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CONTRIBUTIONS OF VEGETABLE PRODUCTION TO THE HOUSEHOLD FOOD SECURITY: THE CASE OF KEBELES SURROUNDING HOLETA TOWN

M.Sc. Thesis

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June 2011

Addis Ababa University

**CONTRIBUTIONS OF VEGETABLE PRODUCTION
TO THE HOUSEHOLD FOOD SECURITY: THE
CASE OF KEBELES SURROUNDING HOLETA TOWN**

**A Thesis submitted to Department of Food Security School
of Graduate Studies
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MASTER OF SCIENCE IN FOOD SECURITY STUDIES**

**By
Getu Gemechu Ejersa**

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LIST OF ABBREVIATIONS

AAU	- Addis Ababa University
DA	- Development Agent
CSA	- Central Statistics Authority
EARO	- Ethiopian Agricultural Research Organization
EEA	- Ethiopian Economic Association
EEPA	- Ethiopian Export Promotion Agency
EHNRI	- Ethiopian Health and Nutrition Research Institute
ETB	- Ethiopian Birr
FAO	- Food and Agriculture Organization
FDRE	- Federal Democratic Republic of Ethiopia
FSPP	- Food Security Program Proposal
GDP	- Gross Domestic Product
GTP	- Growth and Transformation Plan
GO	- Governmental Organization
Ha	- Hectare
HH	- Household
HOA	- Horn of Africa
IFAD	- International Fund for Agricultural Development
IFPRI	- International Food Policy Research Institute
Kcal	- Kilocalorie
Kg	- Kilogram

MA	- Master of Art
MDG	- Millennium Development Goal
MOFED	- Ministry of Finance and Economic Development
MOARD	- Ministry Of Agriculture and Rural Development
MTI	- Ministry of Trade and Industry state
OUPI	- Oromia Urban Plan Institute
PASDEP	- Plan for Accelerating Sustainable Development and End Poverty
SPSS	- Statistical Package for Social Science
SD	- Standard Division
TVET	- Technical and Vocational Education Training
UNDP	- United Nation Development Program
UN	- United Nation
WFP	- World Food Program
WHO	- World Health Organization

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ABSTRACT

Agriculture is the mainstay of the country's economy and the major source of foreign exchange earnings and domestic consumption. To improve the prevailing low level of production and productivity the use of yield improving inputs is of paramount important. In this study, an attempt was made to examine the contribution of vegetable production to household food security. The study was conducted at rural kebeles surrounding Holeta town. The survey data collected from rural kebeles surrounding Holeta town. The collected data considered two groups of farm households, vegetable producers and non-vegetable producer's households for comparison purpose. The study found out that vegetable production has a significant contribution to household food security via improving the income of producing household and improving the productivity of food crop production. Different types of vegetables are grown in the study area with different intensities in terms of land and other input allocation, purpose of production, and marketability. The most commonly grown vegetables in terms of the number of growers are potato, cabbage, tomato, carrot, onion, and green paper. The study found that, majority of vegetable producers households have been found to be more food secure than their non-producing counterparts. Similarly, it was observed that income from vegetable was used to cover other expenditures such as education, health, and wage for laborers. Moreover the study found out that, weak extension support service, limited land holding, lack of access to credit, limited supply of improved seed, marketing and market information, outbreak of disease and pest are some of the most important problems. The drawbacks in the absence and quality of extension service were among the strong problems mentioned apart from the other challenges. Finally, the researcher recommends that in promoting vegetable producer households, continues assessment of contribution of vegetable production to household food security, intensified agricultural farming, problems related to extension service, credit service, market and marketing information, and provision of modern agricultural inputs should be addressed.

1. Introduction

1.1. Background of the study

Agriculture is the main stay of Ethiopian economy. It accounts for about 50% of the Ethiopian gross domestic product. It also provides employment opportunity for about 85% of the total working labor force and accounts for 90% of the total foreign exchange earnings (MOFED, 2002). Ethiopia stands third in the world and first in Sub-Saharan Africa in terms of the share of GDP that stems from agriculture (Block, 1999). Coffee generates 53% of the export revenues with *chat* second (EEPA, 2002). The average share of horticultural crops from export earning remains meager, 1.27% (EEPA, 2002). Out of the export quantity, Djibouti and Netherlands account for 56% and 22% while the rest exported to United Arab Emirates. Ethiopia also exports some processed fruits and vegetables to Yemen, Saudi Arabia and other Middle East countries. The two most important processed products are oranges and tomatoes. Of the total area of Ethiopia, nearly two-thirds is suitable for agricultural production (EEA, 2007). Out of these, only about 33% is operated. Smallholder farmers that produce 97.6% of the agricultural output cultivate about 96.8% of the total agricultural land. Vegetables constitute 2.7% of the total area of all crops in 2005/06 (EEA, 2007).

Despite the huge wealth of productive land, labor, and natural resources, Ethiopia remains one of the poorest countries in the world. Nearly half of its population is food insecure or live below poverty line. Hence, the country is unable to feed its own people and suffering from great proportions of famine due to poor performance of agricultural sector. The critical food shortages and recurrent drought have resulted in a massive food aid and commercial imports of food over last many years (WHO, 2007). According to the WFP (2010), 5.2 million people in Ethiopia are currently affected by drought.

Vegetable production is highly expected to play a major role in the realization of Ethiopian food security and poverty alleviation strategy. It enhances agricultural production and improves, income of rural population, opening employment opportunities for the poor, supports national economy by producing industrial crops that are used as raw materials for value adding industries, exportable crops and sustainable strategy for increasing household food security. Vegetable

improves the direct access to food, and when it does not depend too heavily on imported and costly inputs, it increases the self-reliance of households. Vegetable plots in combination with animal husbandry provide supplementary foods with high nutritive values, including proteins and vitamins, which are especially important for vulnerable groups (example malnourished children and pregnant women). In addition, excess produce can be easily marketed locally. It can be easily done by women and is an acceptable activity for women headed households (Mulugeta , 2009). More appropriately, smallholder vegetable production can achieve household food security by increasing cash income of households and enhancing the productivity of food crop production (PASDEP, 2005).

However, there is no study undertaken to assess the situation and contribution of vegetable production to household food security in kebeles around Holeta Rural area.

1.2. Statement of the problem

Though agriculture is the main source of livelihood for vast majority of population, its productivity level is very low and could not cope with the needs of the rapidly growing population. The major reason for this declining productivity is due to low technological inputs, soil degradation, diminishing farm size and due to vagaries of nature. There is no doubt that about, ample number of food insecure citizens both in rural and urban areas of Ethiopia.

According to PASDEP (2005), transforming the subsistence agriculture in to prosperous and commercialized sector should be the most important development goal of the country. However, recent studies reveal that, there hardly exists any data or information that indicates the transformation of small-scale agriculture to commercial agriculture in Ethiopia. According to Abdi Tsegaye (2008), report the constraints of cash crop including vegetables is the absence of credit facility, poor marketing infrastructure as well as poor access to improved technologies and inputs. The government policy with respect to commercialization of agriculture focuses on those commodities that have export potential and high growth impact. It has been argued that cash crop especially vegetables that can be produced at household level have the potential to contribute to household food security by increasing nutritional value and income of producers.

In spite of its potential to the contribution of household food security, many of the food security studies and literatures on different parts of the country, concentrate on cereal based crops and commodities that have export potential. Nearly all of these studies have either excluded or given too little attention to the contribution of vegetable production to household food security.

Consequently, the real potential of vegetable production in the country to satisfy basic needs – that is, providing food (through-improved production and distribution systems), income, employment, and its role in the wider context of household food security, has not been well understood.

Vegetable production is highly practiced around Holeta as a survival strategy, at the household levels; particularly, along the banks of the Holeta River surrounding the town. Many households are producing different types of vegetables in addition to cereal crop production. The area has high potential of vegetable production. However, its contribution to household food security has not been officially quantified. Thus, this study intended to fill this gap.

1.3. Objectives of the study

1.3.1. General objective:

The general objective of this research is to investigate the contribution of vegetable production to household food security in the study area

1.3.2. Specific objectives:

- To identify the status and contribution of vegetable production to house hold food security in the study area
- To identify the challenges of vegetable production in the study area
- To recommend possible intervention measures to mitigate the challenges of vegetable production in the study area

Therefore, the study attempts to answer the following basic questions:

1. What are the contributions of vegetable production to household food security?
2. What are the major challenges of vegetable production in the study area?

3. How is the status of vegetable production in the study area?
4. How is the community participatory in vegetable production in the study area?

1.4. Significance of the study

The results of this study expected to be valuable for the following reasons: To agricultural experts at all levels to show them the contribution of vegetable production to food security of the household, which may initiate them to find solution for production challenges. To policy makers and development agency, the study creates awareness about food security and vegetable production in order to initiate them to look in to the value of vegetable production to household food security. The significance of the study may not be limited to only these, but it can also be used as a reference for other researchers who may conduct a research in the related areas.

1.5. Delimitation of the study

Although the contributions of vegetable production to food security need to be analyzed in different woredas and towns of Oromia Special Zone Surrounding Finfine, because of time and finance constraints the study limited to three selected potential vegetable producer kebeles.

1.6. Organization of the Thesis

This research paper is organized into five chapters. The first chapter deals with background, statement of the problem, objectives and significance of the study, and delimitations and organization of the study. The second chapter deals on review of related literature as well as empirical literatures pertinent to objectives of the study and conceptual framework. Chapter 3 presents research methodology and description of the study area. Chapter 4 presents the results and discussion. Finally, the conclusion and recommendations are presented in chapter five.

2. Literature review

2.1. Vegetable and vegetable production

2.1.1. Definition and concepts of vegetable production

The term vegetable is usually defined as the designate of the tender edible, shoot, leaves, fruits and roots of plants that are eaten whole or in part, raw or cooked, as a supplement to starchy food and meat. Vegetables are those plants, which are consumed in relatively small quantities as a side dish or a relish with the staple food (Yadav, 2006).

Most vegetables are the leaves, roots, or stems of herbaceous plants although flowers, calyces, immature seeds or fruits may also be consumed as vegetables. Vegetables have typical characteristics as follows:

- a) Most of vegetables are herbaceous and annual, but there are some woody and perennial, vegetables like tree tomato, drumstick, curry leaf, choker mains, etc.
- b) Vegetables are usually harvested when the plant is fresh and high in moisture, which makes handling, transport, storage and marketing difficult.
- c) Vegetable cultivation requires intensive cultural practices and high finance and labor inputs.

