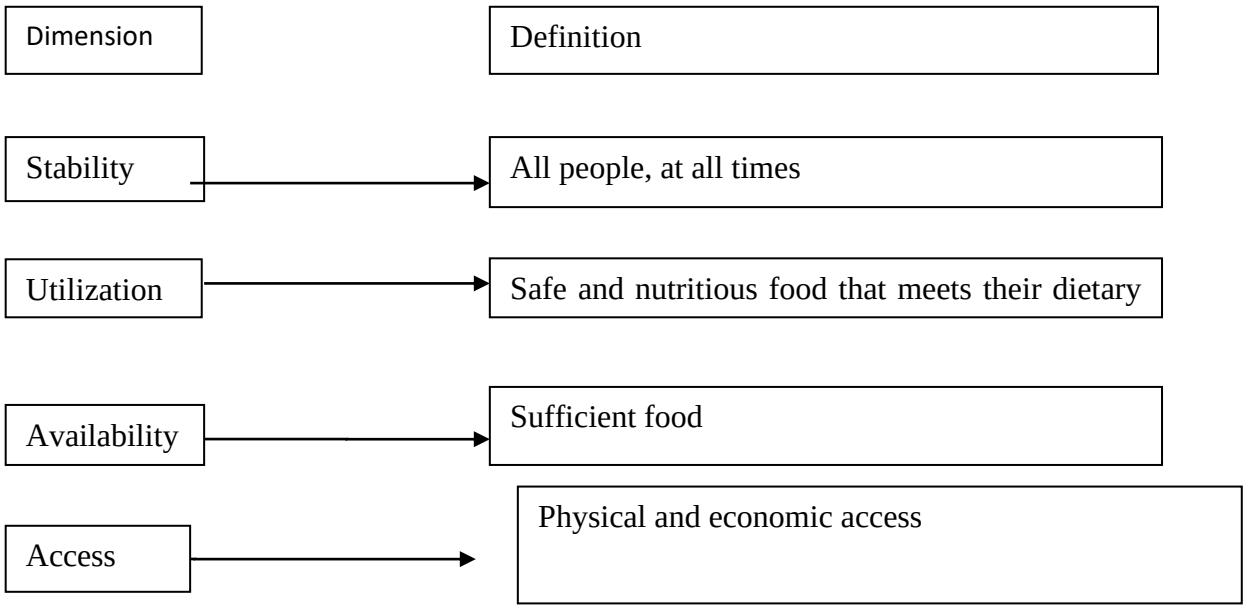

Fig1: *four dimensions of food security (http**:**://foodsecuritycluster.net /sites/default/files/What%20is%20Food%20Security.pdf*

Jrad *et al,* (2010),

elaborated on four dimensions of food security as food availability, food accessibility, food utilization and stability.

Food availability: refers to the physical presence of food which may come from own production, purchases from internal market or import from overseas. Gregory *et al.*,

(2005) explained that food availability refers to the existence of food stocks for consumption.

The same source, availability refers to the physical existence of food, be it from own production or on the markets. On national level food availability is a function of the combination of domestic food stocks, commercial food imports, food aid, and domestic food production, as well as the underlying determinants of each of these factors. Use of the term availability is often confusing, since it can refer to food supplies available at both the household level and at a more aggregate (regional or national) level. However, the term is applied most commonly in reference to food supplies at the regional or national level.

Food access: Household food access is the ability to obtain sufficient food of guaranteed quality and quantity to meet nutritional requirements of all household members. Here, the food should be at right place at the right time and people should have economic freedom or purchasing power to buy adequate and nutritious food. Kuwornu *et al,* (2011), explained that food access is determined by physical and financial resources, as well as by social and political factors. Access depends normally on; income available to the household, the distribution of income within the household, the price of food, and other factors worth mentioning are individuals' access to market, social and institutional entitlement/rights.

Food utilization: this refers to ingestion and digestion of adequate and quality food for maintenance of good health. This means proper biological use of food, requiring a diet that contains sufficient energy and essential nutrients, as well as knowledge of food storage, processing, basic nutrition and child care and illness management (Jrad *et al,*2010).

Food utilization: proper biological use of food, requiring a diet with sufficient energy and essential nutrients, potable water and adequate sanitation, as well as knowledge of food storage, processing, basic nutrition and child care and illness management (USAID, 2008).

Stability of Food: refers to the continuous supply of adequate food all year round without shortages (Jrad *et al,* 2010). To be food secure a population, household, or individual must have access to adequate food at all times. They should not be at risk of losing access to food as a consequence of a shock (e.g. an economic or climatic crisis), or cyclically (e.g. during a particular period of the year – seasonal food

insecurity). The concept of stability can therefore refer to both the availability and access dimensions of food security.

2.2 Empirical Review

2.2.1 Determinants of Food Insecurity

Factors that affect household food insecurity in various developing countries especially in Africa have been documented in some literature and these factors or determinants are most often than not location-specific (i.e. different study areas were found to have variant attributes as food security determinants with some attributes recurring) (Rober *et al,*2013).

The study conducted in Nigeria by Oluyole *et al* (2009) using probit model found out that sex of household head, educational level, age and income have negative influence on food insecurity whereas household size has positive influence on household food insecurity.

Study by Sikwela (2008) in South Africa using logistic regression model showed that per aggregate production, fertilizer application, cattle ownership and access to irrigation have negative effect on household food insecurity whereas farm size and household size have positive effect on household food security.

