COLLEGE OF DEVELOPMENT STUDIES

CENTRE FOR RURAL DEVELOPMENT

THE CONTRIBUTION OF HARICOT BEAN PRODUCTION TO SMALLHOLDERS FOOD SECURITY: THE CASE OF BORICHA WOREDA SOUTHERN ETHIOPIA

By

TADESSE CHIRFA GEBEYEHU

A Thesis Submitted to Addis Ababa University in Partial Fulfillment for the Degree of MA in Development Studies

June 2018

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BY

TADESSE CHIRFA GEBEYEHU

Advisor: - Negussie Semie

APPROVED BY BOARD OF EXAMIN

ADVISOR ---------- SIGNITURE ---------- Date ----------

EXTERNAL EXAMINER ----------SIGNITURE ---------- Date ----------

INTERNAL EXAAMINER ---------- SIGNITURE ----------Date ----------

Addis Ababa University
School of Graduate Studies

I hereby declare that this thesis entitled "*The Contribution of Haricot Bean Income on Smallholder Farmers Household Food Security, the Case of Boricha Woreda Sidama Zone*" has been carried out by me under the supervision of Negussie Semie Tesema (PhD), in partial fulfillment of the requirement for the degree of Master of Arts (MA Degree) in Development Studies (Rural Livelihood and Development). I further declare that this work has not been submitted to any university or institutions for the award of any degree or diploma, and that all source of materials used for thesis have been duly acknowledged.

Declared By	Confirmed by
Tadesse Chirfa Gebeyehu	Negussie Semie Tesema(PhD)
Signature: ----------	Signature ----------
June 2018	June 2018

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Finally I would like to grateful thanks to my family my wife m/s Tewabech Lankamo, my elder son Mentesinot Duressa and kidist Tadesse for their patience and appreciation when I study

DEDICATION

I dedicate this thesis manuscript to my lovely families my wife w/ro Tewabech Lankamo,my Children Mentesnot Tadesse, Duressa Tadesse Kidist Tadesse and for those who helped me at the time of my Study .It is my hope that the challenges I faced during my study and the resolve with which I managed to tide over these challenge was set a good example for you. Almighty God may help you to build patience, tolerance and understanding more. I love you all

ACRONYMS

ADLI:	Agricultural Development Led Industrialization
CSA:	Central Statistics Agency
DA:	Development Agents
EEPA:	Ethiopian Economic Publication Agency
EHNRI:	Ethiopian Health Nutrition Research Institute
FDRE/PCC:	Democratic Republic Ethiopia population census commission
FSP:	Food Security Program
GTP:	Growth and Transformation plan
HHS:	Household size
MOFED:	Ministry of Finance and Economic Development
MORAD:	Ministry of Agriculture and Rural Development
NEPAD:	New Partnership for Africans Development
NPC	National Plan Commission
PASDEP:	Plan for Accelerated and Sustainable to End Poverty
PSNP:	Productive Safety Net Program

ABSTRACT

The purpose of this study was to analyze the contribution of haricot bean production to small holder's food security in case of Borricha woreda southern Ethiopia and describe determinant of food security. The study was conducted in Sidama zone Boricha woreda which is Haricot bean is important crop and serves as food and cash income The Study site Borricha woreda was selected purposively because it is one of the chronically food in secured woreda and intervened with food security program me throughout the year. Here after out of 36 chronically food in secured kebeles found in the woreda three kebeles were selected using purposive sample techniques because of potential area for producing haricot bean . Data were collected from 136 household heads (90 non-producing of haricot bean and 46 haricot bean producers through questioner which was drown by sample random techniques

.in addition household field observation, focus group Discussion and key informant interview were used to collect data .to get food security status of household a modified form of simple equation termed as household food balance model. The finding of the study high light that there is a positive impact of haricot bean production because it brings increase of production income which was improve purchasing power of household and accumulation of wealth which improve food security situation and also in a better position in Dietary frequency and diversity as well as access, utilization and Availability of food . and finalized with some recommendations like enhancing production of market oriented crops in the study area .

Key Words: **Haricot Bean production, Food Security boricha Ethiopia**

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HAPTER ONE: INTRODUCTION

1.1. Background of the study.

Progress continues in the fight against hunger, yet an unacceptably large number of people still lack the food they need for an active and healthy life. The latest available estimates indicate that about 795 million people in the world (FAO, IFAD W F P 2015)

The share of undernourished people in the population, or the prevalence of undernourishment (PoU), has decreased from 18.6 percent in 1990–92 to 10.9 percent in 2014–16, reflecting fewer undernourished people in a growing global population. Since 1990–92, the number of undernourished people has declined by 216 million globally, a reduction of 21.4 percent, notwithstanding a 1.9 billion increase in total population over the same period (FAO IFAD, WFP 2015)

As understood from FAO annual reports (2014), though world hunger has generally showed significant improvements, sub Saharan Africa has still remained with sizable food gap.

As of IFPRI (2002) and Degefa (2002 and 2005) explanations, the reasons why sub-Saharan Africa has failed to feed its population have mostly associated with both natural and man-made factors such as climate shocks, recurrent drought, prevalence of epidemic diseases, resource degradation, conflict, bad governance, inefficient policies, deep-rooted poverty and poor access to modern agricultural technologies. Similarly, as indicated in Devereux (2000) and Mesay 2011), the belated recognition by the observer that famine is more complex and open ended phenomena than they have provisory thought generated a new wave of definition that incorporated multiple impacts behavioral response and insider perspective and avoided taking a simplistic theoretical position

A good behavioral definition is provided by a walker (1989:6) famine is a socio economic process which causes the accelerated distribution of the most vulnerable marginal and least powerful groups in the community to a point where they can no longer as a group maintains a sustainable Livelihood.

Food insecurity incorporates low food intake, variable access to food, and vulnerability a livelihood strategy that generates adequate food in good times but is not resilient against shocks. These outcomes correspond broadly to chronic, cyclical and transitory food insecurity, and all are endemic in Ethiopia (FAO, 2010).

The world attained the status of sufficiently producing enough food to feed every individual on this planet three decades ago. However, feeding all has never happened in reality, as has mainly been explained by the uneven distribution of resources, difference in opportunities and constraints around the world, and power imbalance (Degefa, 2005).

Agricultural growth has played an important role in the process of economic development. Economic growth originating in agriculture can have a particularly strong impact in reducing poverty and hunger, increasing employment and incomes Pingali (2010) and World Bank (2008). It was clearly indicated that the agricultural sector of Ethiopia would continue to be the main Source of economic growth and In terms of structural change, the share of agriculture and allied activities in overall GDP which stood at about 42% at the beginning of the plan (2009/10) declined to nearly 39% by the end of 2014/15. (GTP ll.15/16)

Efforts have been made to implement strategies to improve productivity of smallholder farmers by disseminating effective technologies through the scaling up strategy, to conserve natural resources and improve irrigations, and to bring about a shift from subsistence agriculture to production of high value agricultural products. (GTP, 2014/15)

Thus, promoting commercialization of agricultural production is a basis for the rural development and poverty reduction of Ethiopia as well as many other developing countries. Policy makers in Ethiopia and elsewhere view that agricultural modernization, specialization and structural transformation of the economy towards more rapid and sustainable growth comes through agricultural commercialization process (Pender and Alemu, 2007).

The key strategy to realize poverty reduction objective in rural Ethiopia is transforming subsistence agriculture into market orientated agriculture. In this regard, the government of Ethiopia through its different policy and growth strategy has been implementing ADLI strategy, which has been reflected in the PASDEP (2004 - 2009), and the current GTP (2010- 2015) where smallholder farmers are considered as a principal source of agricultural growth; and agriculture as the main source of overall economic growth. More over commercialization of smallholder farming received high government policy priority through GTP MoFED (2006) and (2010).

GTP-I mainly focused on accelerated growth in agricultural productivity for ensuring food security and supporting the food industry through increasing crop production, enhancing crop productivity by applying good agricultural practices, and improving extension services.

Moreover, it emphasized on the utilization and agricultural inputs, strengthening agricultural marketing system, enhancing agricultural research and strengthening natural resource conservation. During the period of GTP-I, the number of agricultural extension beneficiaries has increased from 5.1 million in 2009/10 to 13.95 million farmers by the end of 2014/15. Although the number of beneficiaries from the agricultural extension system has increased, its effectiveness in terms of better outcome as measured by increased productivity gains needs to be enhanced (NPC 2016)

The GTP II (2015/16-2019/20) has been formulated to carry forward the basis, objectives and Strategic directions of GTP I. In GTP II period, agriculture will remain the main driver of the rapid and inclusive economic growth and development. It is also expected to be the main source of growth for the modern productive sectors. Therefore, besides promoting the productivity and quality of staple food crops production, special attention will also be given to high value crops, industrial inputs and export commodities. To this end irrigation based agriculture, horticulture, fruits and vegetables, livestock and fisheries development will be promoted.

Designing and providing support schemes to small holder farmers where peasants and pastoralists are the main actors in the production process; and facilitating a joint participation of educated young farmers and private investors in the sector are strategic directions that will be pursued during the plan period. To this end, addressing constraints entrenched in the agricultural development and marketing systems will be given utmost emphasis and priority. (GTP II 2015/16-2019/20)

Endowed with varied agro ecological zones and diversified natural resources, Ethiopia has been known as the home land and domestication of several crop plants. Pulses have been cultivated and consumed in large quantities in Ethiopia for many years. Pulse crops are important components of crop production in Ethiopia's smallholder's agriculture, providing an economic advantage to small farm holdings as an alternative source of protein, cash income, and food security (EEPA, 2004)

Therefore the Ministry of Agriculture and Rural Development (MoARD) has, under its 2004 master plan for enhanced market-oriented production, identified several crops, viz. teff, wheat, barley, lentil, chickpea, haricot beans, cotton, sesame, coffee and spices as priority crops (MoARD, 2004 cited in Samuel and Sharp, 2007:62). Accordingly, "the rural development strategy intends to contribute to the transformation of the productive rural sector from a primarily subsistence oriented to a more market-oriented sector contributing to improve household income as well overall economic growth and poverty reduction" (Sharp *et al.,* 2007:50).however, many rural households' incomes are simultaneously the combination of their livelihood-agriculture with either wage employment, off farm business or both

Consequently, the majorities of the rural households of Ethiopia are combining their livelihood agriculture outputs through their family labor and land productivity, enhancing with the non-agriculture income, at the same time to enhancing their total family income. In Ethiopia, common bean productivity can be enhanced substantially through investment in dissemination and promotion of existing technologies (i.e. agronomic practices and improved varieties) and improvements in marketing infrastructure (i.e. promotion of grading and packaging of bean grains at farm level, efficient two-way flow of market information and strengthening formal and informal seed systems (E.Katungi, A.Farrow, T. Mutuoki, S.Gebeyehu,2010)

As knowledge of researcher enhancing market oriented crops through investment is not consider the income of small holder household farmers and difficult to differentiate which agricultural productivity (commercial or substance agriculture) are the most contributors of the agricultural productivity and rural household income at national level and measure the wealth and living standard of rural house hold.

1.2. Statement of the problem

Agriculture is the key sector in many developing African countries. Its contribution goes to the extent of stimulating other sectors by providing input supply. Ethiopia, providing employment to 85% of the population and contributing 39% to the country's GDP and accounting for 85% of the national export earnings. The agriculture sector has experienced steady growth in Ethiopia since 2004, with the overall trend seen as encouraging, both in terms of overall agricultural production and productivity.

However, the sector continues to suffer from major structural problems. Despite continued effort to strengthen the sector, agriculture remains low input, low-value and subsistence oriented, and is vulnerable to frequent climatic shocks.(UNDP,2016)

This subsistence agriculture is not a viable activity to ensure sustainable household food security and welfare in the long run (Pingali, 1997). Therefore, Ethiopia needs to achieve accelerated agricultural development along a sustainable commercialization path to alleviate poverty and ensure overall national development. However, the transformation process, besides designing different strategies, requires the government and development agencies of ensuring that commercial farming and smallholders are well integrated into the market system and benefiting from or contributing to the process of commercialization.

Therefore the government of Ethiopia (FDRE) formulated agricultural policy and strategies (ADLI), to overcome the agricultural problems and transform the country's economy In general, Ethiopia's rural development policy and strategies prioritize the transformation of smallholder subsistence agriculture to commercial agriculture through market-orientated production system. Accordingly, "the rural development strategy intends to contribute to the transformation of the productive rural sector from a primarily subsistence oriented to a more market oriented sector, contributing to improve household income as well overall economic growth and poverty reduction" (Sharp *et al.*, 2007:50).

Ethiopian Government has to prioritize to produce pulses crops which is important to Ethiopian as third important agricultural export commodities after coffee and oil that plays a great role in a country's economy .pulses accounted for 6 percent of export earning in Ethiopian and contributed more than 200 million USD country reserve among the pulses haricot bean is by the first in export volume

In this regard some researchers agreed on haricot bean production throughout Ethiopia and are an increasingly important commodity in the cropping systems of smallholder producers for food security and income.

According to Alemitu,(2005), studied as adoption of haricot bean using Tobit model the study found that With regard to economic importance of haricot bean, it is used as source of foreign currency, food crop, means of employment, source of cash, and plays great role in the farming system. According to Gezahegn et al. (2006), haricot beans cover the dominant part of the Ethiopia's pulses export contributing about USD 134 million to the economy of country (ERCA, 2015). The exports account for about 41 percent of pulse exports increasing from 51 tons to 171 tons in the same period (FAO, 2015). The result found show as major factor to contributing to the use of improved seed was price of inputs, access to credits, fertilizer use, economic status of the household, size of land owned, visits of extension agents and infrastructure development were the principal determinants of the adoption of improved seed and income of household.

Debela ,(2015.) studied impact of improved haricot bean variety on income of household using descriptive statistics. The study found that improved crop verities are crucial to increase agricultural productivity and income of household. Improved seeds are the nucleus of all improvements where the potential impact of other farm inputs depends. The use of good quality seeds and improved varieties is widely recognized as fundamental to ensure increased crop production and productivity for centuries (EEA/EEPRI, 2007).

Shewaye , (2015) studies determinant of haricot bean market using tobit model the study found that market participation affected by various factor like government policy, social factors, economical factors cultural factors and external factors like political stability of the nation. These factors could have positive or negative effects, which could either improve or cause a decline in the welfare of the farmer even though the production of market oriented crops was the means for the enhancing of the income of small holders house hold farmers and importance as a source of protein cash and environmental services pulse have not been given as much attention as other crops in the past years

However by the writer's knowledge the enhancement of market oriented crops with investment is without considering smallholders were not acceptable and taken as a gap rather than no empirical evidence in the study area how small farmers have been benefited from production of haricot bean as food secured. It is from this belief that this study was analyzed to generate empirical evidence on the contribution of haricot bean income on food security of smallholder's households. And at the same time to contribute to existing knowledge and understanding of development actors in their future planning and increase production of haricot bean scheme in Boricha woreda sidama zone.

1.3. Objective of the Study

1.3.1 General Objective

The main objective of this study is to evaluate and analyzes the contribution of haricot bean production on small holders food security in Boricha Woreda Sidama Zone.

1.3.2 .Specific objectives

Based on the aforementioned general objective more specifically the research aspires to:

- Compare and contrast the level of income of haricot bean producers and non-producers in Boricha Woreda.
- Identify the level of haricot bean income contributes in to food security?
- Analyses the impact of haricot bean income on food security

1.4. Research questions

The research question addresses to answer the following questions.

- What is the status of household food security in Boricha Woreda?
- Is income from Haricot bean production contributes to food security at household level more than other crop production?
- what is the factor that affects production of haricot bean at Borricha woreda?