2.1.2. Vegetable

The rapid population increases of the world and their increase demand put immense measure on food demand. As its production cannot cope with, the demand sources of supplementary food have to be explored. Growing vegetable is comparatively easy. It takes less time than growing cereals. In the context of this aspect, vegetable growing should be increased to replace cereals in our dietary. Many people take to growing vegetables in view of more financial gain (Mougeot, 2000).

A grower can grow vegetable throughout the year if water available. But in case of cereals it is not easy. In the lean period of production especially in summer and in the rains, the price of vegetables rises high. So the growers can make a sizable profit due to the heavy demand. For balanced nutrition, we need plenty of vitamins and minerals. We get them easily and rather cheaply from vegetables. The normal growth and strength of the body as well as fertility are due

to the presence of vitamin A in our food. It also develops resistance cold and increase the eyesight. To brace up the nervous system as well as the digestive system vitamin B complex is needed in plenty. What our body need more is vitamin C. It removes the gum disease, prevents scurvy and activates veins and arteries. Cabbage, carrot, tomato, potato, spinach and green chilies contain vitamin C in quantities. Vitamin D strengthens the bones. Its roles in removing rickets and dental disease are very important. Almost in all vegetables, vitamin D is present. Vitamin E removes sterility. All green vegetables especially lettuce contain this vitamin. For the normal growth of our body, at least ten kinds of minerals are required. Of them most important are iron and calcium, in which obtained from leafy vegetables and tubers (Yadav, 2006).

2.1.3. Characteristics of Vegetables and its Marketing

Being produced both by commercial and smallholder farmers vegetable production and marketing is influenced by a number of factors that can be attributed to production, product, and market characteristics. Kohl (1985) identified the major attributes that inhabit marketing.

Perishability-as vegetables are highly perishable, they start to lose their quality right after harvest and continued throughout the process until it is consumed. For this purpose elaborated and extensive marketing channels, facilities and equipments are vital.

This behavior of vegetables exposed the commodity not to be held for long periods and fresh produce from one area is often sent to distant markets without a firm buyer or price. Prices may be negotiated while the commodities are in route, and they are frequently diverted from their original destination if a better price can be found. Sellers might have little market power in determining a price. As a result, a great deal of trust and informal agreements are involved in marketing fresh vegetables. There could not always be time to write everything down and negotiate the fine details of a trade. The urgent, informal marketing processes often leads to disputes between buyers and sellers of fresh fruits and vegetables. Producers are normally price takers and are frequently exposed for cheating by any intermediary. Hence, these marketing challenges are exactly faces the vegetable producers of farmers surrounding Holeta town.

Price /Quantity Risks- Due to perishable nature and biological nature of production process there is a difficulty of scheduling the supply of vegetables to market demand. The crops are

subjected to high price and quantity risks with changing consumer demands and production conditions. Unusual production or harvesting weather or a major crop disease can influence badly the production and marketing system.

Seasonality- Vegetables have seasonal production directly influencing their marketing. Normally they have limited period of harvest and more or less a year round demand. In fact, in some cases the cultural and religious set up of the society also renders demand to be seasonal. This seasonality also worsened by lack of facilities to store.

Product bulkiness- Since water is the major components of the product, it makes them bulky and low value per unit that is expensive to transport in fresh form every time. This, therefore, exposed farmers to loose large amount of product in the farm unsold.

These listed characteristics of the product require a special complex system of supportive inputs. It demands a regular marketing preparation process like washing, cooling, proper management from the time of harvest until the produce is put on display. It is frequently believed a vegetable not only remain attractive to the consumer it must also have a shelf life of few days after having purchased by the consumer (Nonnecke, 1989).

Improving vegetables, productions and its marketing in developing countries is vital for a number of reasons. Rapid increase in demand from growing domestic urban populations, opportunities to earn foreign exchange by exporting high value-off-season produce; the income raising opportunities it offer to small farmers and the contribution to employment made by its labor intensive production, handling and sales requirement are some to mention (Abay Akalu, 2007).

Vegetable production is profitable. Farmers involved in vegetable production usually earn much higher farm income as compared to cereal producers. Cultivation of fruits and vegetables allows for productive employment where the labor/land ratio is high, since horticultural production is usually labor intensive. Increasing vegetable production contributes commercialization of the rural economy and creates many off-farm jobs.

However, expanding the scale of horticulture production is often hindered by lack of market access, market information, and many biological factors (Weinberger and Lumpkin, 2005).

Bezabih Emana, (2007) stated that production is seasonal and price is inversely related to supply. During the peak supply period, the prices decline. The situation is worsened by the perish ability of the products and poor storage facilities. Along the market channel, 25 percent of the product is spoiled.

From these reviewed literatures severe production seasonality, seasonal price fluctuations, poor pre-and post harvest handling, prevalence of pest and diseases, lack of storage are some of the critical problems encountered vegetable production in Ethiopia.

2.1.4. Vegetable production in Ethiopia

Ethiopia has a variety of vegetable crops grown in different agro ecological zones by small farmers, mainly as a source of income as well as for food. The production of vegetables varies from cultivating a few plants in the backyards, for home consumption, to large-scale production for the domestic and home markets. According to CSA (2003), the area under these crops (vegetables and root crops) was estimated to be 400,000 hectares.

The productivity of crops is very low compared to the potential yield obtained in the research centers and on farmers' field technology verification studies. For instance, the productivity of onion and tomatoes was about 90 and 70 quintals per hectare compared to the potential yield of 400 and 350 quintal per hectare in research centers (EARO, 2002).

The potential for irrigation in Ethiopia is estimated to be about two million hectares. Due to limited experience in water management and control, limited capital available for investment and the diverse climate and disease vectors characteristics of the lowland areas (where most irrigation potential is located), irrigated agriculture is far below its potential. Thus production is heavily dependent on rainfall and uses little capital and technology. Consequently, the average productivity of both land and labor is extremely low and variable from season to season. Despite these favorable resource endowments, agricultural production has remained mostly close to subsistence level (Yohannes Agonafar 1998).

Vegetable crops are rich in vitamins, carbohydrates and other nutrients that contribute to a major portion to an Ethiopian daily dish mix. Some nutritional deficiencies like vitamin A and C, and iron can be corrected by use of selected vegetable and root crops as well as fruits. In some areas

of the country, root crops particularly potatoes and sweet potatoes are used as staple food for considerable portion of the population. Root crops in general are drought resistant and serve as security food crops in drought prone areas. Furthermore, vegetables and root crops generate foreign currency earnings in the country.

Vegetable crops play a significant role in developing country like Ethiopia, both in income and social spheres for improving income and nutrition status. In addition, it helps in maintaining ecological balance since horticultural crops species are so diverse. Further, it provides employment opportunities as their management being labor intensive, production of these commodities should be encouraged in labor abundant and capital scarce countries like Ethiopia.

Ethiopia is a country with great variety of climate and soil types that can grow diversity of vegetable crops for home consumption and foreign markets. Currently, the majority of the vegetable crops product comes from the peasant smallholder farms. However, their areas of production and their contribution to the country's total agricultural output were not known much. Based on the survey per capital consumption of the annual fresh production assorted vegetables is about 2.86 million tons. From the total volume of horticultural products, 95% is fresh vegetable production. There is no processing of vegetables in the peasant smallholder farm. Production of canned and bottled vegetables is mainly in the Ministry of Trade and Industry (MTI) and Ministry of Agriculture and Rural Development (MARD) (Bekele Wolde 1989).

2.2. Contribution of vegetable production

Vegetable production has a crucial role to play in solving the problems of rapidly growing population. Due to rapid urbanization, the population in urban areas has increased dramatically in developing countries. One major outcome of this rapid urbanization is expansion of urban poverty (UNDP, 1996).

According to recent estimates, this urban poverty is predicted to grow to 50% by the year 2020 with nearly this entire growth-taking place in world's less developed countries (UN, 2001).

If properly, implemented vegetable production can significantly contributes to the household food security and solving urban poverty in different ways. In a broad term vegetable production is an increasing option as it contributes to the aggregate supply in particular of fresh and

perishable horticultural crops, as well as to food production at home for home consumption and better nutrition Genene Tsegaye (2006).

Vegetable crops produce high yields. Farmers who have very little land may make good living by intensive cultivation of vegetables; whereas to grow cereals would require about ten times as much land to achieve the same standard of living (Rejith,2006).

Vegetable production can also help to increase the income of producers. According to Essamuha and Tonah (2004), study in Tanzania indicated that vegetable production is an important income generating activity. Many people growing vegetables in view of more financial gain.

A grower can grow vegetable through all the seasons of the year. However, in case of cereals it is not easy. In the lean period of production especially in summer and in the rains, the price of vegetables rises high. Therefore, the growers can make a sizeable profit due to the heavy demand.

On the other hand, vegetables are sold at higher rate than cereals and grains. If they are sold at a cheaper rate in the peak production season, then due to their high yield, they have high monetary value. During rainy season, some vegetables give very good in comparison to grain and cereal crops. Market gardeners create substantial income from intensive cultivation of limited lands. Thus, vegetables are important sources of farm income, but for this, they must be sown early in the season, so that they are available early in the market (Yadav et al, 2006).

Vegetable can help to resolve the problem of food shortage. Although the actual contributions are very little known to food supply at a town level indicators from Dares salaam have suggested that vegetable production plays a vital role. An estimate of 50-60 million kg of leafy vegetables is produced within city boundaries and other 25 million kg non-leafy vegetables in Dares Salaam's peri-urban areas (Foekn et al, 2004).

In many instances, an additional motive from the production of vegetable is the need to have a balanced diet. For example, women in Nakuru in Kenya district tend to cultivate more than men. In most cases, low-income households are producing for food supply more than in other income groups (Feoken et al, 2004).

Labor for vegetable production is derived from two sources: member of the households and hired labor. Most of the laborers in the member of households are women and children, which is

common in low- income households (Feoken et al, 2004). Thus, by employing people who would otherwise be unemployed; vegetable production can also help to solve the problem of unemployment. It is assumed to be an important coping strategy in the informal economy (Gyamti, 2002).

2.3. Challenges and constraints of vegetable production

Challenges that vegetable producer's encounters are different from country to country. However, there are some similar challenges faced by vegetable producers as discussed below.