Fertilizer is used by most studies as a proxy for technology. According to Aliber and Hart (2009), subsistence farming by its nature is production for direct consumption. Any farm input that augments agricultural productivity is expected to boost the production; this contributes to wards attaining household food security.

According to the study conducted by Muhammad *et al*(2012) in Pakistan household's monthly income, household heads education levels and Ownership of Livestock has positive relation with house hold food security ;on the other hand, age of the household head and household size have a negative relationship with food security.

Study by Osei *et al* (2013) in the Sekyere Afram Plains District of Ghana, Farm size, off farm income, and credit access were positively and significantly related to the probability of a household being food secure; marital status and household size had a negative and significant relationship with food security.

Nyangwesoi et al (2007) in a study of household food security in Vihiga district of Kenya found that household income, number of adults, ethnicity, savings behavior, and nutrition awareness significantly influence household food insecurity. In a similar

study, Kohoi et al. (2005) established that the significant determinants of food insecurity in the Mwingi district of Kenya were participation of households in the food-for-work program, marital status of the household heads, and their educational level. Similarly, in a study of food security in the Lake Chad area of Borno State, Nigeria, Goni (2005) reported factors that influence household food insecurity, which include household size, stock of home-produced food, and numbers of income earners in the household.Paul Amaza et al (2009) in the study of Changes in household food security and poverty status in Nigeria revealed that household size, cost of hired labor, participation in Promoting Sustainable Agricultural activities and non-agricultural income have significant positive effects on the food security status of the household. Household size had a negative effect, indicating that large households are more likely to be food insecure.According to studies conducted in Ethiopia, ownership of livestock, farmland size, family labor, off farm income, market access, use of improved technology, education, health, amount of rainfall and distribution, crop diseases, number of livestock, and family size are identified as major determinants of household food insecurity **(**Regassa, 2011; Eden et al, 2009 and Bedeke, 2012**)**.

According to Wali and Penporn (2013) conducted in Jigjiga District of Ethiopia, use of fertilizer by farming households, total household income, access to veterinary services and access to extension services was found to have a negative and significant impact on household food insecurity; whereas, the agro-ecology stratum in which the Households' farmland was located found to have a positive and statistically significant impact on food insecurity.As studied by Fekadu and Mequanent (2010), age of the household head, size of land cultivated, use of fertilizer, livestock ownership, soil and water conservation practices and oxen ownership have negative and significant relationship with household food insecurity; whereas, education of household head, household size (AE), and off–farm/non-farm income have a positive significant influence on household food insecurity.Income plays a key role in a household's accessibility to food. It enables households to modernize their production by giving them an opportunity to buy the necessary inputs, and reduce the risk of food shortage during periods of unexpected crop failures through purchases.

It was expected the total annual income of the household and food insecurity would be negatively related (Muluken, 2005).

CHAPTER THREE

3. RESEARCH METHODOLOGY

3.1. DESCRIPTION OF THE STUDY AREA

The Sankura district is located in the Silte zone, which is one of the zones of the Centeral Ethiopia national regional state. The mean annual rainfall of the district is 1,566 mm. The mean temperature is about 16.6 C, and the minimum temperature is 10.78 C. whereas the maximum temperature was 22.32 °C. Agro ecology of the district is dega (43%), woina dega (55.56%), and Kola (1.24). Sankura woreda is situated at a distance of 314 km, western of Adds Ababa, the capital city of Ethiopia; geographically, it is located between 9 9°34′12 N and 37°6′0″N. The district is bordered by the Jardaga Jarte district in the north, Jimma ganati district in the south and southeast, Abe Dongoro district in the north, and Abay-Chomen district in the east. The district has the total land area of 96,638.8 km^2. The total population of the Horo woreda is 107, 323, from this the male 53,131 and females are 54,192 in the 2007 census.

Agriculture is the back bone of the economy and it is the main source of job opportunity for this area. It is takes a greater part as service of income for the farmers, however, it is unable to meet one of it is most important function, i.e. the provision of food for the large expanding population. Cereals such as wheat, teff, finger millet, maize and others crop a resource of food and cash income. Not only are these cereal crops using as a cash income, but also that production the dominant uses as the cash income for the households. Livestock production forms an integral part of almost all farming systems in crop producing areas of the region and they used the livestock as the complement of farm input and source of cash income. Not only these cereal crop use as a cash income; but also chat production is the dominant uses as the cash income for the households. Livestock production forms an integral part of almost all farming systems in crop producing areas of the region and they used the livestock as the complement of farm input and source of cash.

3.2 SAMPLING TECHNIQUES AND SAMPLE SIZE

Purposive sampling is a qualitative research method where specific individuals or groups are selected based on particular characteristics or knowledge relevant to the

study. This technique is particularly useful in examining complex issues like food insecurity, where targeted insights can illuminate underlying causes and effects.

Define Research Objectives: Clearly articulate the goals of the study, such as understanding the causes of food insecurity, assessing community resources, or evaluating the effectiveness of interventions.. Identify Key Populations: Select specific groups that are most likely to provide valuable insights into the issue. Possible groups include:To understand agricultural practices, challenges, and crop yields.To explore food management and nutritional choices. To gather insights on local governance and resource allocation.NGO Workers: To assess program effectiveness and community engagement.Targeted Insights: Allows researchers to gather in-depth information from individuals who are most knowledgeable about food insecurity.Rich Data: Facilitates a deeper understanding of the complexities surrounding food access, cultural practices, and economic factors.Flexibility: Researchers can adapt the sampling strategy as new themes or issues arise during the study.Purposive sampling is an effective technique for exploring food insecurity, enabling researchers to capture the nuanced perspectives of those directly affected by the issue. By focusing on specific populations, this method provides valuable insights that can inform interventions and policy decisions aimed at alleviating food insecurity in vulnerable communities.