1.5. Significance of the Study

Achieving household food security has been one of the priority agendas of the Ethiopian government. Huge amounts of resources including resources from donors have been devoted to achieve food security. However, different reports have shown that the magnitude of the problem has been increasing in all parts of the country. Therefore, an assessment made on as to how measures and responses made so far will provide the government as an evaluative result for its intervention endeavors in the study area as well as for other similar areas. The intervention seeks to support the country's efforts aimed at increasing agricultural productivity and commercialization in a sustainable manner. It does this by facilitating the creation of a favorable policy environment; and helping the country build additional knowledge and investment in the sector

Apart from this stakeholders government bodies NGos research institutions, development partners including extension workers technical Assistants involved in agricultural development has to aware and appreciate the community to produce market oriented crops that harvest with short period of time and improve income of household in boricha woreda.

The present study attempt to enhance or remind and promote the contribution of haricot bean production was increase income of household as well as has good dietary for home consumption and increase food security.

Therefore the finding of this paper were significantly important to give idea for interested students who want to investigate additional research in the area

1.6 S c o p e and Delimitation of the Study

This research study is conducted to assess the contribution of the haricot bean income on Households' food security. The study was delimited to Boricha Woreda which is haricot bean producing woreda located in Sidama Zone SNNPR region and the assessment requires a much more complex, dynamic and also requires multidisciplinary approach which uses different criteria based on interest of groups, disciplines, professions and values. This study, however, is delimited only to investigate the contribution of haricot bean to household food Security.

1.7. Organization of the Thesis

The research paper divided in to five chapter .the first chapter deals with the introduction which composes background of the study, statement of the problem, objective of the study research questions, significance of the study scope and delimitation of the study and organization of the research paper.

The second chapter reviews that with in review of Literature, concept and definition of food security and, food security concept and haricot bean production theoretical food security concept, empirical studies and conceptual frame work, general overview of haricot bean production.

The third chapter presents methodology of the study and description of the study area, data type and collecting methods sampling and sample size determination descriptive analysis, econometric analysis definition and hypothesis of variables.

The fourth chapter reviews that result and discussion, household demographic and socio economic characters of household, descriptive analysis of household income and result of regression and econometric analysis and discussion

CHAPTER TWO: REVIEW OF LITREATURE

This part attempts to present related literature reviewed in relation with production of haricot bean and household food security concepts and definitions, and measuring of it. Subsequently, it tries to discourse the major theoretical perspectives on food security and haricot bean production giving particular emphasis on contribution of haricot bean production income on smallholder farmers food security. Synthesis of few relevant and related empirical studies undertaken on food security is also highlighted in this chapter.

Finally, the conceptual framework for this study, which is drawn from the theoretical perspectives, is explained at the last section of this chapter.

2.1. Food security concept

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." Here food security includes at a minimum the availability of nutritionally adequate and safe food, and assured ability to acquire acceptable foods in socially acceptable ways (e.g. without resorting to emergency food supplies, scavenging, stealing, or other coping strategies).

One of the most influential definitions of food security is that of the World Bank (1986). The Bank defines it as "access by all people at all times to enough food for an active and healthy life." Hence, for the purpose of this study, it is adopted that of the most common and accepted definition given by World Food Summit held in 1996 as a working definition: Food Security' is achieved when it is ensured as "all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life."

Among the various definitions of household food security, the focus in household food security is on how members of a household produce or acquire food throughout the year, how they store, process and preserve their food to overcome seasonal shortages or improve the quality and safety of their food supply. Household food security is also concerned with food distribution within the household and priorities related to food production, acquisition, utilization and consumption

This definition incorporates the four essential components of a measure of food security at the individual and household levels as outlined by, Accessibility, Availability stability and utilization (IFPRI, 2012)

2.1.1 Food Access.

A large extent determined by food prices and household resources. Every household has a limited amount of resources at its disposal, including assets, labor, human capital, and natural resources. These resources are allocated across different income and non-income generating activities (Hoddinott2012) Access to income generating activities is a major determinant of the ability of households to purchase food in general, the allocation of household resources to food

Production, wage labor or other business activities allows the household to access food, either directly through food production or indirectly through income generation (Hoddinott 2012.)

Income generation and food production possibilities of the household are directly affected by individual characteristics such as the education level and health status. Education is linked to the development of cognitive skills that are likely to support income generation and food production (UN World Food Program 2006).

Enhanced cognitive skills may raise income levels and employability through better decision-making in the allocation and distribution of resources and an increased marginal productivity (Mukudi 2003). Education may also play an important role in household production decisions through a better knowledge of nutrition and health practices (Feinstein et al. 2006; Cutler and Lleras-Muney 2006; Luo et al. 2012).

2.1.2. Food Availability

Food availability at the micro-level is strongly related to the overall availability of food, which is determined by domestic food production, commercial food imports and food aid (FAO 2006). These are in turn influenced by domestic policies regarding food production, such as policymakers' focus on food self-sufficiency or food self-reliance. Other policies directly affecting food availability are agricultural subsidy programs, exchange rate policies affecting international trade opportunities and policies creating stable and attractive conditions for agricultural investments.

In general, the food availability dimension reflects the supply side (Barrett and Lentz 2009) and will therefore be affected by all the drivers and determinants that have an impact on the domestic supply of food and the ability to finance food imports.

The quantity and quality of food that a household can acquire given its resources will depend on domestic food prices, which are generally determined by food availability and aggregate food demand. For given prices and income, individual preferences will determine the consumption of different commodities, including food. Dietary preferences can be influenced by factors such as culture, religion and social status (. Atkin, 2013)

An increase in food prices will generally raise the returns to household farm labor and may boost food production. A price increase may therefore positively affect food access through improved food availability. The resulting increase in income may further improve food access, although this effect can be counteracted by the higher cost of food. In any case, this example illustrates that food availability cannot always be easily separated from food access.

2.1.3. Food utilization.

Food utilization refers to an individual's dietary intake and his/her ability to absorb nutrients contained in the food that is eaten. Hence, food utilization relates not only to the quantity of food that is eaten, but also to the quality of the diet. For this reason, both calories and micronutrients appear in the utilization. In particular, the food consumed by an individual must be of sufficient quantity and quality to satisfy not merely subsistence needs, but also energy needs for daily activities, notably income generation (UN World Food Program 2007).

Proper food utilization from an early age is fundamental for the physical and mental development of an individual and determines future income generation possibilities. Research has shown that children suffering of malnutrition in the early stages of life have a higher propensity to become overweight and to be affected by a variety of chronic diseases. Popkin et al. (1996).

2.1.4. . Food stability

To be food secure, a population, household or individual must have access to adequate food at all times. They should not risk losing access to food as a consequence of sudden shocks (e.g. an economic or climatic crisis) or cyclical events (seasonal food security) The concept of stability can therefore refer to both the availability and access dimensions of food security

2.2. Theoretical Review Food Security Concept

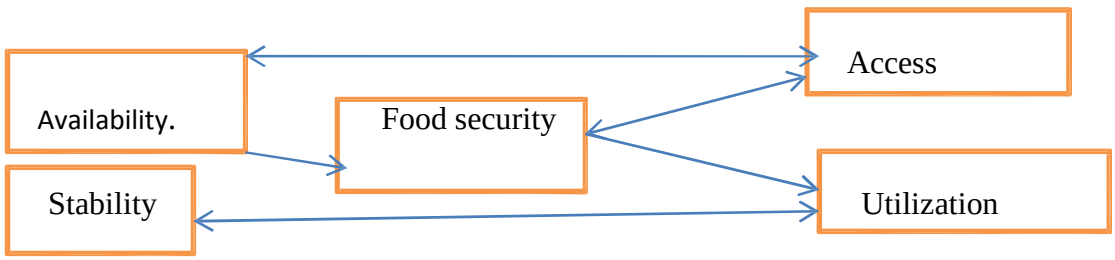
There are several different ways of defining food security. One set is similar to the World Bank and World Food summit definitions; another set focuses on the element of food security in a manner similar to the definition used by (FAO, 2002). Food security exists when all people, at all times, have physical and economic access to sufficient, safe, and nutritious food to meet their dietary needs and food preferences for an active and healthy life (FAO,2007).

Household level food security is rather complex, trans-boundary and multifaceted including biophysical, socio-economic, political, demographic, gender and other dimensions. This understanding of food security encompasses not only current consumption, nutritional status and health, but also vulnerability to and coping with food insecurity (FAO, 2002).

The food security definition comprises four key dimensions (Fig.2.1): availability, stability, access and utilization (FAO, 2007). The first dimension relates to the availability of sufficient food, i.e., to the overall ability of the agricultural system to meet food demand. Its sub dimensions include the agro-climatic fundamentals of crop and pasture production and the entire range of socio-economic and cultural factors that determine where and how farmers perform in response to markets.

The second dimension, stability, relates to individuals who are at high risk of temporarily or permanently losing their access to the resources needed to consume adequate food, either because these individuals cannot ensure ex ante against income shocks or they lack enough, reserves to smooth consumption ex post or both. An important cause of unstable access is climate variability, e.g., landless agricultural laborers, who almost wholly depend on agricultural wages in a region of erratic rainfall and have few savings, would be at high-risk of losing their access to food.

Figure 1: Measurement of Food Security



Household Income: is a measure of the combined incomes of all people sharing a particular household or place of residence. It includes every form of income; Income refers not only to the salaries and benefits received but also to receipts from any personal business, investments, dividends and other income. Household income often used as an economic indicator.in this study household income includes income obtained from livestock agricultural production off farm income and that obtained from gift of others.

Food Security: Food security is a concept that has evolved over time. According to Hoddinott (1999), there are approximately 200 definitions and 450 indicators of food security. In the mid-1970s, definitions of food security focused on aggregate food supplies at national and global levels, and analysts advocated production self-sufficiency as a strategy for nations to achieve food security

In the 1980s, the focus of food security shifted from global and national levels to household and individual levels. Definitions further underwent another round of evolution after the 1996 World Food summit. According to the refined definition, food security is seen as a situation that exists when all people, at all times, have physical, social, and economic access to sufficient, safe, and nutritious food that meets dietary needs and food preferences for an active and healthy life (FAO 2002).

2.3. Overview of Haricot Bean

Common bean (*Pharsalus vulgaris* L.) is the world's most important food legume for direct human consumption. Average per capita consumption of common bean in the main bean production areas is higher in Africa, estimated at 31.4kg/year (Schoonhoven and Voysest, 1991). High in nutrients and commercial potential, common bean holds great promise for fighting hunger, increasing income and improving soil fertility in Sub Saharan Africa (E.Katungi, A.Farrow, T. Mutuoki, S.Gebeyehu, D.Karanja, F.Alemayehu, 2010)

The crop occupies more than 3.5 million hectares in sub-Saharan, accounting for about 25% of the global production but production is concentrated in the densely populated areas of East Africa the lakes region and the highlands of southern Africa. In Africa, common bean is a popular crop among small-scale farmers, given its short growth cycle (about 70 days) which permits production when rainfall is erratic. Common bean is often grown by women farmers for mainly for subsistence and markets.

Despite the great importance, the growth in common bean productivity has been slow as a result of both social and physical environments in which the crop is grown. In Eastern and Southern Africa, common bean is a small farmer crop, cultivated largely by women in an agronomic setting characterized by marginal environments and low external inputs where stresses maintain productivity at less of 25% of potential yield (Beebe, P Comm.).

Abiotic stresses such as drought and soil fertility constraints are widespread, often severe in some countries in Africa Similarly, in Ethiopia; common bean is one of the most important cash crops and source of protein for farmers in many lowlands and mid-altitude zones. The country's export earnings is estimated to be over 85 % of export earnings from pulses, exceeding that of their pulses such as lentils, horse (faba) bean and chickpea **(**Negash,2007). Overall, common bean ranks third as an export commodity in Ethiopia, contributing about 9.5 % of total export value from agriculture (FAOSTAT, 2010

Common bean is also highly preferred by Ethiopian farmers because of its fast maturing characteristics that enables households to get cash income required to purchase food and other household needs when other crops have not yet matured (Legesse et al. 2006).

2.3.1 Economic Importance of haricot bean

Pulse crops are important components of crop production in developing countries and a vital crop for achieving food, nutritional and income security of smallholders. The important and diverse role played by pulses in the farming systems and in diets of poor people, makes them ideal crops for achieving the developing countries government goals of reducing poverty and hunger, improving human health and nutrition and enhancing ecosystem resilience. On average, pulses contribute about 3% of total calories consumed in developing countries, ranging from 4% in Sub Saharan Africa (SSA) to less than 1% in Central Asia (Sitou and Mywish, 2011).

According to Tewodros (2014) Food pulses (fava bean, field pea, chickpea, haricot bean and lentil, also called legumes) occupy about 13% of the croplands in Ethiopia and they are the second most important element in the national diet, providing a principal protein source. They are also an important dietary supplement to cereal consumption. (Tewodros, 2014)

Haricot bean is a very important crop produced well in most of the low and mid altitude agro ecologies of Ethiopia. An increasing pattern has been observed in the country in haricot bean production since 2006. This implies that market supply is also increasing.
Market supply is generally the mirror image of production in the country. The crop is considered as the main cash crop and food (protein) source of the farmers in Ethiopia, mainly in the rift valley area. Because of this importance, farmers are motivated to continue producing it. (Ecx, 2009).

2.4. Empirical Review

Common bean (*Phaseolus vulgaris*) is an important subsistence crop for smallholding farmers in Africa. It is often referred to as the meat of the poor because of its high protein content and affordability. Beans are also vital sources of micronutrients such as iron, reducing iron deficiency caused by the lack of diversity in the starch-based diets of the poor. Rwanda has one of the highest per capita bean consumption in the world (Kalyebara and Buruchara, 2008), confirming that bean is a key crop for food security. Beans provide 32 and 65 percent of calories and protein intake in the Rwandan diet, whereas protein sourced from animal provides only 4 percent of the protein intake (Asare-Marfo, et al., 2011, CIAT, 200 International organizations and governments expect improved varieties to alleviate malnutrition and hunger, but, to date; impact assessment studies have mainly focused on productivity and aggregate welfare measures. Fewer studies

document the impact of technology adoption on household food security (Kabunga, et al., 2014, Rusike, et al., 2010, Shiferaw, et al., 2014).

Similarly, in Ethiopia, common bean is one of the most important cash crops and source of protein for farmers in many lowlands and mid-altitude zones. The country's export earnings is estimated to be over 85 % of export earnings from pulses,

Common bean is also highly preferred by Ethiopian farmers because of its fast maturing characteristics that enables households to get cash income required to purchase food and other household needs when other crops have not yet matured (Legesse et al., 2006).

2.5. Conceptual Framework, Haricot bean income and food security linkage

2.5.1. Food Security Concept

Food security is a concept that evolved over time. There are many definitions of food security. Among various definitions given by a number of experts, the most widely used definition of food security is given by the World Bank that reads as "access by all people at all times to enough food for an active, healthy life" (World Bank, 1986). In the definition given, the essential elements are the availability of food and the ability to acquire it. In this regard, Maxwell and Simth (1992) give details that there are four core concepts implicit in the notion of 'secure access to enough food at all times'.

A. Access to enough food- defined by entitlement to produce, purchase, exchange food, or receive it as a gift. An individual's entitlement is rooted in his/her endowment - the initial resource bundle that is transferred via production and trade into food or commodities, which can be exchanged for food;

B. Sufficiency of food- defined mainly as the calories needed for an active, healthy life in which the case is individual not about the issue of household; whereas household is aggregate of individuals in household whose food need has to be satisfies.

C. Security- defined by the balance between vulnerability, risk, and insurance. The notions of risk and risk avoidance have been central to definition of food security since the term came into use in 1970s.