2.3.1. Access to land and land size problems

Insecurity of land tenure is a crucial problem in urban and peri urban agriculture in which vegetable production is the major activity. This discourages vegetable producers from investing on perennial types of vegetables. This is mainly because urban and peri urban vegetable producer farmers are afraid that they may be evicted from the land at any time (Parechsel et. al, 2002). One of the causes of this problem may also be the negative attitude that policy makers have towards agricultural activities around urban areas. But agriculture surrounding urban area has an important contribution to make food securities. According to UNDP (1996) estimation more than 800 million urban farmers are engaged in it. In many instances additional motives for green vegetable is the need to have a balanced for example women in Nekuru in Kenya district tend to cultivate more than men (Feokan et. al, 2004).

2.3.2. Technical constraints

There are also problems regarding technical services that are needed in vegetable production. This includes waste recycling, inter cropping, and better management. These constraints adversely affect the productivity of vegetable production (Gregor et.al, 2002). Hence, vegetable producers surrounding Holeta town faces mainly this problem due to lack of agricultural extension service. Until recently, there was very little research activities in the area and this partly made contribution of vegetable production to household food security to be ignored by researchers.

2.4. Food security

2.4.1. Food security definition and concept

Food security is a concept that evolved over time. There are many definitions of food security (Hoddinnot, 1999). The most widely used definition of food security given as ‘...access by all people at all times to enough food for an active, healthy life...’ The essential elements are the availability of food and the ability to acquire it (World Bank, 1986).

There are four core concepts implicit in the notion of “secure access to enough food at all times”. These are (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 (Maxwell and Simth, 1992). Debebe Habtawold (1995) explains, lack of physical, human or social resources causes people's access to fall below their subsistent needs’, (b) sufficiency of food, defined mainly as the calories needed for an active, healthy life (Smith et al, 1992). In this case, the definition is individual not household. Where household is aggregate of individuals in household whose food need has to be satisfied, (c) security, defined by the balance between vulnerability, risk, and insurance. The notion of risk and risk avoidance have been central to definition of food security since the term came into use in the 1970s’, (d) time, where food insecurity can be chronic, transitory or cyclical. In a broader way, Maxwell (2001) defines food security, as ‘...a country and people are food secure when their food system operates in such a way as to remove that there will not be enough to eat. In particular, food security will be achieved when the poor and vulnerable, particularly women and children and those living in marginal areas have secure access to the food they want...’

Three conditions must thus be satisfied to ensure food security: food must be available through domestic production and imports, food must be accessible or people must have adequate resources to acquire the appropriate foods; and food must be utilized in conjunction with adequate water, sanitation and health to meet nutritional needs; often, however, food security is discussed with reference to grains only. This can be misleading especially for societies (example pastoral societies) that are primarily dependent on sources of food other than grains. Ayalneh Bogale (2002) describes the food insecure groups of households as those who live on the edge of

subsistence often located in remote areas far from markets. They usually work in an insecure and low productivity occupation.

2.4.2. Food Security Indicators and Measurements

As there are no universally established indicators, it is difficult to measure the food security. There are approximately 200 definitions of food security and 450 indicators of food security (Hoddinott, 2001). A volume of household food security by (Maxwell and Frankenberger, 1992) listed 25 broadly defined indicators. Frankenberger (1992) also classified the different types of indicators into two main categories: 'process' and 'outcome' indicators. The former provides an estimate of food supply and food access situation and the latter serves as proxies for food consumption. Process indicators mainly include food supply and food access indicators.

Food supply indicators are known to provide information on the livelihood of shocks or disaster events that affects household food security. Food access indicators, unlike supply indicators are relatively quite effective to monitor food security situation at household level. Their application as mentioned by Maxwell (1992), varies between regions, seasons and societal strata reflecting various strategies in the process of managing the diversified sources of food, i.e., shift to sideline activities, diversification of enterprises and disposal of productive and non-productive assets.

Output indicators are all direct and indirect indicators of household food consumption, which shows the level, and changes in food consumption and the amount of food in stores as proxy estimates for measuring household food situation. They can be disaggregated at lower level as opposed to food supply indicators. The problem with outcome indicators is that some of the indicators like anthropometrics results may not exactly indicate a number of factors like health care affect the level of food crisis since nutritional intake.

Another important indicator for food security is a coping strategy, which is related to food access indicators. According to (Davies, 1993) as cited by Debebe Habtawold (1995) coping strategies developed by households and the sequential responses through which people used to pass at times of decline in food availability is one indicator of food security; the responses vary from commitment of low domestic resource to distress migration depending on the intensity of crisis.

Assessment of food insecurity is difficult issues as there are no universally established indicators, which serve as measuring tools. Food insecurity requires a multi-dimensional consideration since it is influenced by different interrelated factors. Assessing, analyzing and monitoring food insecurity follow diversified approaches; ranging from a mere qualitative to a combination of both quantitative and qualitative measurements (Debebe Habtawold, 1995).

2.4.3. Global Food Security Situation

The number of undernourished people in the world remains unacceptably high at near the one billion mark despite an expected decline in 2010 for the first time since 1995. This decline is largely attributable to increased economic growth foreseen in 2010 particularly in developing countries and the fall in international food prices since 2008. However, 925 million people are still estimated to be undernourished in 2010. The fact that nearly a billion people remain hungry even after the recent food and financial crises have largely passed indicates a deeper structural problem that gravely threatens the ability to achieve internationally agreed goals on hunger reduction: the first Millennium Development Goal (MDG) and the 1996 World Food Summit goal. Developing countries account for 98 percent of the world's undernourished people (FAO, 2010).

According to the World Bank, between 45 to 50 % of the population in Sub-Saharan Africa live below the poverty line, making it the poorest region in the world.

The FAO reports that approximately 33% of the population in Sub-Saharan Africa is undernourished. There are 307 million hungry people in Africa, with most of these living in Sub-Saharan Africa (265 million) .More than 40% of the population in the Horn of Africa is undernourished and millions are food insecure. (FAO, 2010)

Worldwide, per capital food availability is projected to increase around 7% between 1993 and 2020. Increases in average per capital food availability are expected in all major regions. China and East Asia are projected to experience the largest increase and west Asia and North Africa the smallest. The projected average availability of about 2300 calories per person per day in Sub-Saharan Africa is just barely above the minimum required for healthy and productive life. Since available food is not equally distributed to all, a large proportion of the region's population is likely to have access to less food than needed (Andersen, 2001).

By 2020, the number of food-insecure people in Sub-Saharan Africa is projected to exceed 500 million out of a total population of roughly 1 billion. In other words, without any significant increase in investment or change in historical trends of major indicators, more than half of the region's population will consume less than the nutritional target. The region's food security position will also deteriorate relative to the other regions included in this report. In 2020, the region will account for only 27 percent of the population of the 70 countries, but it will have about 59% share of the total number of food-insecure people.

2.4.4. Food security situation in the Horn of Africa

The Horn of Africa is one of the most food-insecure regions of the world. Out of a total population of almost 160 million, some 70 million peoples (around 45 percent) live in areas that have been subject to extreme food shortages and the risk of famine at least once every decade over the past 30 years. 13 million people are currently judged to be in need of relief assistance and are the target of a US\$378 million interagency appeal for emergency relief, which resulted from an assessment carried out by World Food Program (FAO, 2010).

During the past three decades, while on a worldwide basis there has been ample food for all people, major famines have occurred in the Sudan, Ethiopia and Somalia. In 1984/85, people in all countries of the region experienced life-threatening famine, and the two major famines in the 1970s in Ethiopia and Eritrea led to massive loss of human and livestock life.

In East Africa as a whole, 42 percent of the population is undernourished, and the figures for Somalia, Eritrea and Ethiopia are among the highest in the world. Chronic undernourishment was reflected in a very high incidence of stunting among children and in low life expectancies. Child under nutrition aged between 6 and 24 months, is particularly damaging in that it results in a life-long reduction in physical and cognitive abilities.

Drought and conflict are the main factors contributing to vulnerability to extreme food insecurity. Apart from the southern areas of Uganda and Kenya, the highlands of Ethiopia and parts of equatorial Sudan, most of the region has low and unreliable rainfall (FAO, 2010).

2.4.5. Food security situation in Ethiopia

Food insecurity and famine in Ethiopia is the result of erratic and low rainfall. Ethiopia faced three large-scale drought-induced food shortages famines in recent history, i.e. in 1972/73, 1983/84, 2002/03, which casted many lives (FAO, 2008).

Population increase, deforestation and frequent land distribution has affected agricultural production in Ethiopia. This is reflected in a decrease in household production, a decrease in grazing land and scarcity of manure.

In 2008, about fifteen million people are facing food insecurity that is either chronic or transitory in nature. About five to six million people are chronically food insecure every year. There are people who do not have the capacity to produce or buy enough to meet their annual food needs even under normal weather and market conditions. The remaining ten million are vulnerable, with a weak resilience to any shock (FAO, 2008).

2.5. Ethiopian policy to words food security

In 1991, Ethiopia embarked upon an economic reform program initiated in the form of Structural Adjustment Programs (SAP), which is geared towards realizing economic growth and poverty reduction. Because of the agrarian nature of the country's economy, Agricultural Led Development Industrialization (ADLI) augmented SAP in 1993 that aimed at reducing poverty, and ensuring a dynamic and self-sustained growth through increase in agricultural productivity. PASDEP was introduced as a guiding strategic framework for the next five years. It aims at human development, rural development, food security, and capacity building with the focus on the commercialization of agriculture.

Compared to the previous poverty reduction strategy, PASDEP places much greater emphasis on commercialization of agriculture, diversification of production and exports, and private sector investments to move away farmers from subsistence farming to small-scale market-oriented agriculture (MOFED, 2005).

The PASDEP strategy, above all, gives priority to the enhancement of farm productivity and competition, increasing efficiency in agricultural input and output markets, strengthening the rural credit system, improving irrigation and water management, and the creation of a favorable

atmosphere for commercial agriculture. However, given the series of stabilization and structural adjustment programs, the country's efforts towards improving export earnings, especially from non-traditional and manufacturing sector, remains inadequate (EEA, 2005).

The Ethiopian government's agricultural policy also defines agricultural marketing as a key element of rural growth, poverty reduction, enhanced food security, and addressing the needs of a growing population in both rural and urban areas. According to Mulat (2000), the Ethiopian agricultural output markets are characterized by an inadequate transportation network, limited number of traders with inadequate capital and facilities, high handling costs, inadequate market information system, weak bargaining power of farmers, and underdeveloped agro-industrial sectors.