Finally,99 households from 2 kebeles would be purposively selected for the survey to know food security status of the kebele due to time, resource available and in order to obtain the required information requires very long time and huge finance; Before collecting the data, permission from the district office of agriculture and natural resources would be obtained. However, owing to the country's political circumstances in general and the research area in particular, However, pertinent information would be obtain for the current study since researcher collect it by explaining the need for research to different stakeholders such as the woreda agricultural office, kebele leaders' office, and development agents of districts. I modify the questionnaires at the office before collecting data from sample households. During data collection, primary data information would be acquired at the household level using a structured questionnaire.Then, Yamane sampling formula (1976) with 90 percent confidence level would be used to determine sample respondents.

Yamane's formula is beneficial for determining sample size when studying large populations, such as the diverse households affected by food insecurity in Ethiopia. The formula helps to provide a representative sample that captures the variability within the population.

Calculate Sample Size: Use Yamane's formula to compute the sample size needed for the study.

Stratify the Sample: If Yamane Formula*:* $n = \frac{N}{1+N(E)^2}$

Where: n = sample size

N = total number of household from two kebeles

E = residual of error (disturbances term)

Numbers of households in the Sankura district is =107323

N =107323 households*:*

$n = \frac{107323}{1+107323(0.1)^2} = 99$

n=99

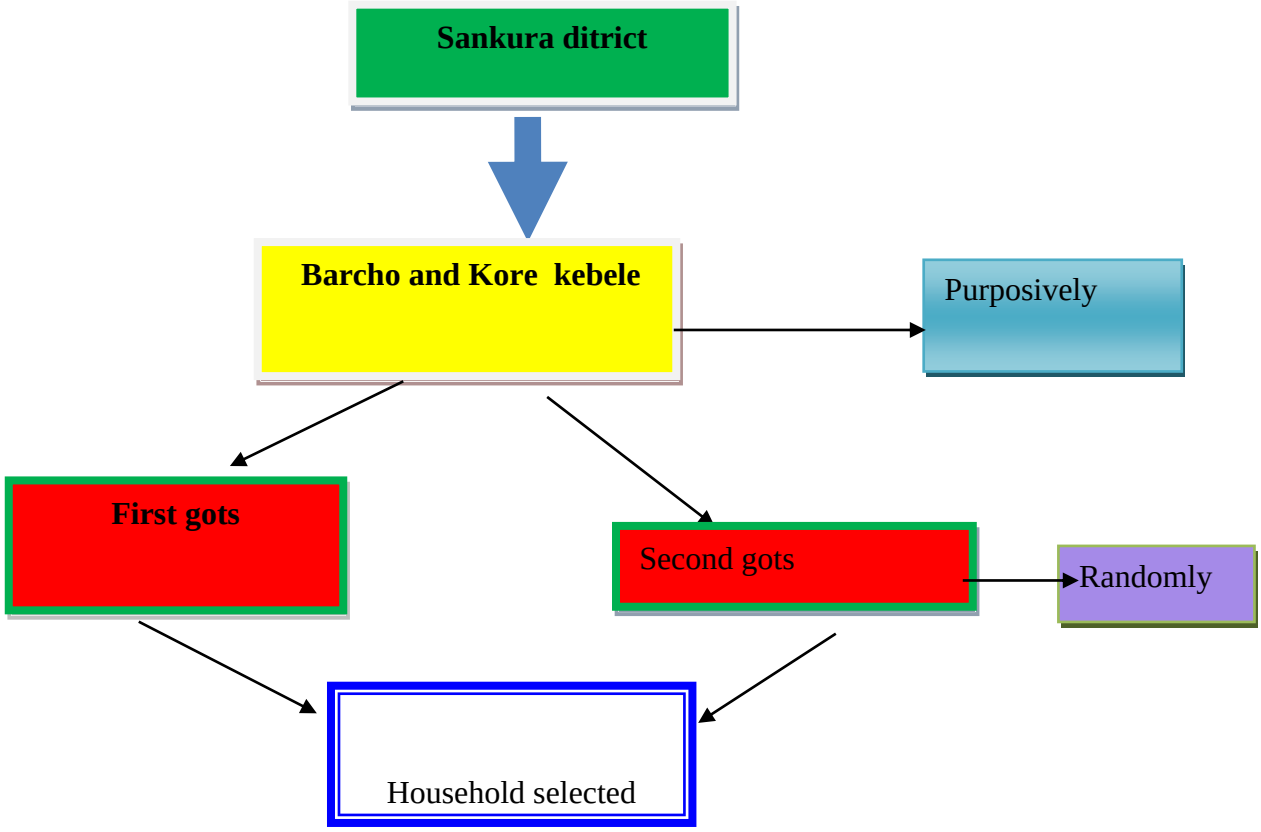

Figure 2: sampling procedure

3.3 TYPE, SOURCE AND METHOD OF DATA COLLECTION

Both qualitative and quantitative data were collected from primary and secondary sources to identify important variable that affect household food security. Thus, primary data were obtained from sample respondents by using structured questionnaire. Qualitative data were gathered from group discussion. Secondary data were collected from published and unpublished materials related to subject. It was the main source of information because it indicates the past and the present food security.

The main data were collected for this study include household demographic characteristics, socio economic characteristics, income source, livestock ownership, land size and access to credit service.