D. Time- where food insecurity can be chronic, transitory or cyclical.

The food Security definition comprises four key dimensions: availability, stability, access and utilization (FAO, 2007). The first dimension relates to the availability of sufficient food, i.e., to the overall ability of the agricultural system to meet food demand. Its sub dimensions include the agro-climatic fundamentals of crop and pasture production and the entire range of socio-economic and cultural factors that determine where and how farmers perform in response to markets. The second dimension, stability, relates to individuals who are at high risk of temporarily or permanently losing their access to the resources needed to consume adequate food, either because these individuals cannot ensure ex ante against income shocks or they lack enough, reserves to smooth consumption ex post or both. An important cause of unstable access is climate variability, e.g., landless agricultural laborers, who almost wholly depend on agricultural wages in a region of erratic rainfall and have few savings, would be at high-risk of losing their access to food.

The third dimension, access, covers access by individuals to adequate resources (entitlements) to acquire appropriate foods for a nutritious diet. Entitlements are defined as the set of all those commodity bundles over which a person can establish command given the legal, political, economic, and social arrangements of the community of which he or she is a member. Thus a key element is the purchasing power of consumers and the evolution of real incomes and food prices. However, these resources need not be exclusively monetary but may also include traditional rights, e.g.to a share of common resources (FAO, 2007). Food access depends largely on household purchasing power, which varies in relation to market integration, price policies and temporal market conditions (UNEP, 2002). Finally, utilization encompasses all food safety and quality aspects of nutrition; its sub dimensions are therefore related to health, including the sanitary conditions across the entire food chain (FAO, 2007)

2.6 Conceptual frame work

Agriculture plays a crucial role in sustainable Livelihood in rural communities' improvement in access to production and diversity of livelihood and reduces vulnerability for smallholders producers (Gbremedihin& peden , 2003)

This study shows Dimension of how production of Haricot bean contributes to food security of rural communities.

Abebaw (2003) explains the importance of having sufficient income enabling an individual to purchase enough food for household. In many low-income developing countries, agriculture is the main source of income and entitlement for rural families. The following simple conceptual framework is developed to show how access to irrigation increases household income and food security. In general, the conceptual framework shows how farm households are able to generate high income through production of high value crops using irrigation and at the same time it indicates how income to be generated increases household food security through production based entitlement (production of subsistent crops) and trade based entitlement given favorable internal and external factors in place.

Fig 2.1 conceptual frame work of haricot bean production

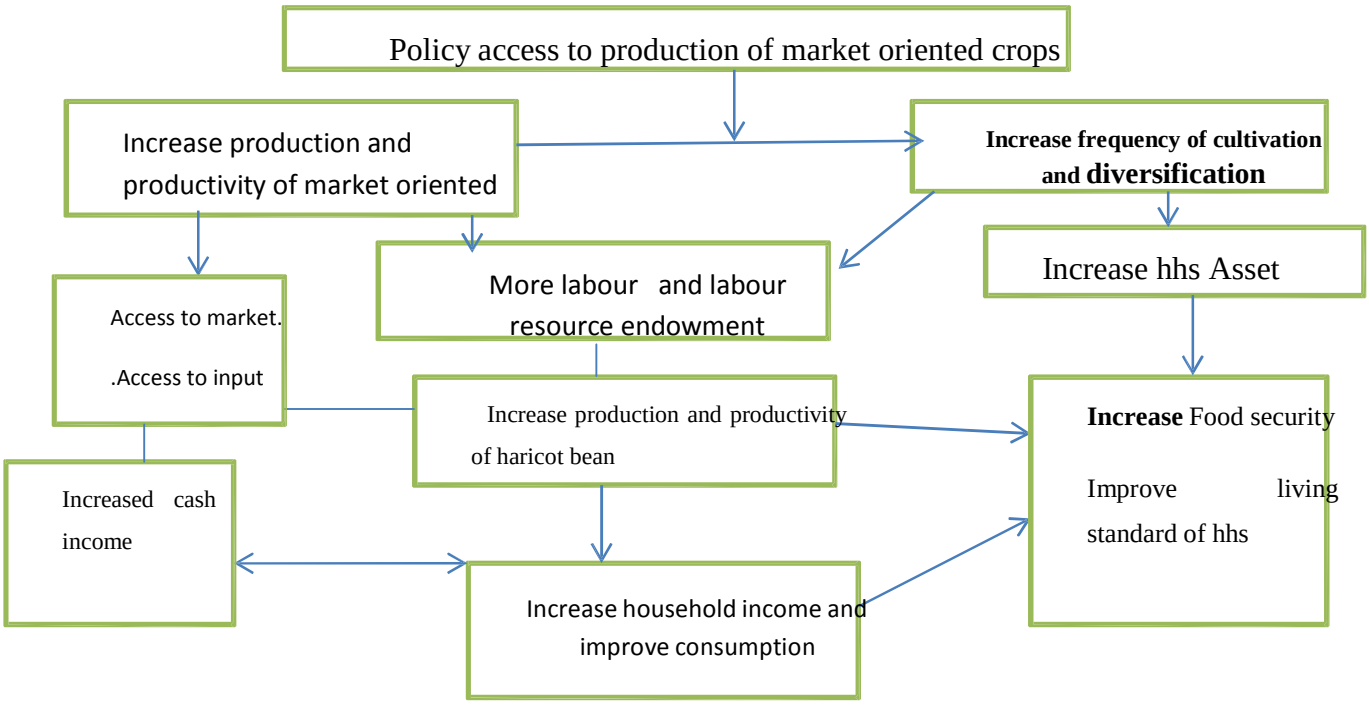


Fig 2.. **Conceptual Framework of contribution of haricot bean income on Household Food Security**

2.6.1. Food Security in Ethiopia

Chronic food insecurity in Ethiopia is the consequence of several long-term contributing factors (Riley et al. 2002); such as Poverty, Large variations in annual and seasonal precipitation, Water shortage for people, crops and livestock, High population density in the highlands and midlands, Environmental degradation, Lack of education, Lack of alternative employment opportunities in rural areas, Lack of productivity enhancing products, High business costs due to bad infrastructure and inefficient markets, High levels of infant and maternal malnutrition (contributing factor of disease and mortality) (Walsund , 2011) Despite efforts to improve food production through increased use of chemical fertilizers and improved seeds, notable improvement in national food production has not been yet achieved. At the national level the country continues to depend on food aid and to a lesser extent and mainly on food imports (Walsund, 2011).

Rural households produce their own food and also purchase from the market. While the majority of urban households are only purchasers of food, some engage in urban agriculture mainly livestock and produce both for their own consumption and for the market. Urban and peri-urban agriculture is intensive in nature and plays an important role in ensuring food security. Most smallholder agriculture in Ethiopia is characterized by a mixed farming system combining livestock and crop activities. Their products are used for both home consumption and sale at the market. In cash crop producing areas, farmers sell cash crops (coffee, chat, fruits and vegetables, etc.) and purchase food grains from the market. For them, the effectiveness of food market systems is as important as the reliability of food production for personal use. In urban areas where household food security is dependent on household income, work opportunities as well as an efficient food market system are crucial to improving access to food (Walsund, 2011). The Ethiopian government's development policy emphasizes agricultural sector development led industrialization. In 1996, the government initiated a food security strategy built around: increasing the availability of food through domestic production; ensuring access to food for food deficit households, and strengthening institutional emergency response capabilities (Walsund, 2011).

2.6.2. Food security in Boricha woreda

Food insecurity in Ethiopia is normally understood in terms of recurrent food crises and famines. The responses to these food crises were conventionally dominated by emergency food-based interventions. However, a high proportion of households that received emergency food aid or food for public work were not only famine prone but also chronically food insecure and they faced predictable annual food deficits (Devereux *et al.*, 2006).

Therefore, in 2003, the government of Ethiopia launched a major consultation process with development partners building on its National Food Security Strategy. This consultation process was aimed at formulating an alternative to emergency relief system to support chronically food insecure households. In case, it has developed

Food Security Programme (FSP) for long-term solutions of chronic food insecurity (MoARD, 2010).FSP (Food Security Program me) is one of components of National Food Security Strategy (FSCB M&E Task Force, 2004).

Boricha woreda is also one of chronically food insecure woredas in the Sidama zone, SNNPR. Hence, the woreda has been intervened with FSP. Likewise, chronically food insecure households in chronic food insecure kebeles have supported from FSP (food security program me).

2.6.3. Agricultural Production and Food Security.

The conventional role of agriculture involves producing food for the growing population, producing raw materials for agro-industry, providing labor and market for urban industry, supplying savings for investment, and providing export earnings (World Bank, 2008; Pingali, 2010). The focus has been on the flow of food, materials and labour towards industry and urban areas, and to some extent, the flow of inputs towards farming areas. However, Pingali (2010) argues that agriculture has multiple roles which need to be re-discovered, and receive a renewed understanding and recommitment (agricultural renaissance) to realize greater value from the sector these include agriculture's contributions to socio-economic development through income growth, food security, household livelihoods, poverty alleviation, gender empowerment and environmental sustainability (Pingali, 2010).

Agriculture also provides income used for household expenses and increased national food supply and food price reduction, which lead to better nutrition, food security and poverty reduction for rural and urban net food buyers (Gollin, 2010; Pingali, 2010).

2.6.4. General Trends in Food Consumption in Ethiopia

For those with low levels of income, food accounts for the majority of a households‟ consumption budget. Engel's Law dictates that as household income rises, the share spent on food falls. In Ethiopia, datasets show that food consumption expenditures have declined from 60 percent in 1995/96 to 56 percent in 2004/05 (MoFED 2008), consistent with Engel's Law. The data also show that there has been a rapid growth in non-food expenditure levels in urban areas in the same period (MoFED 2008). The decline in food expenditure slightly varies between rural and urban locations density of per capita food expenditure by location, divided by rural and urban areas. While the national food consumption pattern clearly follows the rural consumption distribution, urban consumption was significantly higher than rural consumption.

2.6.5. Food Calorie Intake Pattern

Food security exists when "all people at all times have access to safe nutritious food to maintain a healthy and active life" (FAO, 1996). The main goal of food security is for individuals to be able to obtain adequate food needed at all times, and to be able to utilize the food to meet the body's needs. Food security is multifaceted. In general there are three pillars underpinning food security; these are food availability, food accessibility, and food utilization. This infers from concept that food security is not just a production issue. In addition, Maxwell (1996) suggests including related concepts of access, sufficiency, vulnerability, and sustainability in defining food security

Food availability for the subsistent farm household means ensuring food availability for the households through own production. However, due to lack of adequate storage facilities and pressing needs, they mostly end up selling excess produce during the harvesting period, and sometimes rely on market purchases during the hungry season

Food utilization means ensuring a good nutritional outcome, which is nutrition security. Having sufficient food will not ensure a good nutritional outcome if poor health results in frequent sickness building this pillar means investing in complementary resources such as nutrition

education, health care, provision of safe water and better sanitation, instituting gender symmetry, and removal of child abuse practices (Doppler, 2002 In general, the available literature suggests four approaches to measure food security (Maxwell, 1996; Aldrerman and Marito, 1994; Shiferaw and Tesfaye, 2004). Among those approaches model uses a dependent variable quantified based on the level of calories consumed per head and day. Dietary allowances of nutrients have been recommended by national and international bodies from time to time, based on the available scientific information on human requirements. Dietary standards may vary from country to country and region to region Based on the WHO recommendation an adult equivalent person should get at least 2000 k calories of energy per day, even though, this varies from country to country and region to region. Maxwell (1996) recommends that households that get about 80% of the recommended level of calorie intake can be considered as food secured.

CHAPTER THREE: DESCRIPTION OF THE STUDY AREA AND RESEARCH METHODOLOGY.

This chapter introduces the area that selected for the this study boricha woreda in sidama zone southern Ethiopia and give overview of location, topography population size and economic dependent that household practice and other components .

3.1. Description of the Study Area

This chapter gives an overview of physical, demographic and socio-economic situation of the Zone in general and the study Woreda in particular. It briefly explains the population, land use, soil type and the farming characteristics of the study area.

3.1.1 Location and Topography

The area which was selected for this study Boricha woreda was one of the 19 woredas found in Sidama zone, Southern Nation Nationalities and Regional State. It is located at 36 kilometers from the Regional and Sidama Zonal capital city, Hawassa, and 311 kilometer from Addis Ababa. The woreda estimated to has 588.05 sq.km areas and its geographical location extends from 6º 46'N and 38º04'E to 7º01'N and 38 º24'E boricha woreda is characterized by flat laying topography as far as the altitudinal variation of the region is concerned, it extends from the lowest point at south west of the mouth of tributary of Bilate river 1320m.a.s.l to north east 2080m.a.s.l with some scattered ridge in between such as Boricha woreda 2040 m.a.s.l and siso Ridgw 2020 m.a.s.l

Source woreda finance and economic development (BOFED)

3.1.2. Agriculture

The economy of the woreda mainly based on agriculture Mixed farming system is dominant activity for rural households. It is confined to production of rain-fed crops. The main crops produced in the study area are maize, haricot bean, *Enset*, coffee, potato and sweet potato. It has 42 kebeles. Out of these kebeles three are urban and the other 39 are rural kebeles.

Source: woreda bureau of Agriculture and Natural resource (BOA&NR,2007)

Sidama zone Administration Map

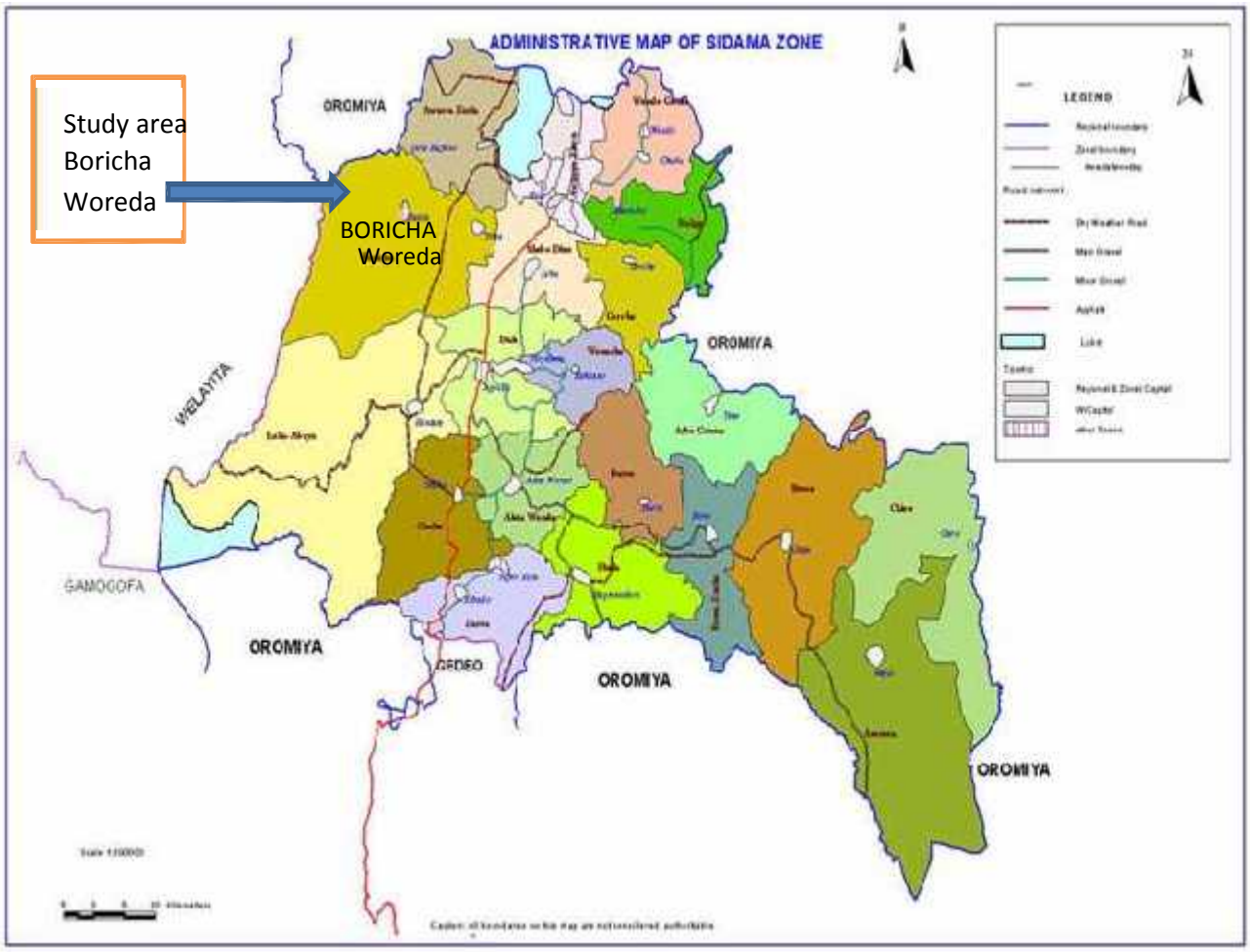


Fig 2.1 location of study area

Source: Sidama Zone Administration (2004)

3.1.2. Climate and Altitude

Woreda is agro-ecologically categorized into two: 25% is midland (*Woynadega*) and 75% is lowland (*Kola*). *Woynadega* has medium altitude, whereas *kola* has low altitude. The altitude of woreda ranges from 1,320 to 2,080m.a.s.l. The range of annual rainfall is between 27.82 to 128.58mm. It is bimodal with short rainy season from March to April which is '*Belg'*, and the long rainy season from June to the middle of August which is '*Kiremt*'.