Food Security Program in PASDEP

The Food security program is designed to address problems of shortfalls in food production, vulnerability to falls in consumption, incomes, and consequent hunger that the country has faced repeatedly. The plan including measures to reduce the variability in crop production and overall food availability – through more irrigation and water control, diversification of crops, and better integration of markets, transport, and information links with maintenance of macroeconomic stability.

Water is one of the most critical resources for crop production in moisture-deficit areas, and the focus in this regard is on the productive use of rainwater and ground water. Construction of hand-dug wells combined with catchment treatment and Small-scale irrigation is also very important to improve cropping intensity and thereby reduce the effect of erratic rainfall. The irrigation technologies will include construction of earth dams, river diversions, treadle pumps, and hand pumps that are managed by individual or groups of farmers.

Food Security Program in GTP

Since moisture deficit areas known for their food insecurity problems, the implementation of the food security program (FSP) has started to yield results.

In this program, there are parts that are inclusive and feeding one to the other. These are household asset building, safety net, and settlement programs, as well as off-farm income generating activities.

The program inclusive of those which are suitable for moisture deficit areas, water harvesting, and that can lead to result in low moisture and small area in order to ensure food security. The other component of the FSP, which was designed to bring food security rapidly, has been the settlement program. This is carried out on voluntary basis and is an alternative available to household. In addition, those who have very small plots and landless youth and women will be encouraged to engage in non-farm income generating activities with adequate support in terms of preparing packages, provision of skill and business management trainings, provision of credit and facilitating markets, so that they can ensure their food security (MOFED, 2011).

2.6. Conceptual frame work

A well-defined conceptual framework provides a broader context, which is critical successfully interpreting indicators, supporting the designing of data collection system, and analytical plans. By definition, food security is a broad and complex concept determined by a range of factors of agro-ecological, socio-economic and biophysical. For this reason, there is no single, direct measure of food security. Instead, the general concept of food security is based on four important pillars (food availability, food access, Food utilization and security). Household food security will be achieved by increasing agricultural productivity, raising household incomes and improving household nutrition.

Range of important factors, which leads to the food in security and individuals in the country are chronic poverty, adverse changes in climate, rapid population growth, poor infrastructure, limited arable land, inappropriate policies, disease, poor water and sanitation. The actual impact of these factors on the food security status of households and individuals may be reversed through a variety of possible pathways.

As indicated in the last sections small holder vegetable production can contribute to household food security by providing producing households with more income so that their access to food can be improved by increasing purchasing power. Besides, food crop productivity of these

producing households can be improved by utilizing essential agricultural inputs, such as pesticides and chemical fertilizer, employing wage labor and draft animal bought with the income from vegetable production.

The four pillars can define the dimension of contribution of vegetable production to household food security as follows:

It is possible to define the dimension of food security based on the following four important pillars:

- Food *availability*;
- Food *access*;
- Food *utilization*; and
- *Security*

Food Availability and stability is achieved when sufficient quantities of food are consistently available to all individuals within a household or geographic unit of analysis. Such food can be supplied through household production, (produced on farmland or home gardens), commercial imports, or food assistance. However, food crop production is always tied with various problems. The first problem related to small holding farm sizes, and with this small land holdings food security cannot be achieved by subsistence alone. In this regard, vegetable can help to improve the productivity at food crop production. That is, the income generated from vegetable can be used to buy agricultural inputs and farm implements including draught animals, which can directly enhance food crop production.

Access to food is the way different people can obtain the available food. Normally food can be accessed through a combination of home production, stocks, purchase, gifts, borrowing or food aid. Food access is ensured when communities, households, and all individuals within them have adequate resources, such as money, to obtain appropriate foods for a nutritious diet. Access depends on income available to the household, on the distribution of income within the household and on the price of food. It also depends on market, social and institutional entitlement/rights to which individuals have access.

Poor households who depend on only food crops for their income are at greater risk of food insecurity than those who have alternative sources of income. Similarly, vegetable producers could have the opportunity to have more cash income and nutritious food than non-vegetable producers and thus be able to buy more food grains in times of food deficit from own production.

Adequacy of food intake and food utilization is the proper biological use of food, requiring a diet providing sufficient energy and essential nutrients, potable water, and adequate sanitation. Effective food utilization depends on knowledge within the household of food storage and processing techniques, basic principle of nutrition and proper childcare and illness management. Vegetable producers, in addition to being in a better position in having the ability to buy more food grain they can also be able to eat variety of food from the produced vegetable, purchase food and non food items such as clothing, , housing, spices, animal products etc. Therefore, producing households can have the normal number of meals per day, consume the acceptable dietary diversity and live healthy life.

Security is the balance between vulnerability, risk and insurance; and time, where food insecurity can be chronic, transitory or cyclical. Vulnerability has two dimensions: one is exposure to external shock and the resultant stress and risks; and the other is lack of means to cope with crisis without damaging loss (Frankenberger, 1992).

On the other hand, “security” which means secures access to enough food. This builds on the idea of vulnerability to entitlement failure, focusing more clearly on risk.

It is necessary to identify the risks to food entitlements. These can originate from many sources and include variability in crop production and food supply, market and price variability, risks in employment and wages, and risks in health and morbidity. Conflict is also an increasingly common source of risk to food entitlements (Frankenberger, 1992).

‘Security’ is not only governed by the magnitude and intensity of the risk or the state of exposure to risk or reliance but also by the extent of risk perception to future food crisis. This issue is closely related to the broad concept of ‘livelihood security’. The tendency to sacrifice current consumption for future livelihoods, to diversify source of income and develop different insurance mechanisms are some of the strategies linked to risk perception against expected crisis. It is

highly affected by the ability to judge its causes and anticipate events that may disturb the 'normal' process in the flow of food supplies (Debebe Habtawold, 1995).

The most food secure households are those, which achieve adequate access to food while using only a small proportion of available resources; the most food insecure, those most at risk, fail to achieve adequate access even by devoting a large proportion of available resources to food (Frankenberger, 1992).

Finally, we come to "time", secure access to enough food at all times. The topic not much discussed in the literature. However, following the lead of the World Bank (1986), it has become conventional to draw distinction between chronic and transitory food insecurity.

Chronic food insecurity means that a household runs a continually high risk of inability to meet the food needs of household members. In contrast, transitory food insecurity occurs when a household faces a temporary decline in the security of its entitlement and the risk of failure to meet food needs is of short duration. Transitory food insecurity focuses on intra-and inter-annual variations in household food access. This category further divided in to cyclical and temporary food insecurity. Temporary food insecurity occurs for a limited time because of unforeseen and unpredictable circumstances. Cyclical or seasonal food insecurity occurs when there is a regular pattern in the periodicity of inadequate access to food. This may be due to logistical difficulties or prohibitive costs in storing food or borrowing (Frankenberger, 1992).

Risks to food entitlement could originate from a number of sources such as: weather variability, food production and supply variability, variability in price and market, health hazard and morbidity causing risks, employment and wage variability. In general, it could be environmental, natural, political, social, cultural and economic risks (Sen, 1981).

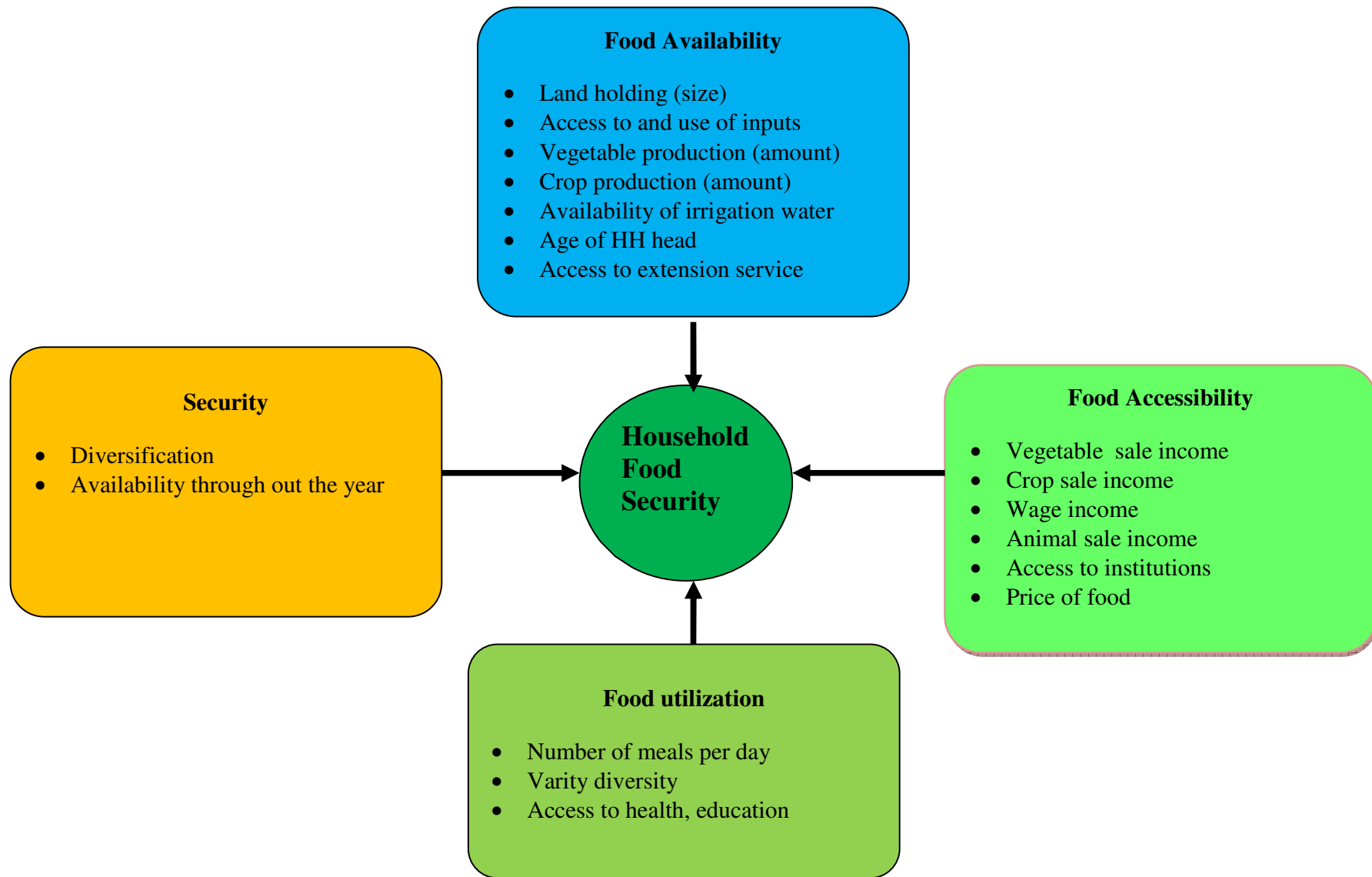


Figure 1: Conceptual frame wok for Contribution of Vegetable Production to HH Food Security

3. Description of the Study area and Research methodology

3.1. Description of the study area

3.1.1. Physical characteristics

Holota town is located at 9° 30' N and 38° 30' E with altitude range from 2300-3800m above sea level, and the average temperature is 21°C and annual rainfall is 900-1100 mm (fig,2). The town started municipal function from 1956. However, since 2003 onwards, the town is under the reform by the virtue of Oromia National Regional State Proclamation No 65/2003. At the end of 2006, it recognized as second rank of urban centers in the region. Currently it has its own council and municipal function and service as the capital of Wolemera Werada. The town made up of eight kebeles with the total area coverage of 5549 ha of which five kebeles were recently incorporated from nearby peasant associations. The study area founded as many of the Ethiopian towns for the purpose of military services in 1900s (OUPI, 2008).