Income expenditure method was used to measure house hold food security in the study area. This method included food and non-food expenditure to identify the house hold that spends more for food by evaluating the collected data from the respondents from interviewed method.

To aggregate the data, some units of measurement have been standardized. As a result, some conversion factors for tropical livestock unit (TLU) and hectare (ha) has been employed.

3.4 METHODS OF DATA ANALYSIS AND ANALYTICAL MODEL

3.4.1 Method of Data Analysis

The methods of analyzing data include both descriptive statistics and econometric analysis. Descriptive tools like simple statistical tools, tables and percentage would be used. In descriptive tools, the collected data was tabulated, analyzed and interpreted in terms of the percentage. While an econometrics tools, were used to analyze the determinants of household food insecurity in rural area.

3.5. ECONOMETRIC ANALYSIS

3.5.1. Model Specification

The data analysis, interpretation and discussion were depending on the dependent and explanatory variables that are listing in the following econometric model parts to analyze the determinants of household food insecurity.

3.5.2. THE PROBIT MODEL

Food insecurity in Ethiopia is a pressing issue, exacerbated by factors such as climate change, conflict, and economic challenges (Devereux et al., 2013). Using a probit model, researchers can analyze the determinants of food insecurity at the household level, identifying key predictors like income, education, and access to resources (Alemayehu & Lemenih, 2014).For example, studies have shown that households with lower income levels are significantly more likely to experience food insecurity (Baye et al., 2019). The probit model helps quantify how much these factors influence the probability of food insecurity, offering a clearer understanding of vulnerabilities (Taffesse et al., 2018).

Moreover, regional disparities play a crucial role, as food insecurity rates can vary widely across Ethiopia’s diverse regions, influenced by agricultural productivity and market access (Woldemichael & Mekonnen, 2017). These analyses can inform targeted interventions by the government and NGOs, addressing the unique

challenges faced by different populations (Hirvonen et al., 2019).In summary, applying a probit model to the study of food insecurity in Ethiopia provides critical insights that can guide effective policy responses and improve food security outcomes (Fafchamps et al., 2014).

The response (dependent) variable of this study is dichotomous taking two values, 1 if the event occurs and 0 if it does not. In this regard, a probit and logit model is used to estimate the dummy variable taking two values. In most applications the models are quite similar, the main difference being that the logistic distribution has slightly fatter tails but, there is no compelling reason to choose one over the other. Probit model is one of the most, which estimate the probability of being in the household food insecurity dependent on some explanatory variables. These models are appropriate when the dependent variable is a binary variable. In this study the response (dependent) variable is dummy variable taking two values, 1 if a household food insecurity and 0 if household food in security. Because of the fact that the binomial probit model is easier to estimate and simpler to interpret, this regression model is used in this study.

The standard normal cumulative distribution function (probit model) is econometrically too specified as following ways.

Latent variable; un observable variable y* which can take all values in

$$\mathbf{y^* = \alpha + \beta x i + \mu}$$

Where: y* is latent variable

α is a vector of parameters to be estimated

β stands for coefficient

Xi stands for vectors of explanatory variable

μ is a random error

CHAPTER FOUR: RESULTS AND DISCUSSION

This chapter includes all the objectives of the study in relation to different socio-economic variables. It mainly contains three major sections: food security status of households, determinants of household food security status and major coping strategies practiced by food insecure households.

4.1 FOOD INSECURITY STATUS OF THE AREA

Table 4.1Table Food insecurity status of household

		Frequency	Percent
	food secure	43	43.43
	food insecure	56	56.56
	Total	99	100.0

It has been used household income and the amount they outlay to purchase the food per head to measure household food insecurity in the study area. To identify food secured and food insecured households, the researcher did the following activities: the researcher collected the income, total and nonfood expenditure of the household from the researcher respondents after that the researcher computed the food expenditure of the household by using compute variables in SPSS.Then,The researcher Identified the general price in current price in the market in the time of survey for the most dominant crop in the study area what they produced, and then the researcher divided the amount of food expenditure of each household by general price to get the amount of cereal they able to purchase per household per year. But, the researcher needed the amount of cereal per head per year to identified the household whether food insecure or not, so the needed amount of cereal per head per year was computed by dividing the amount of cereal per household per year to family size. As a result, as shown from table 4.1, the researcher survey resulted as, 43 (43.43 %) and 56 (56.56 %) respondents were identified as food secure and food insecure respectively. This means, from my 99 sample respondents 43 (43.43 %) have been incomes that enable to purchase above and 252 kg/head/year, whereas 56 (56.56 %) of the researcher respondent have not been incomes that enables to purchase 252 kg/head/year.

4.1.1 Descriptive Statistics for Continuous Variable

Table4.2 descriptive statistics for continuous variables

	Minimum	Maximum	Mean		Std. Deviation	Variance
age of household	22.00	72.00	46.7385	1.09950	12.53618	157.156
Family size	2.00	9.00	4.9769	0.14174	1.61613	2.612
dependency ratio	0.00	2.50	0.8162	0.05422	0.61822	0.382
land size	0.00	3.00	1.3691	0.06756	0.77027	0.593
livestock ownership	0.00	9.15	3.3893	0.14495	1.65267	2.731

From the result in Table above, the minimum and maximum age of the food insecure households were 22 and 72 years respectively; on the other hand, 22 and 70 years for food secure households respectively. The mean ages of the food insecure respondents were 49.35 and the food secured respondent also 43.68 years with standard deviation of 12.9 years for food insecure and 11.43 years for food secure households. This result indicates that the food secured households are relatively younger than the food insecure households. The standard deviation of the food insecure households were relatively higher than food secure households, this indicates that relatively more inactive (the age > 64) households were concentrated in households those were considered as food insecure.the researcher intended to analyze whether there is significant difference due to family size between food secure and food insecure households. The minimum and maximum family size was 2 and 9 for food insecure households respectively; whereas, the minimum and maximum family size for food secure households were 2 and 7 in number respectively. The mean number of family size of food insecure households was 5.5 with standard deviation of 1.74 and for food secure households 4.36 and 1.2, respectively (see table 4. 2). The independent t-test shows that there is a significant difference between food insecure and food secure households due to the number of family size at p=0.00 significant level.