Source : WBOANR 2007

3.1.3 Population

According to woreda office of finance and economic development), (WOFED), (2016 the populations of the woreda were 288,957. From these 144.866 (50.2%) are males and 144.091 (49.8%) are females. Out of 39 rural kebeles 36 are chronically food insecure and the remaining 3 are food secure. Chronically food insecure kebeles have been intervened with FSP the purpose of FSP interventions is to bring long run solution on chronic food insecurity by enabling chronically food insecure households to achieve food security within specific period of time, 3-5 years.
However, households intervened with FSP are unable to achieve food security as expected and planned, have low land size ,high family size and have low access to service are also identified to intervene in FSP (CSA,2013).

3.2 Data type and data collection

Both quantitative and qualitative data type was used to be collected from primary and secondary data source. Qualitative methods are useful for improving the depth of understanding of the local circumstance that households operate in, while quantitative tool help to determine the breadth to which observed behavioral practice, resources or problems are distributed within a population. (Ellis, 2000)

Primary data was collected from sample farmers and key informants using a closed and open-ended questionnaire. Moreover, undertake group discussions with researchers and experts of the respective agriculture office, development agents and by direct observation. The purpose of assigning development agents or woreda subject matter specialists were to keep accuracy of information about production by communicating with local language sidamigna and Amharic that community use day to day Secondary sources of data collected from published and unpublished document about the food security, agricultural production, haricot bean production farming system, and other socio-economic information
The secondary data was collected from books, journals, internet web sites and from different institutional report like CSA and from the Regional Bureau of agriculture and Natural resource (BoA&NR), regional agricultural office documentations, profile, manuals, plans and reports.

3.2.1 Questionnaire of household survey

Most of the data required to answer the research questions were collected from primary sources. To generate the required data from the primary sources, different qualitative methodological approaches such as in-depth interviews, focus group discussions, was proceeds among those methods questioner of household survey was selected as one inputs of the survey .

Questionnaire was used as a tool for gathering data in the research. Both close-ended and open-ended questionnaires were prepared to gather data from total sample household heads.

Then prepared questionnaire was translated into vernacular language (Sidamigna). Prior to Conducting actual process of data collection using this questionnaire is intended to gather more detail information from participants. The questionnaire was circulated though enumerators and supervised by researcher.

The completed questionnaires were collected and the information obtained in this way was changed to spreadsheet format, quantified and basic statistics was used as calculating by means of percentage and average. The questionnaire also addresses important issues such as the contribution of haricot bean income food security problem, their awareness on how to increase income of household security strategies and their major economic activity related to use and farming activity and other relevant information.

3.2.2 Key Informant Interview (KII)

To have deep understanding of haricot bean production income and food security situation of the area, in-depth interview was held with key informants. The interview was conducted to investigate their living condition in general and food security in particular and supplement the findings obtained through household survey.

To get more, detailed information about contribution of haricot bean income on food security situation two key informant interview was held with experts from agricultural bureau and from Woreda of agricultural office and development Agents works on kebele level, farmers those producing and non-producing of haricot bean community representatives, elders and those people earning income from off farm activities in three selected kebele and traders of haricot bean in the local market was participated as key informants .

3.2.3. Focus Group Discussion (FGDs)

A focus group discussion is a structured discussion used to obtain in-depth information (qualitative data - insight) from a group of people about a particular topic. The purpose of a focus group is to collect information about people's opinions, beliefs, and attitudes, it allows the participants not only to speak for themselves but also to negotiate their own shared views that not come to consensus or make a decision. Using a checklist comprising open ended questions specifically prepared for each groups of target community and overall situation of the study area have been asked to get various socio-economic facts.

A total of three Focus group discussions were undertaken with in a group of 7-10 members was conducted with purposively selected individuals' community representative's retailers of haricot bean, haricot bean producers , cooperatives and comprising of sample size of households, which was organized from three selected kebeles of the population. It consists of selected household's member. This focus group discussion was conducted with the objective of obtaining detailed information about their perception contribution of haricot bean income on food security.

3.3. Sampling Method and Sample Size Determination

Multi-stage sampling techniques were used to obtain representative sample households from study population. It is obvious that decision on sample size are influenced as much by cost and time consideration as by the required precession in estimators (Ellis, 1991). Other factors to take in to account are the size of the population to which one wants to recognize, the heterogeneity of the population and how accurate one wants to sample statistics (Bernard, 1988).

There is always a grater trade–off between accuracy and greater economy in sample. Although the degree of accuracy may be reduced, smaller, more cost effective samples will still provide researchers some notion of trend that are occurring in area (Ekuland 1991).by considering this in mind the study site, boricha woreda, was selected purposively because it is one of chronically food insecure woreda and intervened with food security programs here after out of 36 chronically food insecure kebeles found in woredas three kebeles that located in the same agro ecology was selected using purposive sample of present by advising woreda office of agriculture and natural resource extension workers because of potential area to producing haricot bean in study area. Among three kebeles that select purposively 46 household those produce haricot bean from each

kebels was selected and 90 household from the same kebeles household that not produce haricot bean was selected for sample in the same kebeles .In case, random sampling technique was used to select the name of individuals in this study. Accordingly, sample households name were selected by random sampling methods from three sample kebeles. In order to randomize, lists of study households (population frame) were obtained from woreda agriculture and natural resource office department of agricultural extension.

Then, household those selected from each kebeles randomly was selected through writing the name on pieces of paper and then picking households from listed names of households on a Container i.e. lottery system. So that, 136 sample respondents proportionally and randomly selected depending households size was selected for primary data from three sample kebeles of boricha woreda

The sample size was determined using the following formula (Cochran, 1977)

$no = \frac{z^2 pq}{e2}$: $no = \frac{(1.96)^2 (0.3)(0.3)}{(0.5)2} = 136$ = the formula 0.3 and 0.3 for the proportionality of sample

Where n is the minimum sample size, z is 1.96 at 95% confidence level, p is population proportion i.e. the proportion of haricot bean producers in the area. While *e* is the margin of error (acceptable error) which is assumed to be 0.05 and *q* is a weighting variable computed as (1-P).

Table. 1. Distribution of Sample households by their respective kebele

No	Selected kebele	Total HHS	Haricot bean producing sample HHs %	Non Producing HHs %	Total Respondents	Respondents in %
1	Shondolo liwo	1255	17	30	47	34.6%
2	Sadamo chala	1381	15	30	45	33%
3	Hanja Goro	1420	14	30	44	32.4%
	Total	4056	46	90	136	100%

Source Boricha Woreda Finance and economic dev.t

3.3.1 Data Analysis

3.3.1.1 Descriptive Analysis

Both descriptive analysis techniques and qualitative assessment were used for data analysis. The data gathered through household survey was analyzed using descriptive statistical methods such as frequency, mean, and standard deviation. Moreover, an independent t-test was used to test the mean differences between haricot bean producers and Non producers with respect to relevant continuous variables which affect likelihood of participation in producing of haricot bean and household income. Chi-square test was also used to test the mean differences between producers and non-producers with relevant categorical variables.

The overall adequacy of food supply in the study area was analyzed by using household food Balance model (HFBM) which is developed by Degefa in 1996, which is adopted from FAO, to simplify the method of gathering data in food security research nationally as explained by (Messay, 2009) Conveyed that this analytical tool has been used by many scientific studies to assess household food security situation and to measure the contribution of haricot bean income to food availability.

Household Food Balance Model:

NGA = (GP+GB+FA+GG-(HL+GU+GS+GV)

NGA = Net grain available/year/household

GP = Total grain produced/year/household

GB = Total grain bought/year/household

FA = Quantity of food aid obtained/year/household

GG = Total grain obtained through gift or remittance/year/household

HL = Post harvest losses/year

GU =Quantity of grain reserved for seed/year/household

GS =Amount of grain sold/year/household

GV =Grain given to others within a year

As mentioned above, the method has to derive separately the amount of grains available for domestic utilization (food use) and other food components (grain use for other purpose/loss Hence, the net quantity of food available was calculated and converted into dietary calorie equivalent based on Ethiopian Health and Nutrition Research Institute (1995-1997) household members were also converted their adult equivalent.

Then the amount of total calories available by each sample household was computed and divided by seven days to get per day calories available for households. The figures were divided to the adult equivalent (AE) of respective households which finally was given the amount of calories available per AE for each sampled household.

The calculated calorie was compared against the national average daily caloric requirement for a moderately active adult the household less than minimum amount calories required (<2100 kcal) was put under food in secured and otherwise food secured to look in to the dietary calorie status of the households in the study area. Hence, based on the data available, this study employed the Food Balance Model in order to analyze the household food security and to calculate the per capita kilocalorie per adult per day beyond which a household is food secure or not. The calculation was as follow

Total cost = Labor cost (birr/ha) + Seed, fertilizers and pesticide Cost (Birr/ha) +oxen cost

Total income (Birr/ha) = Net production (qt/ha) x Market price (birr/kg)

Net income (Birr/ha) = Total income (Birr/ha) – Total cost (Birr/ha)

After classifying sample households based on their food security status mainly as food insecure and food secure, the major food security determinants of the study area were identified using binary logit model.

3.3.2. Econometrics Analysis

3.3.2.1. Model Specification

To test the hypotheses, a probabilistic model is specified with food security as a function of series of socioeconomic characteristics. The dependent variable is dummy variable, which takes a value of zero or one depending on whether or not a household is food insecure or not. Here, the main purpose is to determine the probability that an individual with a given set of attribute will fall in food insecure or secure groups linear probability model (LPM) logit or probit models can be used to estimate dependent dichotomous variable

However the Logit model has advantage that these predicted probabilities can be arrived easily than other model which handle limited response dependent variable thus the Logit model were apply in this study to estimate the probability of production of haricot bean that has taken either of the two value production of haricot bean or not producing haricot bean

The natural log of the odds ratio is the "logit" and it is a linear function of the x's (that is, of the Right hand side of the model).

$$\ln\left[\frac{pi}{1-pi}\right] = \alpha + \beta x \qquad (1)$$

$$p_i = \frac{e^{zi}}{1+e^{zi}} \qquad (2)$$

Where Pi, is 1 with the probability the household is secure, 0 otherwise insured

$$p_i = a_0 + \sum_{i=1}^{n} a_i x_i + u_i \qquad \text{where, } i = 1,2,\dots,n \qquad (3)$$

n = the number of explanatory variables

a_o = intercept term

a_i = the coefficient of explanatory variables.

u_i = disturbance term

X_i = Explanatory variables such as land size, area of crop coverage, amount of rainfall, family size, age, household education level, number of livestock, access of the credit service, access of infrastructure, institution, etc.

3.4 .Definition and hypothesis of the variables

3.4.1. Dependent variable

Food security :(kilonew)

Food security status at the household level was measured using HFBM tool and converted in food energy requirements based on the household's adult equivalent ratio and reached at figure of food calorie in kilo calorie/day/person. Thus, those households beyond the estimated calorie requirement level (>2100kcal per person per day) were deemed to be food secure and otherwise food insecure. The study applied a probability model specified as food security is a function of series of explanatory socioeconomic, demographic, institutional and farming characteristics of households as elaborated below. The dependent variable is a dummy variable, which takes a value of zero or one depending on whether or not a household is food secure or not (i.e. food secure =1 otherwise food insecure =0.

3.4.2. ExplanatoryVariables

1. **Haricot bean production (HBP):-** Common bean is also highly preferred by Ethiopian farmers because of its fast maturing characteristics that enables households to get cash income required to purchase food and other household needs when other crops have not yet matured (Legesse et al., 2006) in Ethiopia, common bean is one of the most important cash crops and source of protein for farmers in many lowlands and mid-altitude zones. The country's export earnings is estimated to be over 85 % of export earnings from pulses, exceeding that of other pulses such as lentils, horse (faba) bean and chickpea **(**Negash,2007). Overall, common bean ranks third as an export commodity in Ethiopia, contributing about 9.5 % of total export value from agriculture (FAOSTAT, 2010).

2. **Dependency Ratio (DRATIO):-**. It is measured by the ratio of household member with age greater than 65 and less than 14 to productive age of 14 to 64. The dependency ratio affects the probability of farmers‟ producing haricot bean and dependency ratio enables the household to have sufficient labour to participate in haricot bean production thus increasing the premium price that the households can pay
3. **Farm size (FSIZ):** Size of cultivated land is a continuous variable measured in hectare. Farm size is a measure of the availability of land for agricultural production. Household with more land to have a larger number of crops and more marketed surplus which results increase in total income of the household's which will be inurn invested into other income generating activities. Therefore, availability of cultivated land hypothesized to have positive effect on the level of household income diversification the positive relation indicate that the household with owned land resource has owned land has access to more opportunities of diversifying income (Misgana Asmelash 2014 ,2003)

4. **Age of the Household Head (HHAG):** This is a continuous variable and that is measured in years representing experiences in rural way of life. Since in a rural society decisions are mostly taken by a household-head, we have considered the age of household-head only. Older heads have higher accumulated experience in rural way of life and hence help their households to diversify their income activities (Abebaw ,2003)
5. **Sex of Household Head (**SEXHHH): Household head is person who economically supports or manages the household or for some reason of age or respect is considered as head by other members of the household. It could be male or a female. Male-headed households have more access to agricultural technologies, more labor power and farmland as compared to female-headed households. Women farmer may need a long adjustment period to diversify their income sources fully and become food secure (Christina et al., 2001; Beyene and Muche, 2010). As most female headed- households lack labor, they often rent their land on a share cropping basis. Hence, male-headed households are in a better position to pull labor force than the female-headed ones. Moreover, with regard to farming experience and access to technology males are better than female farmers. So sex of household head is an important determinant of food security and it is represented in the

Model by dummy variable (i.e. 1 if the household head is male and 0 otherwise). Therefore, it is hypothesized male headed households are more likely to be food secure than female headed households.(Mequanent,muche,2015)

6. **Participation in Agricultural Extension Program (**PAEX**):- This** dummy variable taking the value of 1 if household participate in agricultural extension program and zero otherwise. The main objective of the extension program is working to generating the income sources of the households. It induced income at the household level and to increase the crop production by using modern agricultural technologies like chemical fertilizer, irrigation etc. Therefore, participating in agricultural extension service expected to have positive impact on the level of income on house hold level

7. **Access to Credit (CRAC): -** It is a dummy variable that taking the value 1, if the household has either access to credit or 0 otherwise. Thus, hypothesized that a household which has access to credit is more likely diversify their income. This a priori expectation is drawn from a study by Zeller (2001) that emphasizes the role of in enhancing the level of households' productive capital, and the role of savings in the accumulation of assets, which provide capital for the income earning process. Thus, with the necessary capital and credit a household engage in diverse income generating activate(Aliou Diagne ,zeller,2001)

8. Labor Availability :(LAUB) Labor was measured in terms of man Equivalent Availability of labor is likely to influence the gross margin of the income. A farm with larger number of workers per hectare (unit of land area) is more likely to be in a position to try and continue using a potentially profitable innovation and it is expected to influence adoption positively. Household's labor availability has positive effect of on adoption increase income (Million and Belay, 2004)

9. Annual income :(Ainc) The status of the farmers in terms of their annual income will matter in deciding to purchase improved agricultural inputs. Wealthy farmers decide to take risk for using agricultural inputs (Getahun, 2004). Therefore, annual income has assumed to have positive relation to dependent variable. It was measured in Ethiopian birr

10. **Access to market. (MAAC)** Market access is one of the variables that affect input output marketing in rural areas. Presence of input/output marketing at farmer's disposal would Increase the uptake of improved agricultural inputs by farmers and increase income of household. Hence the variable was expected to have positive influence on the dependent variable. It was dummy variable with value of 1 for yes if market were far away from the village more than 2 km and 0 other wise.
11. **Input costs-(INPC)** The price of agricultural inputs may encourage/discourage farmers in order to use production enhancing inputs. Wolday (1999) indicated that price of inputs is significantly related to use of improved seeds. If the pricing regulation of inputs does not invite farmers, it will have negative effect on improved agricultural inputs use. Therefore, this variable was expected to have negative association with the dependent variable. It was dummy variable with value of 1 for yes if the price of the input were invite farmers and accessible to buy easily and 0 other wise
12. **Livestock holding (LIVESTOK):** Conditional on keeping livestock, one would expect poor households to keep smaller herds / flocks than better-off households. Livestock Ownership across Operational Holding Classes, shows a positive correlation between farm size and ownership of large ruminants, small ruminants and poultry (GoI, 2006); the World Bank (2004) reports a positive association between livestock herd size and household well-being in Nicaragua.