3.1.2. Population: According to the population and housing censuses of 2007 the population of the town is 30,823 (male15237, female15586). Like any other parts of Ethiopia, the population growth of this town is most alarming.

3.1.3. Agriculture: Agriculture is the main sources of income, which accounts for about 35.6% of the total population of the town (OUPI, 2008). The research institutions in the town are help, the agricultural activities. Holeta Agricultural Research Center, Holeta Bee Research Center, Animal Production Centers and Holeta TVET College are among the institutes, which support agriculture sector. There are also 23 flower farms and 1 appeal farms surrounding the town mostly with foreign direct investment.

Vegetable production is highly practiced as a survival strategy, at the household levels; particularly, along the banks of the Holeta River surrounding the town. Many peoples are producing different kinds of vegetables such as varieties of cabbages, carrot, potato, tomato etc on a total land size of 400 hectare.

Vegetable producer farmers of the kebeles use traditional practices in diverting Holeta River, which is one of the big streams surrounding the Holeta town, to irrigate their vegetable farms. Stone is used as supporting structure while soil is used as a filling material for making canals to divert the river water to the communal as well as private plots.

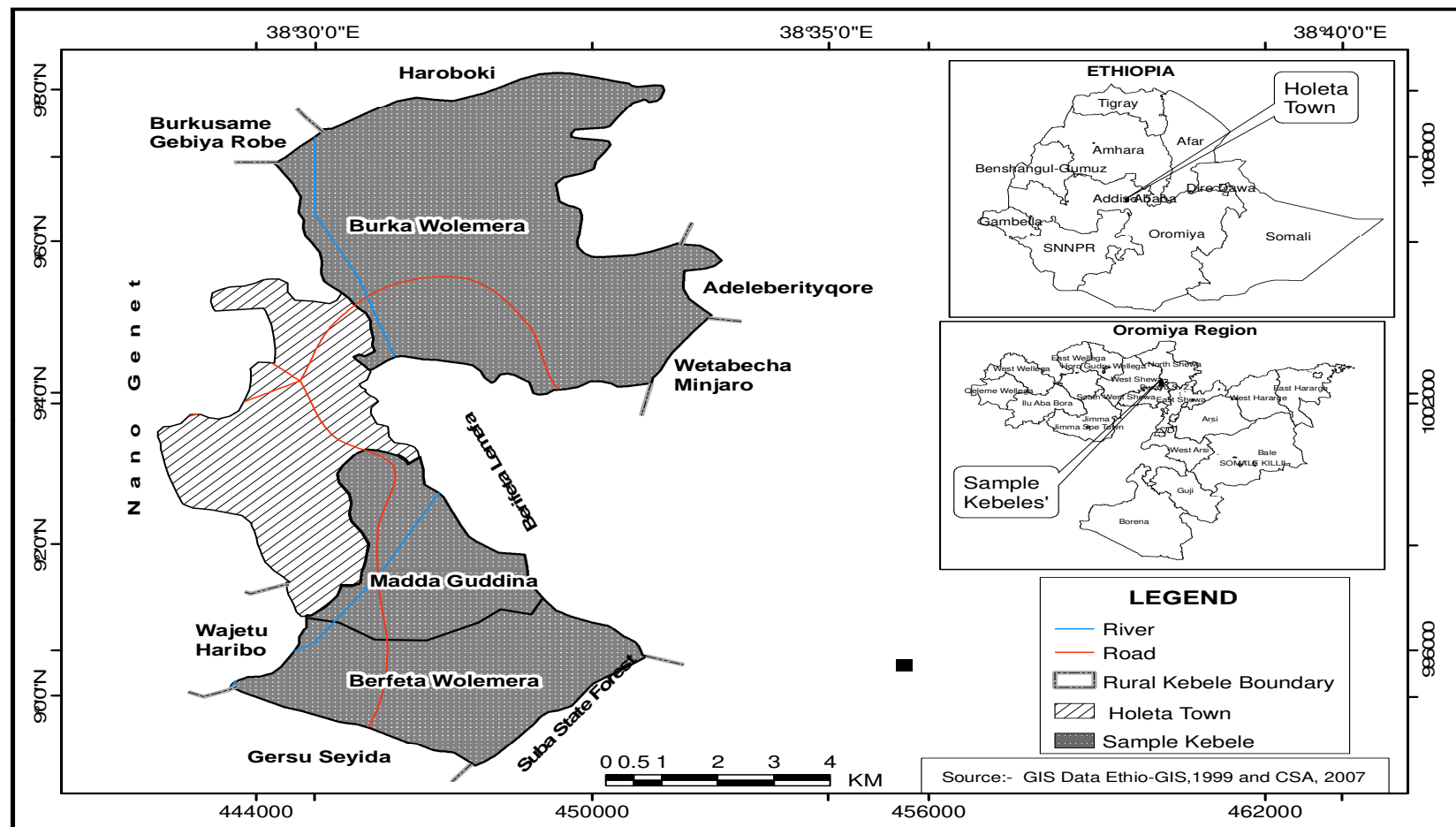


Figure 2 .Study area map

3.2. Research Methodology

3.2.1. Research Design

The main objective of this study is to assess the contributions of vegetable production to household food security of three vegetable producer kebeles surrounding Holeta town of Oromia special zone surrounding Finfinne. Thus, the methodology employed was exploratory research methods in which the researcher explored the major progresses made to address the contribution of vegetable production to household food security. This method is preferred because there is no evidence that shows research done in the area on the same topic of this research and there is not much is known about the contribution of vegetable production to household food security. Moreover, the study was employed both qualitative and quantitative research approach.

3.2.2. Sample size and sampling procedure

There are eight rural kebeles surrounding Holeta Town. Out of these three potential vegetable producer kebeles namely (Barfata-okkoffa, Madda-Guddina and Burqa-Walmara) are purposively selected. Then a stratified simple random sampling was used to select households from each kebele. The households were stratified in to two groups based on vegetable producers and non-producers. This was to ensure comparative analysis between these two groups of households. The number of sample non-producer's households drawn from each kebele was determined in proportion to the number of vegetable producing households in each kebele. The proportion is 1:5 which mean one non-producer to five producers sample households. There are 245, 303, 280 producers, households' members respectively in each kebele. The selection of sample household was depending on the following formula:

$$n = \frac{z^2 (s)^2}{E^2}$$

Where: n = the desired sample size,

E^2 =accepted sampling error

z = the standard normal deviate set at 1.96 which corresponds to the 95 percent

Confidence level,

S=standard division

Whereas since the population numbers are finite, the correction factors will be:

$$n = \frac{n_0 N}{n_0 + (N - 1)}$$

Where: n_0 – is equal to $z^2 (s)^2$

N- is all vegetable producers population

136 sample households are considered for the study.

Table 1: provides sample distribution and the corresponding target population in the study area.

Name of kebeles	Total numbers of vegetable producers households	Number of sample producers	Number of non producers
Barfata tokkoffa	245	37	7
Madda guddina	303	39	8
Burka walmara	280	37	8
Total	828	113	23

3.2.3. Sources of Data

Primary and secondary data were used for the research.

Primary source: primary data were collected using different techniques from the vegetable producers' households, non-vegetable producers' households, woreda agriculture and rural development office, Holeta town local administration department of trade and industry.

Secondary sources: data were collected from different published and reports related documents, internet and official reports.

3.2.4. Data collection instruments

The research was based on both qualitative and quantitative data and collected using the following data-collection instruments.

Household survey– The household survey was conducted on 136 sampled households using structured and semi structured questionnaire.

Focus group discussion (checklist)-This was conducted, by forming three small homogeneous groups of selected informants from the survey population with 8 to 10 individuals in each group one group from each kebeles. This is an appropriate instrument for qualitative data collection in that it provides some quality control on the accuracy of the responses given by the participants, from many people at a time.

Semi-structured-interview (checklist) – This is an extensive and qualitative interview, which was conducted mainly with agriculture and rural development office and trade and industry office on scientific facts of vegetable production.

Direct observations – The researcher, along with the enumerators made some personal observations to all the vegetable production sites of the three vegetable producers' kebeles and attempts to compare some of the responses of the respondents with the fact on the ground.

3.2.5. Data Analysis

Data analysis for this study was involved both quantitative and qualitative research approach. Depending on the objectives of a study and nature of data available, analysis to be made requires different approaches. In this study, both descriptive analysis and household food balance models were employed. The descriptive analysis was made using frequencies, means, and maximum and minimum values of some important variables. Household Food Balance Model was used to estimate the per capita food available at the household.

Majority of the quantitative data were analyzed by the use of statistical software known as SPSS (Statistical Package for Social Sciences). Statistical techniques like mean, percentage, standard deviation and regression were used in the analysis of the data for this research.

Accordingly data acquired from document review, focus group discussion, and semi-structured interview was analyzed qualitatively.