The result in Table 4.2 above indicates that the minimum and maximum number of dependent ratio for food insecure households were 0 and 2.5 with mean and standard deviation of 1.0 and 0.65, respectively. For the case of food secure households the minimum and maximum dependents were 0 and 2 with mean 0.56 and standard deviation 0.45, respectively. The independent t-test between the food insecure and the food secured households shows significant difference in the presence of dependent

members with in the family at p value of <0.05 significant levels. The presence of dependent members within the household is challenging for household food security because those inactive age groups don't have contribution for income generation. Simply, their role is creating high demand for food and non food items within the household. As a result, dependency ratio is factor for household food security.

Table 4.2 reveals the situation of distribution of land holdings in the study area. The land holding of the sample respondents ranges from 0 to 3 hectare for food insecure households and 0 to 2.8 hectare for food secure households. The average land size owned by food insecure households were 1.36 hectare with standard deviation of 0.77 hectare; whereas, 1.37 hectare with standard deviation of 0.76 hectare for food secure households. From the table, I observe that maximum land holding from sample respondents found in food insecurity situation. This indicates that, even if the household holds the large land size they could not attain their food secure status. Because, beside of land size there were another factors those were affect the productivity of land like, use of farm input, educational level and off farm activity of households.The independent t-test shows there is no a significant difference between the mean size of land holding with the food insecure and the food secured households at p value of 0.846 significance level.

The maximum number of livestock ownership in TLU for food insecure and food secure households were 5.63 and 9.18 respectively (see table 4.2). The average number of livestock owned by food insecure household was 2.83 and 3.48 for food insecure households in TLU. Mostly the farmers those have been involved in mango and chat production; as a result, they didn't have livestock for cultivation because of shortage of land, use of hand tools (such as hoe,) and their own labor force and by daily laborer for their farm activity. But the household who have been land and involved in cereal production have livestock's used as complementary for farm their farm activity and as source of cash to purchase farm inputs (like, fertilizer, herbicide, pesticide and improved seeds)..

4.1.2 Inferential Statistics for Continuous Variables

Table 4.3: Inferential statistics result

	Food Insecure (N=70)			Food Secure (N=60)			
Variable	Mean	SD	Mean Difference	Mean	SD	Standard Error Deference	t-value
Age of Household	46.74	(12.53)	-5.67	43.68	(12.92)	2.16	2.63
Family Size	4.97	(1.62)	-1.13	4.36	(1.74)	0.27	4.24
Dependency ratio	0.82	(0.62)	-0.47	0.56	(0.65)	0.10	4.72
Farm LandSize	1.37	(0.77)	0.20	1.38	(.77)	0.14	-0.138
LivestockOwnership	3.13	(1.58)	1.90	3.49	(1.33)	0.24	2.413

4.1.2 Descriptive & Inferential Statistics for Categorical Variables

Table 4.4, Chi-square test for sex of household

		Food insecurity of household		Total	Chi-square
		food secure	food insecure		
sex of household	Female	13	16	29	0. 19
	Male	30	40	70	
Total		43	56	99	

As the survey result indicated that 70(70.70%) households were male headed; whereas, 29(29.29%) were female headed households. Among male headed households 40(40.40%) and 30 (30.30%) were found to be food insecure and food secure, respectively; on the other hand, 13 (13.13%) and 16(16.16%) were food secure and food insecure from female headed households, respectively. The Pearson $\chi 2$-square test of association shows that there is no a significant difference between the sex compositions and the food security stat

Table 4.5: Crosstab for Educational level of house hold

		Food insecurity of household		Total	Chi-square
		food secure	food insecure		
Educational level of household	Illiterate	8	23	31	17.80
	primary(grade1_8)	18	17	35	
	secondary and above	10	4	14	
	Informal	7	12	19	
Total		43	56	99	

From 99 households interviewed, 31.31 % (31) households were illiterate and 52.307 % (68) were literate (Primary 35(26.9%), secondary 14(10.769%) and informal 19(14.61%). The Pearson χ2-square test of association shows that there is a significant difference between the educational statuses of the household heads and the food

Table 4.6: Crosstab for farm input use in household

		Food insecurity of household		Total	Chi-square
		food secure	food insecure		
farm input use	No	3	50	53	93.39
	Yes	40	6	46	
Total		43	56	99	

From the total households interviewed directly, 46 (35.38%) households were found to be users of farm inputs; whereas, 53(40.769%) were non users of farm inputs. From those who use farm inputs and were found to be food secure 40 (40.40.%) and 3 (3.03%) food secure but they did not used farm inputs. From 56 households those were found to be food insecure 50 (50.50%) and 6 (6.06%) of households did not used farm input and used farm input, respectively. The Pearson χ2-square test of association shows that there is no a significant difference between the users and non-users of farm input and the food security status

Table 4.7: income source of household food insecurity of household Cross

		Food insecurity of household		Total	Chi-Square
		food secure	food insecure		
income source of household	Others	33	24	57	28.968
	only on farm	10	32	42	
Total		43	56	99	

The survey result revealed that 57(57.57%) household from respondents involved in off farm activity further than on farm activity,but 42 (42.42%) of household involved in on farm activity for their livelihood. There is significance difference in involving in off farm activity between food secure and in secure activity at <0.05 p value.