The herd / flock size, expressed in tropical livestock units (TLU), of rural livestock keeping households by expenditure quintile. TLU (250 kg live weight) standardizes live animals by species mean live weight with the following conversion factors: cattle: 0.55 to 0.60 depending on the country; sheep and goats: 0.10; pigs: 0.20 to 0.25; and poultry: 0.01.

The household having larger size of livestock can have better chance to have better income from livestock. The more livestock owned by the household were have the less possibility of the households choice to participate in less incentive off/non-farm activities. On the other hand, poor households who owe no or less livestock are likely to relay on sources of income other than livestock. Thus off farm and nonfarm activities have to come form an important part of poor households‟ livelihoods (Homewood et al, 2006). Galab et al., (2002) indicated that livestock linearly correlated to agricultural activities. Therefore, the possession of more size is expected to be positively related to diversification of livelihood strategy

Livestock contribute to household livelihoods through a variety of direct and indirect pathways.

Firstly, livestock provide cash income or income in kind through the sale of animals and / or the sale and consumption of milk, meat, eggs and other animal products. Second, livestock are a form of savings (capital growth through herd growth) and insurance, as the sale of animals provides immediate cash to deal with significant or unexpected expenditures (for example, school or medical fees). Third, livestock provide manure, draft power and transport services, which can be used on the household farm or exchanged on the market (for example, rental of bull for ploughing). Fourth, being a source of wealth, livestock not only contribute to social status but may possibly facilitate access to financial services, both in formal and informal markets. Finally, because some livestock can be kept close to the homestead and require few labour inputs, such as a small flock of poultry birds, these can be tended by women while managing other time-consuming activities (for example, cooking or child care), thereby falling under their control and providing some degree of empowerment. Given these diverse outputs, which comprise both monetized and on-monetized goods and services, it is difficult to quantify the overall contribution of livestock to household livelihoods, and only few have tried (Alary et al., 2011; Moll, 2005; Moll et al., 2007).

13. Off Farm Income (Off Incom): This variable is measured as a continuous variable that measured by ET Birr. It is hypothesized to determine the productivity of haricot bean positively. This is because, those farmers earn high off farm income could have the capacity to purchase farm input and productivity of haricot bean increase to increase income due to this factor off farm income has positive income on productivity.

14. Education level of the household head (EDUC): The level of formal education of the farmer is important variable affecting the probability of using improved agricultural inputs (Nkonya *et al*., 1997). The better the education level the farmer has the better will be his understanding concerning the knowledge of improved agricultural technologies. Thus educational level was assumed to have positive association with dependent variable. It was measured using categorical scale.

15. Use of fertilizer (Fetzer): It measures the experience of farmers fertilizer usage, which takes dummy variable, 1= for fertilizer user and 0= non users. The relationship between fertilizer and yield is expected to be positive. It is hypothesized that as part of modern technology, farmers use 100kg of fertilizer /ha of land commercial fertilizers increase the productivity of farm. Birachi *et al*. (2011) studied that use of DAP fertilizer increased the production of bean yield

Table 2. Summary of Definition and Hypothesis of Variables

No	Variable	Description of variables type	Direction
	HHFS	Household food security	
1	DRATIO	Dependency ratio	Positive
2	FSIZ	Farm size	Positive
3	HHAG	Household age	Positive
4	HHSX	House hold sex	Positive
5	PA EX	Extension participation	Positive
6	CR AC	Credit access	Positive
7	HBI	Haricot bean income	Positive
8	AI	Annual income	Positive
9	LAVB	Labour Availability	Positive
10	MAAC	Market Access	Positive
11	INPAC	Input Access	Negative
12	LIVESTOK	Live stock holding	Positive
13	OFFAM	Off farm income	Indirect
14	EDUC	Education level	indirect
15	FERT	Fertilizer use	Direct

Source : own perception data

CHAPTER FOUR: RESULTS AND DISCUSSIONS

This chapter present results of the study. It begins with results from preliminary descriptive statistical analysis of socio-demographic characteristics of the study sample and other key variables of the study. This is followed by econometric models analysis. Of result and discussion.

4.1 .Households' Demographic and Socio-Economic Characteristics

This analysis is based on data obtained from the schedule survey. The survey of 136 farm households which remained after all questionnaires had been scrutinized for incorrectness and missing data, were grouped (classified) into two groups, namely haricot bean producing household groups (number questionnaires) and non-producing household (number questionnaires) groups. The data presented in the following discussion was drawn a distinction between the two groups of households.

This chapter briefly presents the food security status, relationship of the selected predictor variables with the outcome variable in the farm households and also the econometric model analysis result and discussion in the study area**.**

4.1.1 Characteristics of sample households

Family size: According to the study result, the average family size of the total sample was found to be 4 persons, with 2 and 6 being the minimum and the maximum family sizes respectively. When compare the average family size between haricot bean producers and non- producers, the study revealed that households with haricot bean producers have no more household size than households with no producers the mean comparison between the two group shows that there is no statistically significant difference between the two groups in terms of family size at 4 percent probability level.

Age of the Household Head: The average age of the total sample household was found to be 51.2 years whereas 40 years and 60 years are minimum and maximum years of age. The average age of haricot bean producers and non-producers household was 51.8 and 50.9 years respectively. The age mean difference is statistically significant .this show us even though the difference was significant farmers with more age produce more haricot bean for increase income of families than those low age households

Level of education: The average years of formal schooling of the total sample was found to be grade 7. Between haricot bean producers and non-producers the average year of formal schooling is grade 7 and 6 respectively. There is no that much mean difference between the two groups' this shows a statistically significant at percent of probability level. This shows that even the average haricot bean producers had no more difference than non-producers of formal schooling those educating more produce cash crops or market oriented crops by using appropriate technology than those educating less .Concerning education level.

Frequency of Extension Visit ;(ExVist): Extension service here refers to advice, training, demonstration and distribution of input. According to the survey result, extension agent contacts on average about 2 days with the farmers in a week this was due to the programme of farmers participate in cultivation of crop. For haricot bean producers and non- producers the average numbers of contact was 2.02 days per week for haricot bean producers those 40% and 1.7 days per week or 20% for non-producers respectively. The t-test indicated that there is a statistically insignificant difference between the two groups in terms of frequency of extension contact for advice or service at 1% probability level. This shows that haricot producers have more contact with extension agents for advice than non-producers.

Livestock holding: Livestock production is most important, both in levels and shares, for the middle and upper income categories, reflecting Barrett and McPeak's (2005) finding of a strong positive relationship between household per capita daily income and herd size. Interestingly, we also find that access to salaried income and income from trade and business are increasing as total household income grows.

The asset-based approach emphasizes that households can increase their income levels by asset accumulation or by adopting opportunities that increase the returns to the assets they possess, whether through improved production technologies or more remunerative exchange relationships (Barrett et al., 2006; Carter and Barrett, 2006).

In the context of pastoralism, pastoral units that are relatively diversified and have reasonable market access may need fewer livestock per capita to sustain their livelihood. Livestock contribute to household livelihoods through a variety of direct and indirect pathways. Firstly, livestock provide cash income or income in kind through the sale of animals and / or the sale and consumption of milk, meat, eggs and other animal products.

The result of live stock holding of the study area was estimated by the income that gained by selling of livestock and livestock products therefore the income that got from selling livestock and livestock products determine the accessibility of purchasing power of household by considering this the mean of livestock holding income for the sample households was found to be 3674.8. The mean livestock holding for haricot bean producer's households was 4037.8 and 3489.3 for non-producers. The mean comparison for the two groups shows that there is a statistically no that much significant mean difference between the two groups in terms of livestock holding at 1percent probability level. This shows that haricot bean producers had no a better off in livestock holding than those had no producing haricot bean crop concerning livestock income earned from selling livestock on local market depending on price of animal on study area.

Distance to market center: Access to market is a determinant of profitability and sustainability of agricultural produce or proxy to agricultural marketing services. The mean distance between the villages and the weather road in kilometers for the total sample was found to be 0.8 kilometers. The average for haricot bean producers and non-producers was 1.20 and 0.66

kilometers respectively. The mean difference between the two groups shows that there is no statistically significant mean difference between the two groups at 1percent probability level.
This shows that haricot bean producers has no mean difference or better off than those of non-producing of haricot bean concerning market distance from village .

Cultivated land Area: Size of cultivated land has positive influence on the probability of farm household's food security in the study area. The size of cultivated land has positive relationship with the amount of production to be harvested. Therefore, those farmers who cultivated more become in a better position than those who cultivated less. The output of the model shows that cultivated land has positive relationship with food security. The average cultivated land holding of the sample farmers in the study area is also lower than the average cultivated land holding of the other woredas found in the zone due to dense of population. The average cultivated land holding for haricot bean producers and non-producers was 2.85 timad and 2.48 timad respectively. The t-test revealed that there is no mean difference between the two groups is a statistically significant at 1% probability levels. This show even though the difference b/n two group was minimum comparatively haricot bean producers has more cultivated land than non-producers concerning land holding.

Total labor used: Labor is one of the important production resources in Ethiopian agriculture. The availability of sufficient labor enable household to produce more on the available size of farmland. Therefore, labor availability and proper utilization in the household helps to understand economic status and food production condition of the household which, in turn, determine household food security situation. With regard to these farmers in the study area reported that they use both family labors hired labour exchange labour and corporation labour for agricultural activities. The agricultural activities includes; cultivating land, fallowing, weeding, harvesting and threshing. The annual total family labor utilized by total sample was found to be 43 or 31.6% for family labour 45 or33.1% for exchange labour and 31 or 22.8% used for hired labour and the other 12.5% used for labour for cooperation respectively. This show that using of family labor has more advantage than that of not using or using hired labour concerning income and cost minimizing for the household even the two groups is a statistically have no that much difference impact on production of haricot bean.

Types of input used: Use of input like improved seed and fertilizer for crop production plays an important role for production and productivity. In the study area, use of improved seed and fertilizer is very important input for production of crop. Farm gross margin by its very nature demands high use of improved seeds using fertilizer is the new technology provide for the farmers to improve productivity of the crop and increase income in the study area farmers use chemical fertilizer in study area 70.6 % used chemical fertilizers and improved seed for improving productivity of haricot bean.

Table 3: Socio-Economic Institutional and Demographic Characterizes Of Sample Households (Continuous Variables)

Variables	All sample		Haricot bean producers		Non producers of HB		t value
	Mean	S.error	mean	S.error	mean	S.error	t-value
Age	51.2	.394	51.8	.530	50.91	.52	-1.52
Family size	3.5	.12	3.37	.209	3.70	.160	-1.2
Education level	6.8	2.1	7.4	1.3	6.5	2.3	2.2
Cultivated land	2.48	.106	2.85	.190	2.29	.122	-2.592
Labour used	.97	.089	0.59	.127	1.17	. 110	-3.25
Extension visit	1.51	.106	1.02	.073	1.76	.150	-3.38
Input used	.29	.4	.13	0.5	.38	.05	-3.07
Market distance	0.84	.061	1.20	.080	.66	.0.76	-4.470

Source: Own Survey of Field

4.2. Descriptive Analysis of Household Incomes and Value of Current Assets

4.2.1. Household Income

Rural people derive income from multiple sources both from within and outside agriculture. Crop and livestock income play important role for households in the study area. In the following section explanation is given for income from haricot bean production agriculture users; income generated from livestock and non-agriculture by the two groups. But for both groups income from remittance and off-farm were found to be none.

Haricot bean income: The study showed that the mean value of total sample household crop income was 850 Birr. The mean crop income for the haricot bean producers depend on price of local market per quintal was found to be 1200 Birr whereas compare to other crop like maize average value of income for that of non-producers haricot bean and producing maize was 1000 Birr per quintals. The mean comparison for the two groups that haricot bean producers and maize producers concerning price income at local market showed that there is a mean difference between two groups in terms of crop income at 1 percent probability level This shows that haricot bean producers had a better crop income than those non-producing' of haricot bean and maize producing households.

Livestock income: The study showed that the mean value of sample households' livestock income was 3674.8 birr. The mean livestock income for the haricot bean producer's household is found to be 4037.8 birr whereas the average value for that of non-producers of haricot bean and livestock producing was 3489.3 Birr. The mean comparison for the two groups showed that there is a statistically significant difference between the two groups in terms of livestock income at 5 percent probability level. This shows that haricot bean producers had better off income as livestock producers and non-haricot bean producers compared to their income level

Total farm income: In the study area average total farm income indicate that income that earned from maize producing farm per hectare and income that earned from haricot bean producing farm per hectare taking the same number of respondents for the total sample is found to be 6977.42 Birr at local market . The mean farm income for haricot bean producers was 8491.09 birr and non-producing household or maize producers were 6203.8 Birr. The mean comparison for the two groups shows that there is a statistically significant difference between the two groups in terms of crop income at 1 percent probability level, showing that haricot bean producers had a better off in terms of total farm income.

To sum up, the total income evaluation indicate that haricot bean producing households earn more income than the non-produced or maize producing group and the mean separation test confirmed the difference is statistically significant. Hence, the descriptive analysis suggests that haricot bean producing households have more income on relatively and can enjoy a higher standard of living and better quality of life non-producing households assuming other variables remaining constant even though non-producing households do not produce haricot bean they participate on producing of crops like coffee and others crops this show as respondents have depend on Agricultural practice

Off-farm income:

Off farm (non-farm) income refers to the portion of farm household income obtained off the farm including non-farm wage and salaries, pension and interest income earned by farm families. This does not include the total income that earned from different activities .in the study area off farm income describe as income that earned from the salaries ,rent of houses and income earned from working daily labour like preparing chat for traders caring it to market with donkey and houses rather than agricultural production income .