Household food balance model

Household food balance model was used for utilization to quantify available food at household level. The contribution of vegetable production to dietary calorie supply for the household was computed using simple arithmetic formulas described below:

$$NGA = (GP + GB + FA + GG) - (HL + GU + GS + GV) \text{ Where,}$$

NGA= Net grain available/year/household

GP= Total grain produced/year/household

GB= Total grain bought/year/household

FA= Quantity of food aid obtained/year/household

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

HL= Post harvest losses/year

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

GS=Amount of grain sold/year/household

GV=Grain given to others within a year

The quantity of food produced was calculated and converted into dietary calorie equivalent based on Ethiopian Health and Nutrition Research Institute (EHNRI)'s food composition table. The calculated calorie was compared against the national average daily caloric requirement for a moderately active adult (2100 kcal) to look into the contribution of vegetable production to the dietary calorie supply of the households in the study area. A modified form of a simple equation termed as Household Food Balance Model, originally adapted by Degefa Tolosa (1996) from FAO Regional Food Balance Model and thenceforth used by different researchers in this field (Eshetu Bekele, 2000; Mesay Mulugeta, 2001, 2009), was used to calculate the per capita food available

4. RESULT AND DISCUSSION

4.1. Sampled households characteristics

This chapter deals with the analysis of the survey data and interpretation of the results of data analysis. Specifically, the contributions of vegetable production to the household's food security of the sampled households are analyzed and discussed using descriptive statistics.

4.1.1. Demographic characteristics (Sex and Age)

Gender involvement ratio on vegetable production activities varies greatly from country to country, depending on cultural/religious context, the economic conjuncture, the economic activity, the production system, scale and areas involved (UNDP, 1996). In the study area, men farmers are dominant (Table 2).

In the study area, the number of female participation in vegetable production is high if not, more than male. During FGD it was indicated that the number of women involved in vegetable production was low due to land ownership. However, most wives of the men members are active participants on their husbands owned plots. This is true in both vegetable producers and non vegetable producer's households.

Population age distribution is a good indicator of economically active population and their dependents in terms of food. It also shows the potential productive population on one hand, and the segment of population that will be expected to phase out of productive age on the other. As far as the age structure of the sampled household is concerned, the age of sampled households varies from 18 to 72 years. The respondent's age ranged from 36 to 54, years are active and productive age group. The survey result revealed that 48.7% of the producers household heads are found in this age and 43.3% of the non- producers household heads are found in the same age group (Table 2). This implies that more proportion of producers are in the active age group than their non producer counterparts.

Table 2: Demographic characteristics(sex and age)

Age (yrs)	Producer n=113		Non producer n=23		Total=136	
	n	%	n	%	n	%
Sex						
Male	86	76.1	13	56.5	99	72.8
Female	27	23.9	10	43.5	37	27.2
Total	113	100	23	100	136	100
Age						
18-35	30	26.5	8	34.8	38	27.9
36-54	55	48.7	10	43.5	65	47.8
>54	28	24.8	5	21.7	33	24.3
Total	113	100	23	100	136	100

Source, survey result, 2011

About 80.2% of the sampled respondents were Orthodox christen, while the remaining 13.2% and 6.6% were protestant christen and Muslim, respectively (Table 3).The dominant ethnic group in the study area is Oromo which constitute 82.4%, while the remaining respondents were Gurage, Amahara and Walayita.

Regarding marital status of the household head, the majority of the respondents 90.4% were married, while 8.1% of the respondent household heads were single.

Among the married households, 89.4% producer and 95.7% are non-producer households (Table3).

Table 3: Religion, Ethnicity and Marital status of sampled households

	Producer n=113		Non producer n=23		Total=136	
	n	%	n	%	n	%
Religion						
Protestant	15	13.3	3	13.1	18	13.2
Orthodox	90	79.6	19	82.6	109	80.2
Muslim	8	7.1	1	4.3	9	6.6
Total	113	100	23	100	136	100
Ethnicity						
Oromo	90	79.6	22	95.7	112	82.4
Amhara	9	8	1	4.3	10	7.4
Gurage	12	10.6	-		12	8.8
Walayta	2	1.8	-		2	1.5
Total	113		23	100	136	100
Marital status						
Single	10	8.8	1	4.3	11	8.1
Married	101	89.4	22	95.7	123	90.4
Divorced	2	1.8	-	-	2	1.5
Total	113	100	23	100	136	100

Source, survey result, 2011

Education is an important characteristic that enhances the farmer's ability to acquire information, perceive, interpret, and respond to adopt new technologies.

Table 4 depicted that educational scores ranged from illiterate to above grade 12. It is very important to note that most of the respondents 65.4% were educated while, about 34.6% of the sample respondents were illiterate (Table 4). 36.3% producers and 26.1% non-vegetable producers are illiterate. This difference is because of the producers pass their full time on vegetable production during the adult education is given to them at summer time.

Household size, which means number of individual members of a household, is a variable used by many empirical studies on food security to see how it affects food security status of households. As far as the family size of the studied household is concerned, the family size of sampled households ranges from a minimum of 1 to a maximum 9, with an average family size of 5 (Table 4).

Table 4: Educational status and Household size

Educational status	Producer n=113		Non producer n=23		Total=136	
	N	%	n	%	n	%
Illiterate	41	36.3	6	26.1	47	34.6
Read and write	6	5.3	2	8.7	8	5.9
1-4	14	12.4	3	13.1	17	12.5
5-8	36	31.8	9	39.1	45	33.1
9-10	7	6.2	2	8.7	9	6.6
11-12	7	6.2	-	-	7	5.1
>12	2	1.8	1	4.3	3	2.2
Total	113	100	23	100	136	100.0
HH size						
1-3	20	17.7	4	17.4	24	17.6
4-6	76	67.3	14	60.9	90	66.2
7-9	17	15	5	21.7	22	16.2
Total	113	100	23	100	136	100.0

Source, survey result, 2011

Ox Ownership of Sample Households

Oxen are the most important means of land cultivation and basic farm assets. Households who own more oxen have better chance to be food secured than others. This is because oxen possession allows farm activities on time. Mulugeta (2002), and Ayalneh (2003) have shown that

this variable has a positive and significant effect on food security. The number of oxen available to the household is, therefore, expected to enhance the probability of being food secured.

On the other hand, Dessalegn Rahamato (1997) discussed that households food security role of the oxen is considered in such a way that, those households “who have more farm oxen are more likely to have farmland and to obtain bigger harvest than those who do not, even though the size or quality of the land of both groups may be the same”. The survey result depicted that 27.4% of producing and 39.1% of non-producing households have one ox whereas, the majority of both groups of households 54% producers and 60.9% of non producers have 2-3 oxen (Table 5). In the table 5, the average number of oxen owned by both groups of households is almost similar. The statistical test also shows that there is no significant difference in the average number of ox ownership of both groups of households.

Table 5: Farm Oxen ownership by sample households

Oxen (No)	Producer n=113		Non producers n=23		Total=136	
	N	%	N	%	N	%
1	31	27.4	9	39.1	40	29.4
2-3	61	54	14	60.9	75	55.1
>=4	21	18.6	-	-	21	15.4
Total	113	100	23	100	136	100
Mean	2.29		1.70		2.19	
SD	1.15		0.64		1.10	
T-test = 0.208 Sign. (2- tailed)= 0.323						

Source, survey result, 2011

Household land holding

Households with larger arable land ownership have direct correlation with increased crop production and diversification. According to Teshome Tesfaye (2003), land is a basic asset for majority of the rural livelihoods. More land size-holding means more cultivation and more possibility of production, which in turn increases farm income and improves food security. The availability of irrigable land is also important for farming households to involve in vegetable

production. HH survey result depicted that the mean cultivated land size of producers and non-producer's households during the 2010 cropping year was 0.577 ha and 0.736 ha, respectively. As the figures show, the mean size of land accessed by non-producer households is a bit greater than that of producer. The figures not show significant difference of land holding. On the other hand, the study revealed that the maximum and minimum land holding of the respondents minimum 0.13 and maximum 8 ha for producers and 0.13 minimum and 2 ha maximum for non-producer household. The high variation of land holding was because of producers having cultivated more additional land through sharecropping and collecting from other farmers through contract agreement (Table 6).

Table 6: Household landholding

Land size in hectare	Producers N=113		Non producers N=23	
	No	%	No	%
< 0.25	7	5.5	1	3.7
0.25-0.49	21	19.4	4	17.3
0.5-0.74	23	21.3	5	23.8
0.75-0.99	32	28.2	6	28.6
1- 1.24	11	9.8	4	17.3
1.25-1.5	13	11.3	3	9.2
>1.5	6	4.5	-	-
Total	113	100	23	100
Mean	0.577		0.736	
SD	0.597		0.51	
Max	8		2	
Min	0.13		0.13	
t value	9.87		5.58	

Source survey result 2011

4.2. Contribution of vegetable production to household food security

This study employed the three pillars (i.e., availability, access and utilization) of household food security identified by the World Bank (1999) to measure the contribution of vegetable production to household food security. This infers from the concept that food security is not just a production issue.

4.2.1. Food Availability

Food availability is the physical presence of food in the area of concern through all forms of domestic production, commercial imports and food aid. Availability is determined by food produced in the area, food brought into the area through market mechanisms and food supplied by the government and/or aid agencies.

4.2.1.1. Types and Quantity of Vegetables grown

As indicated during the field observation and focus group discussion vegetable production activities are common in the area. Different types of vegetables are grown in the study area with different intensities in terms of land and other input allocation, purpose of production, and marketability. That is, farmers preferred to cultivate vegetables with high profit, good number of customers, and suitable to climate. The most commonly grown vegetables in terms of the number of growers are potato, cabbage, tomato and carrot especially potato is widely grown in the area. Onion and green pepper are rarely grown in the area (Table 7).

Table 7 shows that 79 %, 58%, 36% and 28 % potato, cabbage, tomato and carrot respectively. However, notable differences in the proportion of respondents who reported production of the remaining vegetable products were apparent. For example, while a relatively a few number of smallholder farmers reported growing of 4.4%, and 2.7%, onion and green pepper. Reason attributed to this variation is partly due to differences in production per hectare and accessibility of improved seed from the area of production, purpose of production and other input allocation.

Table 7: Types of vegetable products grown by sampled households in the study area

Characteristics	Madda gudina		Barfata tokkofa		Burka walmara		Total	
	N	%	N	%	N	%	N	%
Tomato	38	82.6	11	25.9	-	-	49	43.4
Potato	37	80.4	32	74.4	39	83	108	95.6
Cabbage	25	54.3	27	62.8	28	59.6	80	70.8
Carrot	13	28.3	7	16.3	18	38.3	38	33.6
Onion	5	10.9	-	-	-	-	5	4.4
Green paper	1	2.2	1	2.2	1	2.2	3	2.7
Others	-	-	15	34.9	4	8.5	19	16.8

Source: Survey result, 2011



Fig .3 Major types of vegetable productions in the study area

4.2.1.2 Quantity of vegetable produced

Table 8 depicted that the average vegetable produced in the year 2010 in the study kebeles by sample households. Household survey pointed out that, most of the producer produce unsatisfactory amount of vegetable when it is compared with production from research center. During FGD, experts of Wolmera Woreda Agriculture and Rural Development Office were indicated reason attributed to the lower production is due to lack of technical support (lack of extension service), lack of improved seed, low land holding and lack of other inputs.