4.2 DETERMINANTS OF HOUSEHOLD FOOD INSECURITY

Table 4.8: Crosstab for credit access of household

		Food insecurity of household		Total	Chi-square
		food secure	food insecure		
Credit service of household	No	9	38	47	65.49
	Yes	34	18	52	
Total		43	56	99	

Credit plays an important role for household food security. Among 99 households, 52(52.52%) were users credit access; whereas, 47(47.47%) were not used of credit access. Among the users of credit access,34(34.34%) and 18 (18.18%) household were found food secure and food insecure, respectively. In the other hand, from non users of credit access 38(38.38%) and 9(9.09%) households were found as food insecure and food secure, respectively. The Pearson $\chi 2$-square test of association showed that there is a significant difference between the users and non-users of credit access in the food security status. The household, who obtained credit access, could be productive because as the collected data indicated that they used for purchase of farm input, to pay tax and debt, to purchase livestock, for petty trade and household consumption. This increase and diversify the income of households from different sources. It also saved the livestock to be sold at the time of food shortage and increase farm output obtained from agriculture because of farm input application. Unless the credit is used for productive activity, the needs of the household towards food security cannot be achieved because some household heads used the credit for other non-productive activity.

This measured or done by using probit model and the result of this model in the survey is as follows with brief and short explanation.

Table 4.9: Probit model result for determinant of food insecurity

Food Insecurity	*Coefficient*	*Standard error*	*z*	*Prob.* $\|z\|>Z^*$
Age of Household	*0.01251*	*0.03738*	*0.33*	0.7379
INFORMAL	*1.54985*	*1.09524*	*1.42*	*0.1570*
PRIMARY	*0.04198*	*0.94734*	*0.04*	0.9647
Secondary and above	*0.35070*	*1.33074*	*0.26*	*0.7921*
Familysize	*0.41080*	*0.30855*	*1.33*	*0.1831*
Dependency Ratio	*0.17519*	*0.67647*	*-0.26*	*0.7957*
Farm land size	*0.66963*	*0.59149*	*-1.13*	*0.2576*
Use of FarmInputs	*-2.69731*	*0.76095*	*-3.54*	*0.0004*
Incomesource of household	*-1.82294*	*0.92180*	*1.98*	*0.0480*
LivestockOwnershipHeadhold	*-0.41480*	*0.22339*	*-1.86*	*0.00633*
Credit access	*-2.31260*	*0.80494*	*-2.87*	*0.0041*
Constant	*1.64247*	*1.76386*	*0.93*	*0.3518*

The interpretation for the above survey result with enough explanation is as follows. As the researcher have seen from the above table from nine variables what the

researcher have used only four were found that significantly affect the food insecurity of the household. These are use of farm input, livestock ownership in TLU, income source of household, and credit access were significantly affect at less than 0.1 p value and the following explanation were focused in those significant variables .As the researcher depicted in the above table the coefficient of use of farm input is negatively related with food insecurity statistically significant at 0.01 p value. This means the household who used farm input (pesticide, herbicide & fertilizer) could increase his production and productivity of crop production and improve the food security status of his family. Therefore, other things being constant when the household increase the use of farm input by one unit the household being food insecure is decreased by 2.69 coefficients.

The coefficient of income source of household (off farm activity) in the above table is negative. So, income source (off farm activity) of household is negatively related with food insecurity statistically significant at 0.05 p value. Evolving off farm activity makes the household to diversify the income source and to minimize the risks and uncertainties of crop production; thereby the household who involved in off farm activity could maintain the food security rather than not involved.

The coefficient of livestock ownership in TLU is negatively related statistically significant at $p<0.1$ significant level. Household food insecurity and number of livestock in TLU owned is negatively related. As the data the researcher obtained from household interview, sale of livestock is the dominant coping strategy of food insecure households to cope the problem food shortage and also they sale their livestock for purchasing farm input (pesticide, herbicide & fertilizer) as well as for repay their credit. This reduces the sale of crop produce for that purpose livestock is an important source of income generation and used as complementary in crop production. The probability of being food insecure is decreased by 0.41 when the household own one more livestock in TLU by keeping other variables constant.

The coefficient of credit access in the result was negatively related with food insecurity of household statistically significant at < 0.05 p value. This means, whenthe household uses the credit access, who can be involved in off farm and nonfarm activity and as a result diversify his income source and minimize the food shortage problem of his family. In addition to that, the household can purchase the farm input and increase the crop production even if the household have small cultivate land.

Thus, other things being constant when the farmer uses one more credit access his food insecurity decreased by 2.31 coefficients.