The mean off- farm income of the total sample was found to be 1588.2 Birr. The average annual off-farm income for haricot bean producers and non-producers was 2032.6 Birr and 1361.1 Birr respectively. The mean comparison between the two groups shows that there is a statistically significant mean difference between the two groups in terms of off-farm income at 1 percent probability level. This shows haricot bean producers has better off than from non-producers in concerning off -farm income.

Table: 4 Descriptive Results for the Value of Income and Off- Farm Income of Total Sample

All variables	All sample		haricot bean producers		non producers		t- value
	136		N= (46)		N= (90)		
	Mean	SD	mean	SD	mean	SD	
Total Farm income	6977.47	7445.92	8491.09	5890.8	6203.8	8047.4	-5.86
Livestock income.	3674.8	5609.2	4037.8.	36664	3489.3	6389.5	-5.38
Off farm income.	1588.2	1327.	2032.6.	1722.2	1361.1	1008.7	-2.86

Source: Own Survey Data, 2017

4.2.2 Household Asset

The introduction of haricot bean production has increased the asset holding of households. Households also reported that a significant increase in investment in livestock and said that they are better able to meet the costs of living since the introduction of production of haricot bean. It therefore appears that haricot bean production can make a significant contribution to increasing household resilience and buffering livelihoods against shocks and stresses

The reported value of assets owned has also increased significantly from 7000 birr to 250000 with an increase of over production of haricot bean. Reported value of all categories of assets has increased apart from valuables (radio, watch, etc.). Beneficiaries reported significant increases in the value of their farm tools, household furniture and equipment, house and other physical assets that has been observed through converting their asset to the current price. During haricot bean production users' focus group discussion, participants confirm that their income had increased four-fold following the production of haricot bean development should enable households to accumulate wealth and therefore higher asset for those who have participated with impact on household food security. Farmers use income of agricultural activities to build asset in a form of construction of house, purchase of agricultural equipment and household goods, etc. Different literatures indicate that farmers who engage in cash crop production had generated income and accordingly build household assets. The household asset values included in the study were house, agricultural equipment Nonagricultural equipment's, and household goods.

Table 5. : Value of Current Asset

Value of current Asset	Haricot bean producers		
	Non producers.	Producers	Total
<2000	47	10	57
2001-3000	25	8	33
3001-7000	18	14	32
70001-25000	0	14	14
Above 25000	-	-	-
Total	90	46	136

Source: Own Survey Data, 2017

4.2.3. Credit Access

Credit was an important institutional service to purchase agricultural inputs and water pumping motors. MFI or Credit and Saving Institution and informal credit institutions like saving provide the credit services as report. It facilitated the use of new technological innovations like varieties. In this sense, the findings of Takele (2008) also explain out a similar result. Haricot bean producers who accessed credits were maintaining their output if production fails due to risks. The number of haricot bean producing household who accessed credit was different from those household of non-producing haricot bean. The difference was also statistically significant However; this was reported that some farmers have access to credit while others may not have due to limited interest on credit access. Nearly similar result was also reported by the findings of (workicho 2007)

The sources of credit for farmers in the study area were MFI (OMO microfinance Credit and Saving Institution Farmers cooperatives, NGOs and traditional institutions. Farmers used credit was used cooperatives institution which delivers Agricultural inputs but some of sample households as described to an inquiry on why they did not take credit. According to them, the reasons were absence of credit service high rate of interest fear of inability to pay back their loan on time. .

Table 6: Access to credit of sample respondent households

Access to Credit.	HB. Producers N (= 46)	HB Non- Producers N=90	Total 136
Access to Credit.	1. Yes 23	Yes 38	61
	2. No 23	No 52	75
Total	46	90	136

Source: Own Survey Data, 2017

4.2.4. Access to Input Used

Various studies made in Ethiopia have recognized that an appropriate application of modern farm inputs such as chemical fertilizers, improved seeds and herbicides would increase crop yield and productivity in smallholder farming system Degefa (2006). Therefore, the importance of inputs is certain for highly degraded environmental context and unfertile land such as boricha Woreda so as to improve land productivity and make better agricultural production. The availability of agricultural credit to subsistence farmers is a key indicator in assessing the food security situation of certain target community. Hence, it was tried to examine the access to get modern input and utilization system of the study area in relation to food security status.

Regarding the availability of credit, the survey result shows that credit activities were limited especially in crop farming sector. Most of households' stated that they have received credit to purchase improved agricultural inputs in last year production season. Among those households who have got a credit, most of them reported that they utilized it to buy improved seeds and fertilizer while the some used it to purchase livestock like oxen used to work.

The study result disclosed that there is a significant systematic association in terms of food security status among respondents due to they have got access to agricultural inputs or not at 1 % level of chi-square test. This can be related to the fact that among total sample household 96 or 70.6% use input and 46 or 29.4% do not use input this show that farmers who got credit make use of it for purchasing of improved seeds, fertilizer and farm oxen to increase crop production

This show that one of the reason for low input utilization in crop farming might be due lack of an institution responsible in provision of the inputs (mainly improved seeds of vegetables, maize and haricot bean crops a s participants explained during the FGDs

Table 7: Household Access to Agricultural Input

Access to input		HB producers	Non producers	Total
1	Yes	39	28	67
2	No	7	2	9
Total		46	30	76

Source: Own Survey Data, 2017

Table 8: Purpose Credit

Purpose of credit	HB producers N= 46	Non producers N=90	Total
Payment of labor	4	30	34
Purchase of input	37	34	71
Rental of oxen	4	26	30
Others	1	-	1
Total	46	90	136

Source: Own Survey Data, 2017

4.2 .5. Gross Margin Analysis

Gross margin analysis was employed to explore the income contribution of farm production. It was used to compare the income levels between the haricot bean producers and non-producers and assess the contributions of income. In this study gross margin was calculated by subtracting the incurred operational costs (costs of input purchase, labor cost, etc.) from gross income, where gross income is total value of agricultural outputs including crop and livestock outputs.

Mean comparisons of computed gross margin was made between haricot bean producers and non-producers household. The analysis result shows that the households with haricot bean producers earned more income than the household non producers of haricot bean, with statistically significant mean difference. Hence, the descriptive analysis suggests the treated households have more income on average and can enjoy a higher standard of living and better quality of life than the control households assuming other variables remaining constant.

Gross margin: The average gross margin for the total sample is found to be 9966 Birr. The mean gross margin for haricot bean producers and non-producers was found to be 35637.8 Birr and 2478. Birr respectively. The mean comparison for the two groups shows that there is a statistically significant difference between the two groups in terms of gross margin at 1 percent probability level, showing that haricot bean producers had a superior gross margin.

Table 9: Descriptive Result of Gross Analysis

No	Income Item	All sample N=136	Haricotbean producers N=46	Non producers N=90	t-value
1	Total farm income	19736	44429	7115.7	-5.908
2	Livestock income	2674	4037.8	3489.3	-285
3	Total income	22410	48466.8	10605	
	Operational cost item				
1	Cost of fertilizer	4210	4210	4210	-4.17
2	Cost of seed	5207	8267	3643	-16.98
3	Cost of labor	3027	357	274	-4.56
4	Total variable cost	12444	12829	8127	
5	GM=gross income -TVC	9966	35637.8	2478	

Source: Own Survey Data, 2017

4.3 .Descriptive Analysis of Sample Household's Food Security Status

Household food security was assessed by analyzing household food calorie consumption within 7 days using data on food type and amount consumed. Gross household food consumption for 7 days was converted into calorie, and divided the calories figure by the number of Adult Equivalent (see table 8 in for conversion factor) in the household and then the result also divided again to 7 days which resulted in on average calorie consumed per Adult Equivalent per day in a given household.

Based on the result, households were categorized into food secure and food insecure taking 2100 kcal consumption per Adult Equivalent per day as cut off point (Hoddinott, 2001) which is minimum calories required per AE per day. From the total sample households, 90 households were food secured whereas the remaining 46 household was foods insecured. The food security situation between haricot bean producers and non-producers was different. The haricot bean producers were in a better position than non-producers. About 67.4 % of haricot bean producers were food secured whereas only 65.6 % of the non-producers appear to be food secured. The statistical test indicates that there is significant difference between haricot bean producers and non-producers with regard to their food security situations.

Table 10: Calorie Content of Food Consumed In Study Area for 7 Days per Gm.

No	Food item	Unit	Calorie per gm
1	Maize	gm	122
2	Teffee	gm	166
3	Haricot bean	gm	122
4	Cabbage	gm	16
5	Enset	gm	203
6	Livestock product	gm	18
7	Sorghum	gm	193
8	Sweet potatoes	gm	137
9	Wheat. (ambasha	gm	208
10	potatoes	gm	84
11	Barley enjera	gm	164
12	Chick pea (shumbura qolo)	gm	327
13	Kale brasica carinata	gm	16
14	Pumpkin (duba)	gm	27
15	Custard apple (Gishta)	gm	66
16	Guava pridium (zeytun)	gm	25
17	meat+raw, butter, (kitifo	gm	283
18	milk, butter	gm	40

Source :EHNRI 1995-1997

Table 11: Food Security Status of Haricot Bean Producers and Non-Producers Households

Food security status	Haricot bean producer's		Non-producers		Total No	%
Calorie						
Food Secure	31	67.4	59	65.5	90	
Food Insecure	15	32.6	31	34.4	46	
Total	46	100	90	100%	136	100%

Source: Own survey data, 2017

4.4. Result of Regression

4.4.1 Determinants of Households Income and Food Security.

The concept of food security encompasses multiple dimensions such as food production, access and absorption factors that lead to situation of food insecurity therefore mainly include non – availability of food lack of access to food and improve utilization of food .hence the determinants of household food security in effect comprise the factor that determine each components of food security .the determinants of food security are different at different level of application i.e. global, national ,regional household and individual level (khan.et al .2012).

Numerous study analyzed factor that determine of food security national and household level at rural areas are per captia income, land holding, education, income earned from agricultural and nonagricultural activities soil fertility increasing of population are some of among the factors and commonly cited from the literature (Geb-reselasie 2005,Negatu,2004).

Despite the depth of the problem of food security in Ethiopia there is relatively little empirical research on study area aims to assess by focusing on whether the household has enough food or income to meet its basic needs or on the normal behavioral and subjective response on that condition.

The household's income differential that measured in their gross margin is determined by different factors. In addition to the descriptions given in different part of this paper, the income analysis in this sub-section was estimated using the Binary Logit model and the study has tried to address the objective and give empirical evidence for result obtained for regression estimation method

Table 12: Logistic Regression Estimation Result.

Variables	Odds Ratio	Std. Err.	Z	P>|z|	[95% Conf. Interval]
Age	1.12	.0544	2.49	0.013***	1.025
MST	.736	.4176	-0.54	0.589	0.2422
HBP	3.46	2.262	1.90	0.057 **	0.9625
HHS	.936	.1535	-0.40	0.691	0.6795
CL	.742	.1008	-2.19	0.028**	0.5691
VALASS	.574	.1669	-1.91	0.057 **	0.3253
Mrkt_Dis	1.77	.5627	1.82	0.069*	0.9563
Sourc_Lab	1.042	.2139	0.20	0.838	0.6974
Ann_Inc_Off	.999	.0001	-0.99	0.32	0.9994
TINCOME	1.000	.0000	0.18	0.858	0.9999
Exte_Vist	1.125	.1645	0.81	0.420	0.8447
Inpt_Used_	3.361	1.663	2.45	0.014***	1.274
Acc_Crdt	.7945	.3295	-0.55	0.579	0.3524
Edn	1.137	.1212	1.21	0.225	0.9234
_cons	.0022	.0061	-2.26	0.024	.0000

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1
Source own communication *' ** and *** mean significant at 1%, 5 % and 10% probability level respectively

Logistic regression

Number of obs = 136

LR chi2 (14) = 28.86

Prob > chi2 = 0.0109

Pseudo R2 = 0.1539

Age of Household Head

In contrary to our expectation, ages of household head have been found positive and significant at 1% level of significant influencing the food security level and status of household.

The odds ratio implies that keeping other factors constant, for one year increase in age of the households head among households in 1.025 intervals and over time, on average the level of food calories intake increase by 1.12 % which, is not strong enough. This might be due to the fact that even if experience increases with age of household head and producing more income for the household at the same time the capacities of households to do multiple jobs decrease and Affect income of household. Moreover, old age induce household not to participate in different income generating activities rather to consume more leisure.

Household Size

Given the negative relationship between household size and food security noted in the descriptive part Table 12, it is not surprising that the estimated parameters were negative and insignificant of probability level. This negative relationship shows that an increase in family size by one leads to a reduction of calorie consumption by 136 units. The possible reason is that with existing high rate of unemployment, an additional household member shares the limited resources that lead the household to become food insecure. This result is in consistent with the finding of Yilma (2005), as it reported the negative relation between family size and households' food security status.

SIZE OF CULTICATED LAND

The size of land holding is strongly linked to a farm household food security status. A household with enough cultivable land most likely yields more produce.

Moreover, this can indicate the degree of the household dependability on its land as a main source of livelihood in general and determining its food security status in particular. Different studies indicated that farmland size positively affects the food security status of households. This is because food production can increase extensively through expansion of areas under cultivation. Therefore, under subsistence agriculture, landholding size plays significant role influencing farm household security.

Related to this, various studies have also witnessed that it is not only the size of farm land held that affects farm households' food production status, but also the fragmentation of the farm land

into different plots located at different places the very logic behind this is that the more a farmer's farm land is fragmented into different plots of distant locations, the less will be the farmer's effectiveness in farm activities. This is because the farmers' time and energy are wasted fruitlessly during their travel between different plots of farms in the study area the land was measured with Timad. With this view farmers at study area has 2.85 timad of land if he was haricot bean producer and 2.29 timad of land if not producer and has another plot of land for producing other crop like coffee and enset therefore by this concept model show us cultivated land size was negative and significant at 1% and show that different plot of land minimize production and productivity (2016, Degefa Tolosa And furgesa Derara, Household, food security situation in central Ethiopia).

The livelihood of the farming communities in the study area primarily depends on agriculture where crop production plays important role. Farmers need to have enough land for cultivations as to produce different crops. Therefore, those farmers who cultivated more become in a better position than those who cultivated less.

The output of the model shows that cultivated land has negative relationship with food security and significant at 1% probability level. The odd ratio implies that with all other factors kept constant, the consumption of calorie intake by household decrease by .742 units with decreasing of size of cultivated land by .569 %.at household significant

This shows that even if the farming communities producing more and increase income food utilization determine food security so that without increasing food calorie intake food availability alone does not solve security problem another estimation of land show as that Ethiopian agriculture was rain dependent and risk agriculture if drought occur in one agricultural season the productivity will decrease and household may affected by food insecurity. Therefore, promotion of the use of irrigation system or any other source of water is useful during the drought season so as to increase the productivity of rural household

Household Asset

The concept of household Asset includes the total value of assets per household and household total net worth that the value of total asset plus the total amount of non-financial asset. we focus on the two most important crops grown and use sales data from sold crops to create prices and values household in the developing countries are low in saving asset but saving low does not mean that house hold has no asset (de Janvry et.al 1991) saving is not only critical for households to cope with unexpected shocks, but can free access to a range of consumption smoothing options that are vital for them to maximize utility over time. Diversity in asset choice is also important in order to allow households to manage risk in any one period.

It is our expectation that household Asset have been found positive impact on life standard of household in general in study area the result show as asset found negative and significant at5% this might be the fact that free access to a range of consumption smoothing options that are vital for them to maximize utility over time and diversity in asset choice is also important in order to allow households to manage risk in any one period. These attributes are especially important in developing countries where the lack of sufficient access to consumption smoothing mechanisms can perpetuate and worsen poverty. This show as household may produce risk averse strategies of crops choose safer lower yield crops to produce more due to credit scarcity of some others reasons.