Table 8: Quantity of Vegetable Crops Produced in Qunt. Per Year

Characteristics	Potential in ave.	<=20 Qun.		21-60 Qun.		61-100 Qun.		>100	
		No	%	No	%	No	%	No	%
Tomato	261	17	15.1	25	18.4	5	3.7	2	1.5
Potato	350	64	47.1	37	27.2	6	4.4	1	0.7
Cabbage	216	65	58	12	8.8	1	.7	2	1.5
Carrot	210	29	21.3	9	4.4	-	-	-	-
Onion	140	3	2.2	2	1.5	-	-	-	-
Green paper	225	1	0.7	2	1.5	-	-	-	-
Others	-	17	12.5	2	1.5	-	-	-	-
Total		196	156.9	89	63.3	12	8.8	5	3.7

Source, survey result, 2011

4.2.2. Contribution to Food Access

A household's ability to access adequate amounts of food, through one or a combination of own home production and stocks, purchases, gifts, borrowing and food aid. From this point of view, accessibility viewed from perspective of purchasing power of the people and the physical accessibility to the sources of food.

Food may be available but not accessible to certain households if they cannot acquire a sufficient quantity or diversity of food through these mechanisms. In this regard, the contribution of vegetable production to HHs' food security discussed from income generation view and employment creation.

4.2.2.1. Income generation

Data collected from the sampled household survey suggest that the economic benefits of vegetable production to the households are great. The most important economic benefit of the vegetable production for the household is income generation. Annual income generated by sample households from the vegetable production revealed as in Table 9.

About all 100% of households, those who participated in vegetable production activities were engaged in sale of vegetables. The mean annual income reported from the sale of vegetables was 9,690 birr with a minimum of 180 birr and a maximum of 20,000 birr. Among the sampled respondents who participated in the vegetable production, 14.2% had got an income greater than 15,000 birr but the rest 5.3% had got less than 1000 birr and the majority of HHs 31% had got 5,001-10,000 birr per year. It has significant contribution to household income generation (Table 9).

Table 9: Annual income generated by sampled households from the Vegetable production in the study area (Birr/household/year)

Income (Birr)/household/year	Producers n=113	%
<=1000	6	5.3
1001-3000	24	21.2
3001-5000	18	15.9

5001-10000	35	31.0
10001-15000	14	12.4
>15000	16	14.2
Total	113	100.0
Mean	3.66	
Std. Deviation	1.44	
t-Value	26.99	

Source, survey result, 2011

Vegetable production enables many of these households to save a certain amount of their income and/or spent for buying other food items that is not produced by HHs. Therefore, beside the directly earned income by selling vegetables, consumption of self-produced food has covered a considerable share of the households' total food intake and this in turn helps to save even larger share of the households' cash income to cover non-food expenses such as health, education, clothing and transportation.

During FGD, the participants revealed that vegetable production helped them to sustain life as well as to purchase basic consumable foods and to cover other expenses from the income they generate. As one of the participant in FGD has revealed

“My family was leading a destitute life before my engagement in vegetable production. However, after I engaged in vegetable production, we are able to improve our food security situation yearly; my family earns about 9,000 birr from sale of vegetable yearly. It is this income, which helps my family to purchase other food items, cloths, to cover education fees, medical expenses and the like. Otherwise, we would have nothing. Now we are better at least we have something to eat throughout the year.”

Table 10- depicted that the majority of HH income used to cover non-food expenses. 76.1% of vegetable producers had earn income from sale of vegetables, whereas, the majority of non-producers HHs, 65.2% earn income from sales of cereal crops to cover their non-food expenses. In both types, (producers and non-producers) income from animal sales had insignificant and contribution of vegetable to cover non-food expenses had high in the vegetable producers HHs.

Table 10: Income used to cover expenditure of households non-food expenses

Income used to cover expenditure of non food expenses			
HH category	Sale of vegetable	Sale of cereal	Sale of livestock
Producers	76.1%	11.5%	2.7%
Non producers	-	65.2%	4.3%
Total	76.1%	20.6%	4 2.9%

Source, survey result, 2011

4.2.2.2. Contribution to employment opportunity

Farmers are engaged in different agricultural activities throughout the year. Labor requirement reaches its peak during the main agricultural period when land preparation, sowing, weeding and harvesting are undertaken. In order to assess how households solve their labor shortage, families with inadequate family labor were asked. Table 11 depicted that, 31.9% of vegetable producers households, 26.1% non-vegetable producers use wage labor.

Table 11: Mechanisms of labor shortage compensation

How did you solve the problem of labor shortage?				
HH category	Friends and relatives	Wage labor	Debo	Others
Producers	48.7%	31.9%	15%	4.4%
Non producers	47.8%	26.1%	21.7%	4.3%
Total	48.5%	30.9%	16.2%	4.4%

Source, survey result, 2011

Table 12 depicted that the trends of wage laborer 83.3% producers and 66.7% non-producers HHs pointed out that their trends of wage labor employment during last three years shows

increment. This implies vegetable production plays a significant role in creation of access for employment opportunity. The study conducted by Mohammed Jemal (2002) in Addis Ababa revealed the same fact that low-income urban poor households were getting full time employment through their engagement in vegetable production.

Table 12: Trends of wage labor employment during last three years

wage labor employment trend			
HH category	Increased	Decreased	Remains the same
Producers	83.3%	5.6%	11.1%
Non producers	66.7%	33.3%	-
Total	81%	9.5%	11.1%

Source, survey result, 2011

4.2.3. Contribution to Food Utilization

Food utilization refers to households' use of the food to which they have access, and individuals' ability to absorb and metabolize the nutrients. In this context 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 etc.

In this study, the changes in number of meals per day and food diversity are discussed in relation to income improvement of households caused by vegetable production.

4.2.3.1. Number of Meals per Day (frequency of meal)

Number of meals taken per day is one of the indicators that households get the proper and sufficient amount of food daily. Moreover, if this continues for the whole year depending either on own production or through purchase from reliable income source, the household can said to be food secure. Table 13 shows that 87.6% of producers and 47.8% of non-producers, households consume three meals a day. On the other hand, the household consumes largest

proportion of those eat twice (about 52.2%) were identified to be non-vegetable producers. The t-test also shows that the variation is significant at 5 percent level of confidence.

The disparities in both cases indicate that the food security situation of producers better than non-producers.

Table13: No. of meals consumed per day by sampled Households in the study area.

No of meal per day	Household group				Total n=136	
	Producer n=113		Non producer n=23		N	%
	n	%	n	%		
One meal	-	-	-	-	-	-
Two meal	14	12.4	12	52.2	26	19.2
Three meal	99	87.6	11	47.8	110	80.8
Total	113	100	23	100	136	100
T-test = 0.307 Sign. (2- tailed)= 0.123						

Source, survey result, 2011

4.2.3.2. Nutritious Diet (Food Diversity)

Consuming sufficient, nutritious, and balanced food in last year by all family members year round is important to keep the family members healthy and active, and it is an important factor for effective utilization of food. To assess households' utilization of food, sampled households were asked whether their family members consume nutritious and balanced food (food containing protein, carbohydrate and vitamins) sufficiently in the previous year based on their perception. Of the total sampled households, 73.5 % producer and 52.5% non-producer households replied that their family members consume the required diet. From the above figures, we can deduce that greater percentage of producer households have the ability to access the desired food diet.

During FGD, it was identified that the type of food consumed at home varies between vegetable producers and non-vegetable producers. All the participants confirmed the fact that vegetable

producer households consume much more fresh vegetables all year round than non-producer households.

4.3. Categorization of households into Food secure and Food Insecure

Access to sufficient food and nutrients is essential for household welfare, as well as for accomplishing other development objectives. Households with insufficient access to food often face other challenges related to food insecurity including poor health and declines in productivity.

The contribution of vegetable production to dietary calorie supply for the households was computed using arithmetic formulas of household Food Balance Model, which originally adapted by Degefa Tolosa(1996) and then used by different researchers in this field (Eshetu,2000; Mesay Mulugeta 2001,2009). It was used to calculate the per capita food calorie available. The calculated calorie was compared against the national average daily caloric requirement for a moderately active adult (2100 kcal) to look into the contribution of vegetable production to the dietary calorie supply of the households in the study area .

However, this model is not without limitation. The limitations includes, it takes into account only grains, overlooked intra household disparity in food distribution, fails to consider quantity of grain spent for social and religious festivals, fails to take into account the amount of food given to animals as feed, grain used for the exchange of ox and labor are the main limitation. In the study area, farmers produce vegetables; which, mainly used for sale to generate income, which helps for purchase of cereal crops and other non-food items. Table14 portray, that the majority of producer households are food secure. Among the sampled respondents who participated in the vegetable production, 18.6% had got daily calorie greater than 3500 kcal which was a maximum kcal. However, 12.4% producer households had got less than 1000 kcal whereas the majority of households 29.2% had got 2501-3500 kcal per day. On the other hand, non-vegetable producers, 30.4% had got daily calorie greater than 3500 kcal. The statistical test shows that there is significant calorie variation between vegetable producers and non-vegetable producers' households.

Table 14: Available Households' calorie

Kilocalorie	producers n=113	Non producers	Total=136
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			n=23			
	n	%	n	%	n	%
<1000	14	12.4	1	4.3	15	11
1001-1500	22	19.5	2	8.7	24	17.6
1500-2099	6	5.3	12	52.2	18	13.2
2100-2500	17	15	0	0	17	12.5
2501-3500	33	29.2	1	4.3	34	25
>3500	21	18.6	7	30.4	28	20.6
Total	113	100	23	100	136	100
Mean	2573.45		2354.39		2536.40	
S.D	1470.64		945.45		1395.27	
T-Value	18.60		11.943			

Survey, result, 2011

Thus, those households whose daily kcal consumption falls below minimum daily kcal consumption required are categorized as food insecure and those whose daily kcal consumption lying above the required minimum kilocalorie as food secure. Accordingly, Table 15 depicted that out of the 113, vegetable producers households 62.8% were found to be food secure and only 37.2% households were found to be food insecure. On the other hand, out of the 23 non-vegetable producers households, 65.2% were found to be food insecure and the remaining 34.8% households were food secure. This implies that the contribution of vegetable production to household food security that placing producer households in food secure status.