4.3 MARGINAL EFFECT OF INDEPENDENT VARIABLE

Table 4.10:Result from probit mode

Food Insecurity	*Partial effect*	*Standard error*	*z*	*Prob.* $\|z\|>Z^*$
Age of Household	*0.00071*	*0.00213*	*0.33*	*0.7383*
INFORMAL	*0 .09961*	*0.07422*	*1.34*	*0.1796*
PRIMARY	*0 .00240*	*0.05431*	*0.04*	0.9648
Secondary and above	*0.02034*	*0.07860*	*0.26*	*0.7958*
Familysize	*0.02340*	*0.01713*	*1.37*	*0.1718*
Dependency Ratio	*0.00998*	*0 .03833*	*-0.26*	0.7946
Farm land size	*0.03815*	*0.03324*	*-0.26*	*0.2511*
Use of FarmInputs	*-0.33256*	*0.12617*	*-2.64*	*0.0084*
Incomesource of household	*-0.11858*	*0.05687*	*2.08*	*0.0371*
LivestockOwnershipHeadhold	*-0.02363*	*0.01212*	*-1.95*	*0.0513*
Credit access	*-0.23046*	*0.08307*	*-2.77*	*0.0055*

As it has discussed in the above table, from the result of the Probit model the dependant (food insecurity) variable was significantly affected by the following explanatory (independent) variables.

Use of farm Input: when the farmer uses one more farm input (pesticide, herbicide and fertilizer) the food insecurity of household affected (decrease) by 33 percent but other things being constant.

Income Source of Household: Household income source affects food insecurity negatively at 5 percent probability level. Thus, when the farmer involves in one more off farm activity the food insecurity decreases by 11.8 percent but other things being constant.

Livestock Ownership of Household: This also affects food insecurity negatively at < 0.1 p value. Thus, when the farmer have one more livestock in TlU the household's food insecurity decreases by 2 percent, but other things being constant.

Credit Access: The use of credit access is also negatively affecting the food insecurity of household. Therefore, other things being constant when the house hold uses credit access his food insecurity decrease by 23 percent.

4.4 Coping Strategy

Coping strategy is a strategy in which the people use during food shortage. Various coping strategies were analyzed that enabled households to cope food shortage. Those identified coping strategies were ranked based on the household choice during interview. The coping strategy in which food insecure households followed were classified in to two stages with three choices for each at the time of household interview. These are at the initial stage of food shortage and at the severe stage of food shortage with first choice, second choice and third choice for each stage. From the interviewed result, the following coping strategies were identified from households. These are; sale of small ruminants (like sheep), borrowing grains & cash from relatives, and selling chat and purchase cereals for food are their strategies used by households at the initial stage of food shortage. They also followed different coping strategies when the problem of food shortage is severe. Among the strategies, sales of large ruminants (like cattle), selling equines, and reduce size of the meal were identified as the major coping strategy practiced by food insecure households at sever stage. According to the information obtained from respondents who were included in the researcher studies in sankura district the following coping strategies were practiced in addition to the above coping strategies. These are; daily laborer, and sale of cash crops especially mango and chat, consuming crop surplus rather than selling at market, selling more livestock's than usual ,ate seasonal food and they are outside the social obligation (like, Mahiber and Teskar) are the major coping mechanismed by households. These are; coping strategies obtained from household interview were presented in the following chart for simplification. The table below presents range of coping strategies chosen by the household as 1^{st}, 2^{nd}, and 3^{rd}, at the initial stage and at severe stage.

Table 4.11: coping strategies practiced by food insecure household

Copying strategy at initial stage

Strategies	Frequency	Percent	Cumulative Percent
1. sale of small ruminant and poultry	28	40	40
2. sale chat & purchase cereal for food	22	31.4	71.4
3. borrow grain & cash from relative	20	28.57	100.0
Total	70	100.0	

Table4.12: coping strategies practiced by food insecure household

Strategies	Frequency	Percent (%)	Cumulative percent
1st, Sale large ruminants	27	38.57	38.57
2nd, Sale of equines	23	32.8	71.4
3rd, Reduce size of mill	20	28.57	100
Total	70	100	

CHAPTER FIVE: CONCLUSION AND RECOMMENDATION

5.1 CONCLUSIONS

Food insecurity remains a critical issue for over half of rural households in Ethiopia, particularly in the Barcho and Kore Kebele study area. The assessment revealed that key determinants of food insecurity include land size, farm input use, off-farm income, and access to credit, which negatively impact food insecurity. Conversely, larger household size, higher dependency ratios, and the age of the household head

contribute positively to food insecurity. Interestingly, the educational level of the household head did not significantly affect food security outcomes.

The study identified two stages of coping strategies among food insecure households, ranging from selling small livestock and borrowing from relatives to more drastic measures such as selling large ruminants and reducing mill size. These findings underline the urgent need for targeted interventions to enhance agricultural productivity and improve household resilience against food insecurity.

5.2 RECOMMENDATION

In the light of the findings from the study, The researcher recommended the following;

1. Efforts to improve access to credit by farmers and the promotion of off-farm activities as alternative livelihood options should be pursued by both local and central government structures in Ethiopia to improve the household food security situation in rural Kebele. Policies that would make micro-credit from government and non-governmental agencies accessible to rural farmers would go a long way in addressing their resource acquisition constraints and eventually improving household food insecurity level in the country.
2. As family size and food insecurity are positively related serious attention has to be given to limit the increasing population in the study area. This can be achieved by creating sufficient awareness to household family planning through extension service in the rural households. Otherwise, the ever-shrinking productive resources in the study area coupled with increasing population would hamper any development intervention from achieving its objectives.
3. As the survey result indicated, even though there is off farm activity movement in the study area and it have been significance effect on household food insecurity it is not enough to eradicate the food shortage problem in the area. Therefore, the government should be facilitating by providing the financial and technical support in the area. As a result the farmers should diversify their income source through involved in different activities.