Current asset * haricot bean income Cross tabulation

		haricot bean income		
		non-producer	producer	Total
current asset	2000	41	4	45
	2001-3000	34	2	36
	3001-7000	15	27	42
	7001-25000	0	13	13
Total		90	46	136

Source Own survey of 2017

The study show that in study area producing market oriented crops helps farmers to accumulate more wealth than non-producing of market oriented crops therefore higher asset for haricot bean producers In this regard comparing haricot bean producers and non-producers have significant difference in asset accumulation those haricot bean producers has more income i.e. from 7001 to 25000 So haricot bean producers have more income than non-producers and improve life standards

Market Distance from the Village (markdis)

In contrary to our expectation, distance of the market from the living village which is linked to transport accessibility and the ability to sell farm products in the market were positively and significant at 1 % level of significance. The larger the distance in km from the living village has more cost of transport and labour than the nearest market center, the lower the level of income. Household living far away from the market center, have lower level of income since there is additional post-harvest loss due to inconvenience of transport access.

The perishable nature of vegetable products makes the storage problem more acute; that means, vegetables have to be sold in a short time after harvest. Poor access to markets for outputs creates problems for production on a market-oriented basis, whereby lack of markets for tomato and potato after harvest leads to huge loss. Some of the key informants from the producers justified that sometimes crops like potato sold less than one hundred birr per quintals, which cannot cover the input cost of the product

The result of the odd ratio model show that as distance of the market far by 1.7 from living village the farmers cost more and the gap of food insecurity increase in .96 unit this indicate market distance has positive impact on food security due to buying perishable crop which has not got in our farm and minimizing cost of labour and post-harvest loss therefore household those living near market distance have more chance than those living far away from the market concerning market distance.

Input used

Various studies made in Ethiopia have recognized that an appropriate application of modern farm inputs such as chemical fertilizers, improved seeds and herbicides would increase crop yield and productivity in smallholder farming system Degefa (2006). Therefore, the importance of inputs is certain for highly degraded environmental context and unfertile land such as boricha Woreda so

as to improve land productivity and make better agricultural production. The availability of agricultural credit to subsistence farmers is a key indicator in assessing the food security situation of certain target community. Hence, it was tried to examine the access to get modern input and utilization system of the study area in relation to food security status.

The result of the study show that input used has positive impact on production and productivity therefore the result was positively significant at 1% probability level this is related to increasing using input by 3.36% of land production increase and food security increase by 1.2 % concerning input used.

Haricot Bean Production (HBP)

The production of haricot bean has been positive influence on the probability of household food security at 10% probability level this indicate that due to multifunction of haricot bean like income source, sources of protein and opportunity for job and others the haricot bean has been fulfill calorie intake concerning food security status for household and enhance purchasing power of household to get food access so that households that produce haricot bean has more opportunities and more comfortable than that of not produce haricot bean in study area so the result of the study show that it was influence positively and significant at 10% probability level

4.5 Econometric Analysis

Model-fit test is one of the most useful tests for truly assessing model fit for binary logistic regression models (Gujarati, 2004). One of the measure of goodness of fit used in logistic regression is pseudo R2 that indicate the level of independent variables that correctly predicted by the model. Since pseudo R2 at prob chi2 =0.27 was found 1.32, the model were well fitted.

In a rule of thumb, p-value of 0.05 is taken as a reference in assessing the goodness-of-fit test. In this study the prob > chi2 were found to be 0. (See Annex 2). Thus, the model was good to fitness.

This means that all the explanatory variables use in the model is enough to explain the variation in the dependent variable.

To test the correlation between variables included in the model correlation test were run. As general rule, multi collniearity is a problem when the correlation result is above 0.80 and below -0.80 (Gujarati, 2004). The coefficients of all variables were found to be above -0.09 and below 1.00 (see Annex 1). In addition, Variance Inflation Factor (VIF) and tolerance level (1/VIF) are two important measures of multi-collinearity problem (Gujarati, 2004). According to Wooldridge, 2009 by rule of thumb, VIF value of 10 or tolerance indexes of 0.10 are used as a critical point to indicate serious multi-collinearity problem. And, the minimum, maximum and mean values of VIF for this test were found 1.08, 0.9 and 1.39 respectively (see Annex 1

CHAPTER FIVE: CONCULLUSION AND RECOMMENDATIONS

5.1 Conclusion

Given the significance of ensuring food security at household level in Ethiopia, micro-level analysis on identification of household food security determinants and the link between food security and enhancing production and productivity of crop as well as appreciate to practice cash crop and high value crops or market oriented crops that harvest with in short period of time must get due emphasis and considerations in policy strategies and research and development works. This chapter presents what has been learned from the study as a conclusion and forwards possible implications for concerned stakeholders to address the problem of food insecurity. The study was conducted in boricha woreda in Sidama zone Ethiopia, where majority of smallholders living in food in secured due to erratic rainfall patterns accustomed in the area.

The study show that among the total sample household 74 household were found food insured and cannot fulfill calorie per day per person which is national standard for Ethiopia(2100kcal) and 62 household has considered as food secured and better than national value per day per person (>2100kcal)

The study show that on the contrary household's food energy acquisition for that household producing haricot bean was higher than non-producing households in general the study area food security situation was found with some variation situation (some variation situation among sample respondents). Even it has shortage of rain fail and affected by drought area as concerned

To this end the attribute to the difference in household food security status were not because of difference in production of crop and getting low level of income alone .the study disclosed that determinants of household food security are characterized by distinctive socio economic and biophysical features of sample household .in other way those households that maintain productive age group ,fertile cultivated land and produce appropriate seed ,maintain market not far away from residence ,use appropriate input timely and consume asset of household properly and producing crop that market oriented for income enhancement could play an important role in improving food security situation in study area .

Concerning crop production point of view there is good opportunities and potential resource for intensive agriculture that use different methods of cultivation like intercropping of maize with haricot bean and potatoes enset as well according to information got from focus group discussion government has committed to deliver inputs like fertilizer and improved seeds on time in study area .

The analysis disclose that producing market oriented crops are crucial and contributed to improve food security status of household by increasing income of households .the result of the study Show that household that producing haricot bean has some difference on food security status concerning calorie intake of food this is not chance .it is because of increase of income of household for accessibility of food and consuming haricot bean as Source of food of household. Hence, it is viable to advocate a farming system focused on production of not only directly consumable and food crops centered approach but through improved supply of institutional credit ,improved input delivery facilities and better extension support services farmers has to be appreciate to produce market oriented cash crops in the study area.to increase household income . Apparently, food availability can be assured by mainly boosting of food grain production strategies. However, the recurrent drought problem of the area which additional pressure is accompanied was already inefficient to producing cash crop and market oriented crops system and leads to food insecurity conditions.

5.2. Recommendations.

Agriculture as a corner stone of rural lives plays a pivotal role in human history. Ethiopia is one of the highly agricultural dependent countries. The majority of the people subsidize their lives in sedentary mixed farming, be it crop production or livestock production. As a matter of fact, there should be well organized policy for agricultural and rural development to help the rural people to help themselves. FDRE government formulated policies and strategies for the rural and agricultural spheres. The government advocates the 'free market' economy that market-led agriculture can be the vehicle for country economic development. The policy says that the farmer have to produce market oriented products to increase household income.

It has already been indicated that the scope of this research is limited to three kebles in Boricha woreda. However, the finding of the study could be used to suggest a number of policy measures that can be used to alleviate the food security problems and brings sustainable household economy .Therefore, the writer suggest the following points based on the findings of the research result.

Haricot bean production has a great contribution for calorie intake at household level .the result from regression model witnessed that Age of household production of haricot bean, input used for haricot bean production has positive and significant relation to household food calorie intake whereas cultivated concerning cultivated land and total income of household has to negative and significant relation with household food calorie intake .the negatively related and significant variables show as that household may produce unproductive seeds for production or low management of land fertility was taken as a cause for relation

- Generally, food insecurity and malnourishment that are prevailing in the study area are the direct result of the existing abject poverty .In order to achieve food security it is advisable to uplift the real income of rural household through providing yield augmenting inputs on reasonable price on timely basis. Sustainable food security intervention must not exclude the improvement of production and productivity of agricultural sector through deliver of improved seed. As the findings of this study assured, production of haricot bean and food security are positively and significantly related in the study area. Therefore, development strategies and programs related

with food security through agricultural production should think about the importance of production of market oriented crops. Hence, the development of small scale production of market oriented crops should be further strengthened. However, in the production of agriculture the following points have to be considered to utilize the full capacity of the irrigation scheme:-

- Production of market oriented crops at household level has to appreciate and scale up of production of haricot bean production.
- Organize capacity-building activities to advance the farmers' participation in market oriented crops and management to upgrade their existing indigenous way of management system.

- The stakeholders, that working in agricultural production and ministry of agriculture are important and concern to promote the provision of services in the form of agricultural extension advice, input supply, and possibly for technical and financial support in delivering improved seed and minimizing of post- harvest loss that producing haricot bean in study area

- Promoting and enhancing of managing of cultivated land due to land management as well as fertility concern

- Strengthen Farmer Training Centers (FTCs) to train farmers on agronomic practices, marketing, of market oriented crops development practices are needed;

- The Agricultural Research Center in the study area Hawassa agricultural center Agricultural Development Office have to create strong linkage to among themselves in order to support the farmers in technology promotion regarding producing of haricot bean ;

- Increase off farm activities used to diversify the source of income and increase household food Availability

- Diversified farm activities beside food crops production which consume for home consumption focuses on market oriented crops pulses, fruits and vegetables by using irrigation.

- Food utilization is improved through change in household consumption pattern including eating habits and food preferences, culturally accepted food types which, in turn, would stabilize household food availability. In addition, access to diversify production of crops and increase income of household play a role to improve household food utilization. Hence, the household themselves and government body should take this action into account.

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7 .Appendixes

Annex 1: content of food calorie consumed in study area per 100gm per person

No	Food item	Unit	Calorie per gm
1	Maize	gm	122
2	Teffee	gm	166
3	Haricot bean	gm	122
4	Cabbage	gm	16
5	Enset	gm	203
6	Livestock product	gm	18
7	Sorghum	gm	193
8	Sweet potatoes	gm	137
9	Wheat. (ambasha	gm	208
10	potatoes	gm	84
11	Barley enjera	gm	164
12	Chick pea (shumbura qolo)	gm	327
13	Kale brasica carinata	gm	16
14	Pumpkin (duba)	gm	27
15	Custard apple (Gishta)	gm	66
16	Guava pridium (zeytun)	gm	25
17	meat+raw, butter, (kitifo	gm	283
18	milk, butter	gm	40

Source: ENHRI 1995-1997

Annex Regression Result Logit model

Variables	Odds Ratio	Std. Err.	Z	P>|z|	[95% Conf. Interval]
Age	1.12	.0544	2.49	0.013***	1.025
MST	.736	.4176	-0.54	0.589	.2422
HBP	3.46	2.262	1.90	0.057 **	.9625
HHS	.936	.1535	-0.40	0.691	.6795
CL	.742	.1008	-2.19	0.028**	.5691
VALASS	.574	.1669	-1.91	0.057 **	.3253
Mrkt_Dis	1.77	.5627	1.82	0.069*	.9563
Sourc_Lab	1.042	.2139	0.20	0.838	.6974
Ann_Inc_Off	.999	.0001	-0.99	0.32	.9994
TINCOME	1.000	.0000	0.18	0.858	.9999
Exte_Vist	1.125	.1645	0.81	0.420	.8447
Inpt_Used_	3.361	1.663	2.45	0.014***	1.274
Acc_Crdt	.7945	.3295	-0.55	0.579	.3524
Edn	1.137	.1212	1.21	0.225	.9234
_cons	.0022	.0061	-2.26	0.024	.0000

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Source own communication *' ** and *** mean significant at 1%, 5 % and 10% probability level respectively

Logistic regression

Number of obs = 136

LR chi2 (14) = 28.86

Prob > chi2 = 0.0109

Pseudo R2 = 0.1539

Annex 2: Multicollinearity test for explanatory variables

```
. corr kilonew Age MST HBP HHS HHED CL VALASS Mrkt_Dis Sourc_Lab TINCOME Inpt_Used_HB Acc_Crdt Exte_Vist
(obs=136)
```

	kilonew	Age	MST	HBP	HHS	HHED	CL	VALASS	Mrkt_Dis	Sourc_~b	TINCOME	Inpt_U~B	Acc_Crdt	Exte_V~t
kilonew	1.0000													
Age	0.2111	1.0000												
MST	-0.0368	-0.0104	1.0000											
HBP	0.0633	0.0991	0.0774	1.0000										
HHS	0.0053	0.1661	-0.0033	-0.1054	1.0000									
HHED	0.0271	0.0003	0.1270	0.1607	-0.0675	1.0000								
CL	-0.1135	0.0714	-0.0685	0.3354	0.2111	0.1040	1.0000							
VALASS	-0.1109	0.0090	0.1538	0.6427	-0.2763	0.1715	0.2014	1.0000						
Mrkt_Dis	0.1964	0.0505	0.0762	0.3658	-0.0868	0.0772	0.0595	0.1437	1.0000					
Sourc_Lab	0.0727	0.1431	0.0460	-0.0068	0.1035	-0.0095	-0.0483	-0.0126	0.1709	1.0000				
TINCOME	-0.0267	-0.0050	0.0420	0.1459	0.3415	0.0902	0.2920	0.1451	-0.0241	-0.0600	1.0000			
Inpt_Used_HB	0.1220	-0.0473	-0.0965	-0.2568	0.2337	0.0360	0.0326	-0.2390	-0.2317	-0.0555	0.2027	1.0000		
Acc_Crdt	-0.0940	-0.1258	0.1835	-0.3004	0.1128	-0.1018	-0.1110	-0.1747	-0.1276	-0.0052	-0.0134	0.0704	1.0000	
Exte_Vist	0.0367	0.0830	0.1128	0.0752	0.0585	0.0013	0.1167	0.0784	0.0450	-0.1367	-0.0282	-0.1985	0.0402	1.0000

vif

Variable	VIF	1/VIF
HBP	2.20	0.455510
VALASS	2.02	0.494085
HHS	1.56	0.641103
TINCOME	1.39	0.721425
CL	1.30	0.767482
Mrkt_Dis	1.28	0.783297
Inpt_Used_HB	1.27	0.787974
Edn	1.23	0.811380
Exte_Vist	1.13	0.886970
Sourc_Lab	1.13	0.887467
MST	1.11	0.904822
Age	1.08	0.928746
Mean VIF	1.39	

Logistic model for kilonew, goodness-of-fit test

Number of observations = 136

Number of covariate patterns = 136

Pearson chi2 (123) = 132.13

Prob > chi2 = 0.2707

Goodness of fitness used to check weather our data follow any pattern or fit a specified or assumed probability Distribution in the logistic regression

VARIABLES	(1) kilonew
Age	0.123**
	(0.0484)
MST	-0.424
	(0.551)
Edn	0.133
	(0.105)
HBP	1.182*
	(0.627)
HHS	-0.102
	(0.161)
CL	-0.270**
	(0.131)
VALASS	-0.578**
	(0.287)
Mrkt_Dis	0.626**
	(0.315)
Sourc_Lab	0.0457
	(0.204)
TINCOME	-1.79e-06
	(2.96e-05)
Inpt_Used_HB	1.243**
	(0.488)
Exte_Vist	0.134
	(0.143)
Constant	-6.461**
	(2.673)
Observations	136

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Annex 3: Standardized beta coefficients

```
. listcoef, std help

logit (N=136): Unstandardized and Standardized Estimates

 Observed SD: .49989106
   Latent SD: 2.1005515

  Odds of: >2100kca vs <2100kca

-------------------------------------------------------------------------------
 kilonew |      b          z     P>|z|    bStdX    bStdY   bStdXY       SDofX
---------+---------------------------------------------------------------------
     Age |   0.11740     2.541    0.011    0.5391    0.0559    0.2566      4.5918
      MST | -0.22508    -0.373    0.709 -0.0800   -0.1072   -0.0381      0.3555
     HBP |   1.09175     1.892    0.058    0.5184    0.5197    0.2468      0.4749
      HHS | -0.13678    -0.883    0.377   -0.2035   -0.0651   -0.0969      1.4881
    HHED |   0.03491     0.202    0.840    0.0388    0.0166    0.0185      1.1104
      CL | -0.25507    -1.969    0.049   -0.4353   -0.1214   -0.2072      1.7065
   VALASS | -0.56147    -2.223    0.026   -0.5617   -0.2673   -0.2674      1.0004
Mrkt_Dis |   0.63756     2.213    0.027    0.4562    0.3035    0.2172      0.7155
Sourc_Lab|   0.06953     0.356    0.722    0.0704    0.0331    0.0335      1.0127
 TINCOME |   0.00000     0.182    0.856    0.0349    0.0000    0.0166   7445.9284
Inpt_Used_HB|   1.14910     2.458    0.014    0.5255    0.5470    0.2502   0.4573
Acc_Crdt | -0.24752    -0.611    0.541   -0.1240   -0.1178   -0.0590      0.5010
Exte_Vist|   0.14527     1.051    0.293    0.2043    0.0692    0.0973      1.4066
-------------------------------------------------------------------------------
       b = raw coefficient
       z = z-score for test of b=0
   P>|z| = p-value for z-test
   bStdX = x-standardized coefficient
   bStdY = y-standardized coefficient
  bStdXY = fully standardized coefficient
   SDofX = standard deviation of X

.
```

ITEM NO	FOOD AND DESCRIPTION	LOCAL NAME	Composition in Terms of 100 grams Edible									
			Food Energy	Moisture	Nitrogen	Protein	Fat	CHO (inc.fiber)	Fiber	Ash	Calcium	Phos
			Calorie	Percent	Grams	Grams	Grams	Grams	Grams	Grams	Milligrams	Mill
139	False banana (root), Ensete ventricosum: boiled	Amicho (Kembata)	131.00	65.50	0.19	1.20	0.20	32.10	1.20	1.10	29.00	
140	False banana, Ensete ventricosum: baked	Gunja (Gedeo)	204.00	46.00	0.20	1.20	0.10	51.40	1.90	1.30	59.00	
141	False banana, Ensete ventricosum: baked	Kunchisso (Gedeo)	215.00	43.60	0.27	1.70	0.10	53.40	1.70	1.20	80.00	
142	False banana, Ensete ventricosum: baked	Uncha(Welayita)	145.00	61.30	0.13	0.80	0.10	36.60	1.20	1.20	42.00	
143	False banana, Ensete ventricosum: baked	Worki/qyit'i'a (Guji)	188.00	46.30	0.28	1.80	0.50	50.00	5.40	1.70	192.00	
144	False banana, *Ensete ventricosum*: baked	Omolcho (Sidama)	209.00	45.60	0.20	1.20	0.10	51.90	2.90	1.20	208.00	
145	False banana (refined) + butter + chili + salt: porridge	Bulla, genfo (Gurage/Chcha)	105.00	77.30	0.01	0.10	3.80	17.90	0.20	0.90	18.30	
146	False banana, *Ensete ventricosum*: baked	Kebo (Gedeo)	190.00	49.90	0.24	1.50	0.10	47.40	1.70	1.10	76.00	
147	False banana (refined) + butter + birds eye chili + spice + salt: scrambled	Beroperst (Gurage/Chcha)	413.00	11.10	0.97	6.40	13.30	72.80	0.90	1.40	74.50	
148	False banana, *Ensete ventricosum* : baked	Omolcho (Guji)	185.00	47.40	0.26	1.60	0.10	49.60	5.20	1.30	3.80	

						Composition in Terms of 100 grams E					
ITEM NO	FOOD AND DESCRIPTION	LOCAL NAME	Food Energy	Moisture	Nitrogen	Protein	Fat	CHO (Inc.fiber)	Fiber	Ash	Calcium
			Calorie	Percent	Grams	Grams	Grams	Grams	Grams	Grams	Milligrams
20	Maize, *Zea mays L.* : unleavened bread	Torocho (Kembata)	152.00	38.30	0.85	5.30	2.70	52.90	1.40	0.80	3.50
21	Maize (75%) + wheat (25%): whole, unleavened bread	Tilie (Welayita)	255.00	36.50	0.98	6.10	2.30	54.10	1.60	1.00	11.00
22	Maize, *Zea mays L.*: gruel with salt	Buliqa (Borena)	76.00	81.20	0.27	1.70	0.40	16.00	0.30	0.70	4.00
23	Maize + milk: porridge	Wolewol (Gambella/Nuer)	100.00	76.10	0.48	3.00	1.90	18.40	0.60	0.60	37.80
24	Maize, Zea mays L.: porridge with salt	Huflsa (Sidama)	122.00	71.90	0.34	2.10	0.90	24.60	0.80	0.50	4.60
25	Maize, *Zea mays L.* : split, boiled with salt	Qinchye (Borena)	85.00	75.60	0.36	2.20	0.40	21.20	3.10	0.60	4.40
26	Maize + sesame powder + salt: boiled	Selmaen-fofel thesha (Asossa/Berta)	132.00	67.40	0.50	3.10	2.30	25.90	1.10	1.30	32.80
27	Maize, *Zea mays L.*: bread	Dabbo (W. Wellega)	192.00	52.20	0.72	4.50	1.90	40.60	1.30	0.80	10.50
28	Maize, *Zea mays L.*: steamed	Gafuma (Sidama)	154.00	58.80	0.56	3.50	1.60	35.10	3.70	1.00	3.60
29	Maize, *Zea mays L.*: enjera	Tayeta (Tigray/Shire)	159.00	60.20	0.71	4.40	1.30	33.50	1.20	0.60	2.40

THE CONTRIBUTION OF HARICOT BEAN INCOME ON SMALLHOLDER FARMER'S HOUSEHOLD FOOD SECURITY: THE CASE OF BORICHA WOREDA, SIDAMA ZONE

Serial number of the questionnaire----------

Enumerator name _____ Date of interview_____ signature _____

Entry 1

Good morning/ afternoon sir/madam? I am so glad that I met you thank you very much for your commitment to meet me respecting our appointments devoting your precious time

The objective of this interview is all about academic. It has no any administrative values and/ or will not use for decisions that might affect your personal life. Thus, confidential and open in your responses

Name of the kebele _____

Name of HH head _____

Instruction for enumerators: Dear enumerator, please circle the number representing respondents answer from given alternatives and or write their answer for the rest of questions requiring quantitative and other responses.

2. Household information

1. Sex of the household head: 1. Male 2. Female

2. Age of the household head: _____

2.1 Marital status of hhs

1. Married 2. Divorced. 3. Single 4. Widowed

2.2 Category 1) producers 0) non producers

3. Size of the household: How many people are living in your household?

Age	Sex	
	Male	Female
B/n 0-15		

b/n 16-5-65		
Above 65		

4 Educational level of hhs head)

Iliterate	1-4	5-8	9-10	11-12	>12	Other

5 Household *resources ownership*

5 .1 Land ownership

5.2 Are you having your own land? Yes ☐ No ☐

5.3 if yes on question5.1.1 1 what size of land used for

Land Allocation /land used	Land size
Cropped land	
Grazing land	
Forest land	
Abounded land	
Total	

6. Crop production information

6.1 Have you practice of producing crops? Yes ☐ No ☐

6.2 If yes for no 6.1 what type of crops do you cultivate give order?

1 ----------2----------3----------4----------5----------

6.3 Are you producing haricot bean? - 1. Yes ☐ 2 no ☐

6.4 If yes for no 6.5 how are you produce?

1 intercropping with other crop 2 mono cropping (bean only) 3 both

6.5 What type of haricot bean variety you produce?

1 improved variety 2 local variety 3 both varieties

6.6. How many quintals of haricot bean did you harvest per timad ? ----------

6. 7 what did you do these products? 1) For HHS consume 2) sale for market 3) both ------

6.7.1 If you consumed for food and market both

Amt Consumed per quntal	Amt sold quntals	Amt stored

- If for sale who is the major buyer of your farm outputs? 1)local consumer 2 cooperatives 3)middle man from town 4) urban consumer 5) others ----------
- how much income you earn ----------
- Is the market price fair to sell your product? yes ☐ NO ☐
- How far the market from your locality? Near ☐ far away ☐

6.7.2 If market is fair for sale of product rank the buyer and price per kg/quntals

Buyers	Price per quntal	Price per kg
local consumer		
cooperatives		
middle man from town		
urban consumer		
Retailers		
Whole seller		

6.7.2.1 Question for Traders

1. Did you participate in haricot bean trading business? Yes ☐ NO ☐

2 How long have you been operating the haricot bean business? Years ----------

3 If yes from where you got to buy? 1) From producer 2) from cooperatives 3) retailers 4) others

3 If from producers how much you buy per kg of haricot bean? ----------

4 Is there enough product of haricot bean in your market? Yes ☐ No ☐

4 what challenges you encounter to buying haricot bean from producers?

1) Seed Quality problem 2) High price 3) low demand 4) other specify --------

6.7.3 For what purpose you sale the crop? 1) To purchase staple food 2) to build house

3) For educating children 4) to buy farm inputs 5) others ----------

6.8 Why did you choose to produce this particular crop? ----------

1) For food consumption purpose 2) for resist drought 3) to harvest in short time and get more income 4) other specify -------

6.9 Total area of haricot bean production during the last 2007/2008 cropping season in

timad (other):----------

6.10 For how long to producing haricot bean? 1) For 2 years 2) for 3 years 3) for 5 yrs 4) more than 5

6.11 What is the source of labor used for haricot bean production? (v) (Multiple response Is possible)

1. Family labor 3. Hired labor
2. Labor exchange 4. Cooperation

6.12 How many quintals of haricot bean you produce last 2007/2008 producing years? ---

6.13 How is the trend of volume of haricot bean production during the past 3 years?

1) Increasing 2)Decreasing 3) the same

6.14 If the production increases, what are the reasons? ----------

6.15 Would you like to expand haricot bean production? Yes ☐ No ☐

6.16 If yes which variety did you expand? 1) Local 2) improved

Why? ----------

6.17 What are the haricot bean production constraints you encountered? Rank horizontally

Germination problem	Oxen shortage	Insect problem	Drought problem	Seed shortage	Fertilizer shortage	High price of seed	Low price of product	Disease problem

7 Income Generating Activities

7.1 What are the main sources of your family income?

1) Sale of livestock 2) Sale of livestock products and by-products 3) income from crop production 4) Income from off fame 6 others ----------

7.2 Income from crop production

Crop Grown	Total harvest (kg/qts)	Amnt consumed	Total Amount sold		
			Kg/qts	Unit price	Total income

7.3 Income from livestock sales

Type of livestock owned	No. sold in the last 12 months	Income generated in (Birr)	Total income earned

Cow			
Goat			
Sheep			
Donkey			
Oxen			

7.4 Income from livestock product sale

Type of livestock product	Quantity sold in a year	Total income earned
Milk		
Egg		
Butter		
Skin		
Meat		

7.5. Income from Off farm activities

Description of activities	Annual income (in Birr	Remarks
Sales of fire wood/ charcoal		
Rent of land and pack animals		
Sale of labour (Agricultural wage)		
Hand craft (weaving, pottery..)		
Others		

8 Which types of activities do appear to you best working to bring more income to your Household? (Rank them in order of importance)

1 ----------2----------3----------4----------5----------

8.1. How do you rank the income earned from haricot bean production? 1) High 2) middle 3) low 4) Others specify ----------

9. **Extension services**

9.1 Do you get advisory services from extension agents? Yes ☐ no ☐

9.2 When does extension agent visit you? 1) During land preparation 2) During sowing 3) when disease pest occur 4) during harvesting 5) other specify ----------

9.3 Which improved variety of haricot bean have you first grown? 1) local -2) improved 3) .

9.4 If your answer is improved variety how do you get this improved variety? 1) Through cooperative 2) through extension Agent 3) From local markets 4) other specify

10 . INPUT ACCESS

10.1 Are you use input for haricot bean production? Yes ☐ No ☐

10.2 What type of input you used? 1) Chemical fertilizer 2)compost 3) blanket 4)both

10.3 If chemical fertilizer used which type of fertilizer 1) DAP 2) UREA 3) Blanket 4) others ----------

11 CREDIET ACCESS

11.1 Did you borrow money or (fertilizers and improved seed) for haricot bean production for the last Production season /20072008? . Yes 2. ☐ ☐

11.2 If your answer for 11 **.1** is yes, from where and for what purpose did you borrowed? (*Multiple Responses are possible

No	Source		1 Payment for hired labor 2. Purchase of fertilizer and seed 3. purchase of farm implements 4. payment for rented oxen 5. to rent land for expansion of haricot bean production 6. others (specify)
1	Microfinance		
2	Cooperatives		
3	NGOS		
4	Banks		
5	Traders		
6	Relatives		
7	Equb/edir		
	Others		

12 Household Food Security Issues

12.1 Have you food shortage in your families for last 3 years? Yes ☐ No ☐

12.2 If no for 12.1 how many times you (your family) used to eat per day in most of the years' time?

1) Once/day 2. Twice /day 3. Three times/day 4. Four times/day.5 more than four time

12.3 From where did you have food consumed in your house hold?

1) Own producing 2) purchasing 3) Relief 4) gifted from others

Indicate the type and amount food available for last few months

No	Food Item	Unit	Purchased	Own producing	Total quantity available
1	Cereal				
2	Maize				
3	Wheat				
4	Teff				
5	Enset				
Vegetable					
1	Onion				
2	Cabbage				
3	Carrot				
Live stock					
1	Milk				
2	Egg				
3	Meat				
4	Others				

12.4 Is what you produce last year enough to your families? Yes ☐ No ☐ .

12.5 If no Q12.4 for how long it lasted month?

13 If you face food shortage what do you think for the shortage of food?

1) Absence of adequate rainfall 2) shortage of adequate input 3) inadequate farming system
4) Shortage of cultivated land 5) Poor quality of land 5) inappropriate use of fertilizer
6) Inappropriate policy change 7) shortage of oxen

13.1 Which month was critical for food shortage? 1) hamle(july) ,nehase (Agust)meskerem(sep) 2)

tikimt(October) ,hidar (NOV) tahsas (Dec),3) tir ,yekatit ,megabit , miaziya,ginbot ,sene

13.2 Do you understand the importance of production of haricot bean? Yes ☐ No ☐

13.3 What are the challenges of production of haricot bean in the area?

---

14 What kind of support is needed for the future to produce haricot bean in the area?

---

15 Any comment and suggestion about food security and haricot bean production?

Checklist for Focus Group Discussions (FGD and key informants (KI) of production of haricot bean

<u>Checklist for FGD of haricot bean producers</u>

1 What motivating factors for households to produce haricot bean?
2 What do you think the position of haricot bean production regarding income and food security?
3 What is the major crop produce in the localities?
4 How do you rank haricot bean production regarding income compare to others crop production?
5 How haricot bean production relation to access and availability food security in the area?
6 What is the constraints that face to fully produce haricot bean in the area?

7 What is the situation of food security before production of haricot bean?

Check list for non-producers of haricot bean

1 .What are the major crops types which are you produce in your land?

2 Are you aware of the importance of haricot bean concerning income and food security?

3 Is there difference between the bean producers and non-producers regarding the household Income and food security?

4 Is there any challenge that for you to produce haricot bean? ----------