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APPENDEXES

Survey for Interview Schedule

Interviewing questionnaire prepared for determinants of rural household food Insecurity in Sankura district

1. Name of household head: _____
2. Kebele
3. Age of HHH: _____
4. Sex of household head: 1.male 2.female
5. What is your Educational status?
    1. Can not read and write
    2. Primary(grade1-6)
    3. Junior(grade 7-8)
    4. Secondary and above
    5. Informal education
6. Marital status: 1.Single 2.Married 3. Divorced 4.Widowed
7. Total number of family size ____

8. Religion: 1.Orthodox 2.Muslim 3.Protestant 4. Other (specify) _____
9. Dependency Ratio:_____

No	Age	Sex	Active (15-64)	Inactive(1-14)	Inactive(>65)
1					
2					
3					
4					
5					
6					
7					
8					
9					

Asset possession of households

10. Do you have your own land for cropping and capture? 1= yes 2 =no

11. Do you use farm inputs? 1. Yes 2. No

12. If yes which inputs do you use? 1. Improved seed 2.Chemical fertilizers 3.Pesticide

4. Herbicide 5.Other (specify)_____

13. If you say no why

1. . Lack of income
2. Distance to input source
3. Shortage of input supply
4. Price of input
5. Others (specify): _____

14. How much yield did you get from cultivation of crops ? Fill the table below.

Crop	**Yield**	**Did you sale the crop last production season? 1. Yes 2. No**	**Amount of income obtained**
Barely			
Wheat			
Teff			
Sorghum			
Maize			
Rice			
Chat			
Bean			
Pea			
Others			
Total			

15. Do you have livestock? 1. Yes 2. No

16. If yes fill the table below

S/N	Type of livestock	Number of livestock	In TLU	Did you sale your livestock last year and this year? 1. Yes 2. No	Income obtained from sale of livestock
1	Oxen				
2	Cow				
3	Sheep				
4	Mule				
5	Horse				
6	Donkey				
7	Goat				
8	Poultry				
9	Bull				
10	Heifer				
11	Other (Specify)				
Total					

Source of household Income

17. What are your major sources of household income? (Rank if the response is multiple answers).

1. On- farm 2.Off -farm 3.Non- farm

18. Have you earn income from the following sources? Indicate in the table below

No	**Income source**	**Yes**	**No**	**Monthly income in Birr**	**Annual income in Birr**
1	**Farm income**				
1.1	Sale of crop produce				
1.2	Hiring agricultural land(Renting out)				
1.3	Sale of livestock and livestock products(milk,eggs,				

No	Income source	Yes	No	Monthly income in Birr	Annual income in Birr
	butter,chickens…)				
2.	**Off farm**				
2.1	Daily laborer in agriculture,labour				
3	**Non-farm**				
3.1	Hand craft				
3.2	Construction work				
3.3	Sale of Charcoal and Fire wood (collection)				
3.4	Petty trade				
3.5	Sale of local drink(tella,areke,&tej) and food(kolo,bread)				
3.6	Weaving				
4.	**Remittance**				
5.	Other				
6	Total				

29. Household Expenditure

No	Type	Monthly expenditure in Birr	Annual expenditure in Birr
1	Cloth		
2	Health		
3	Education		
4	Kerosene		
5	Social obligation		
6	**Farm input**		
6.1	Purchase of fertilizer		
6.2	Purchase of improved seed		

6.3	Purchase of chemicals		
6.4	Farm labor		
6.5	Purchase of farm tools		
6.6	AI service		
6.7	Tax for the land		
6.8	Veterinary service		
6.9	Other farm expenditures		
7	Food expenditures		
7.1	Purchase of cereals		
7.2	Purchase of oil		
7.3	Purchase of small ruminants (for household consumption)		
7.4	Purchase of poultry ….		
7.5	Purchase of fruit, vegetable, coffee,onion,tea,chat...		
7.6	Purchase of sugar, salt….		
8	Others		
Total expenditure	Non-food expenditure		
	Food expenditure		

20. Have you received credit service from lenders? 1. Yes 2. No

21. If yes for question 20 for what purpose did you spend? Justify

1. Purchase of farm input
2. Household consumption
3. To pays tax and debts
4. Purchase of livestock
5. Other(specify) _____

22. If you say no for 20 why 1. No access to credit 2. High interest rate 3. Fear of inability to pay 4. Lack of awareness 5. Other (Specify)_____

27. Did you pay back the credit? 1. Yes 2. No

28.If no, why? 1. Crop failure 2. Death of livestock 3. Fall in crop &livestock price 4.other_____

29. What are the major staple foods that your household consumes? (Multiple answer possible).

1.Teff 2.Wheat 3 .Barley 4. Maize 5. Sorghum 6.other (specify)_____

30. How do you cope with the problem of food shortage?

Stage of the problem	Coping mechanisms During crop failure in (Rank)	Code for the Numbers 1. Sale of livestock 2. Borrow grains or cash from relatives 3. Reduce size of meals 4. Sale firewood and charcoal 5. Escaping of meal 6. Food aid 7. Seasonal migration for laborer 8. Ate less preferred food 9.Sale of agricultural tools 10.Children discontinue from school 11.Child laboring 12.Engaging in petty trade 13. Others, specify (Daily laborer)
At initial stage of a food shortage	1 _____ 2 _____ 3 _____ 4 _____ 5 _____	
At severe stage of a food shortage	1 _____ 2 _____ 3 _____ 4 _____ 5 _____	

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