Table15: Food security status of household

Food security status	Producers n=113		Non producers n=23		Total=136	
	N	%	N	%	N	%
In secured	42	37.2	15	65.2	57	41.9
Secured	71	62.8	8	34.8	79	58.1
Total	113	100	23	100	136	100

Source, survey result, 2011

4.4. Opportunities and constraints of vegetable production

The steady growth in the production and marketing of vegetable was not without problem. Problems stretched from input supply to marketing. Understanding problems and opportunities with priorities was very important for both research and development initiatives.

4.4.1. Opportunities

Holeta area is very suitable to produce not only vegetable products but also other commodities of cereal, pulses and/or animal production. There is also good potential for vegetable production including potato, tomato, onion, cabbage, green pepper, carrot and beetroot vegetables.

Cereal crops wheat, teff, barely, pulses and improved local animals for milk production are some of the potential. On top of this, relatively fertile arable land and abundant ground water potential are some to mention.

The natural proximity to Addis Ababa (only 29 km) and being found on the main road to Addis Ababa. Hence, such a short distance is an opportunity to farmers producing perishable crop like vegetable to supply fresh product on time to large market before spoilage.

The conducive government agricultural policy and favorable weather conditions for all high land crop and vegetables production are opportunities to the area. On the other hand, increased infrastructure facilities like mobile and wire telephone, electric power, availability of ground water (even though it is not accessible) and all weather roads could facilitate vegetable production and marketing of the area.

The other major opportunity is the existence of governmental organizations which is always near to farmers are Agricultural Research Institute, ATVET and Wolmera woreda agriculture and rural development office exists in the area to disseminate agricultural technology innovations.

Among the different opportunities that prevailed, the trend in the growth of production and marketing tradition in the area were one that drew attention. Experience (learning effect) and

neighborhood effect are much more important in technology adoption. The multiplication of improved potato seed on farmers site was one to due attention given by Holeta research institute.

4.4.2. Constraints

There are factors that hamper the production and marketing of horticultural crops surrounding Holeta town. According to, the sample respondents weak extension support service, limited land holding, lack of access to credit, limited supply of improved seed, outbreak of disease and pest, marketing and market information are some of the most important problems reported by sample respondents. Based on this, the constraints have been discussed below:

4.4.2.1. Weak extension support service

According to Van Den Ban and Hawkins (1988), the main aim of extension program is to initiate change to bring about sound agricultural development especially on the part of smallholder farmers. It offers them technical advice and supplies with the necessary inputs and services. Agricultural extension is therefore used as a tool for rural development. On the other hand, extension work is not an arbitrary activity. It requires systematic planning in order to bring about the desired change.

Farmers require advice on appropriate crop types and agronomic practices in order to take advantage of high production per harvest area and high quality production. Historically, the extension service in Ethiopia has been focused on improving productivity and production in line with the focus of government agricultural development programs on improving food security. This seems to be consistent with Abadi Tsegaye (2008) argument that when the extension officers should translate the different production market recommendations for farmers in the area. For example, by giving advice in relation to appropriate crop types and varieties, which was more demanded and appreciated by consumers. Extension technical advices such as these help producing farmers to be efficient and profitable in vegetable production. In the study area only one kebele has DA.

During FGD, most of the group members depicted that because of lack of technical advices from extension agents are forced to sell their produce right after harvest at prevailing price and

watering prior uprooting on field ultimately results in low quality of vegetables, especially for root and tuber vegetables.

Even Barfata Tokkoffa where the DAs are assigned to support farmers right from land preparation up to post harvest handling but they lack technical capability to support the farmers of their interest and they lacked the competence on pre-and post harvest handling practices of vegetable crops. According to Experts of Wolmera Woreda Agricultural, offices and Holeta Town Local Urban Administration department of Urban Agriculture explained major constraints that made lack of technical capability was lack of special training in vegetable production and irrigation water management that enables them to provide proper advice to farmers.

The development agents also complain that they have no clear job description. In addition to their conventional agricultural extension activities, they engage in different tasks such as farm inputs distribution, collection of loans including land use taxes, participation in various administrative and political committees. They believe that this creates suspicion on the part of farmers in relation to DAs role. This would erode DAs confidence of becoming the trusted advisors.

It was for this fact that farmers applied improper rate of inputs on the farmland and irrigated the land by inappropriate amount and timing of water to vegetable. Due to this the farmers could not store their product and forced to sale in low price immediately after harvest.

As FGD depicted that the cumulative effect of these problems resulted in low production per hectare, low quality produce, heavy post harvest losses because of poor traditional on farm storage , which are prone to storage pests and disease. The survey result revealed that, 100%, 97.3% and 24.3% of vegetable producers households in Madda guddina,Burka wolmera and Barfata tokkoffa were indicated, they could not benefit from the extension service, respectively (Table 16).

On the other hand, all of surveyed sampled non-producer households of Madda Guddina and Burka wolmera depicted that they could not benefit from extension service, while 85.7% surveyed sampled non-producer households of Barfata tokkoffa indicate that as they benefit from extension service. The peculiarity of Barfata tokkoffa is because of handing over of DAs on the kebele; however, the practical evidence during the field observation shows that the extension

system lacks highly qualified staff at field level. The observation in the field depicts that some of the development agents have little knowledge compared to the farmers.

Table16: Agricultural extension service

Advice of extension agents				Yes	No	Total
Producers	Kebele	Madda Guddina	N	-	39	39
			%	-	100%	100%
		Burka Walmara	N	1	36	37
			%	2.7%	97.3%	100%
		Barfata tokkoffa	N	28	9	37
			%	75.7%	24.3%	100%
	Total	N	29	84	113	
		%	25.7%	74.3%	100%	
Non producer	Kebele	Madda Guddina	N	-	8	8
			%	.	100%	100%
		Burka Walmara	N	-	8	8
			%	.	100%	100%
		Barfata tokkoffa	N	6	1	7
			%	85.7%	14.3%	100%
	Tota	N	6	17	23	
		%	26.1%	73.9%	100%	

Source surveyed data 2011



Figure 4 Low quality production because of lack of extension service

4.4.2.2. Lack of access to Credit

Lack of agricultural production credit provider and unavailability of credit on demand was indicated as constraints. According to the survey result, with regard to the source of cash used to buy modern inputs; all 113 vegetable producer households as figures in the table 17 revealed, 77.9% purchase inputs from vegetable sales 11.5% of producing households use income from other sources (such as sales of grains and small ruminants). While only 9.7% of producing households used loan from Oromia MFI with high rate of interest. On the other hand, the non-vegetable producers also revealed as lack of credit provider and unavailability of credit as the production constraint.

Table 17: Sources of money for agricultural input purchase

Source of purchase agricultural inputs				
HH type	Using loan from micro finance enterprises	Purchase from vegetable sales	Using other sources (sales of grain and small ruminants)	Others
Producers	9.7%	77.9%	11.5%	0.9%
Non producers	4.3%	-	34.8%	4.3%
Total	8.8%	74.3%	15.4%	1.5%

Source, survey result, 2011

4.4.2.3. Limited input supply

As to the input constraints that the HHs producers and non-producers face, the entire sample HHs disclosed that they have been experiencing input constraints. With regard to input price, 99.3% of both producer and non-vegetable producers reported that the input price is beyond their capacity to buy. Only one person from the vegetable producers sample HHs revealed that the price of input is high but he can afford. As to a particular type of challenges, they face all 100% of producer sample HHs indicated lack of improved vegetable seed. 78.2% and 82.3% of the surveyed sample vegetable producers and non vegetable producers respectively depicted that lack

of commercial fertilizer before sowing season was the major constraint of their production activities. Even during the cooperatives providing them with fertilizer they still have lack of money to purchase it as it was witnessed by the FGD. In addition, all of vegetable producers portray that lack of pesticide and insecticide chemicals as the problem.

From the field observation and FGD it was observed that forged vegetable (tomato, cabbage, carrot, beetroot) were coming in to Holeta local market from Addis Ababa by various merchants who don't have license for sale of improved vegetable seed. Farmers used to get these seeds from open market, which, were no certification, quality test, and failure guarantees. As a result, farmers faced problems of low production and seed viability. During field, observation vegetable produced from the seed type was found poor in quality, productivity and unattractive on the field. This phenomenon made some of vegetable producer HHs to divert their production only on potato since it is easily accessible in the production area even if the price of its seed is high.

4.4.2.4. Marketing problem

From many other major factors that hinder the production of vegetable products in the study area the majority of the sampled producers, indicate marketing problem.

The FGD further consolidated the fact that as the most farmers are not getting the products to the consumers directly, retailers exploit them. The farmers have expressed their grievances as follows:

“We are not getting enough profit from our work. It seems that half of what we are producing taken by retailers and we only get the other half without including the expenses for the input we use”.

Table18 depicts that about 78.8% of the surveyed sampled households said that marketing vegetable has always been a critical post-production constraint at the household in the study area. During FGD, it was indicated that marketing products starts with the problem of transporting of the products to the sale points and market information, which is another serious post-production problem that these vegetable producers are facing. Vegetable products need a quick and early delivery to market; otherwise, it could spoil.

As reported by some of the informants during the FGD, similar and related vegetables in the market by producers often cause price fluctuation in the market negatively affecting their income level. Regarding the selling points of products, the HHs sample survey result depicted that 61.1% of vegetable producers sales their produce at Holeta local market to both retailer merchants and consumers and 38% of the sample producers reported that they sale their produce on farm get to small retailers Table18. In the study area, frequent low pricing reported at peak supply periods that were not based on the actual supply and demand interaction but from information collusion created by retailers.

During FGD, the entire group members reveled that, inadequate availability of marketing information that resulted in uninformed planting and marketing decisions. Most farmers obtained information on the local market from their neighbors and retailers, hence, this mostly because of lack of DAs on the site and follow up of urban agriculture department.

Table 18: To whom do the producer's sale their vegetables

HH category		To retailers on farm gate	To both retailers and consumers on market	others	Total
Producers	Count	43	69	1	113
	%	38%	61.1%	0.9%	100%
Non producers	Count	-	-	-	-
	%	-	-	-	-
Total	Count	43	69	1	113
	%	38%	61.1%	0.9%	100%

Source, survey result, 2011

On the other hand, although there are many producers in the study area, there is no any organization which to safeguard farmers' and rights over their marketable produces, farmers were exposed to baseless traders, ultimately sell their produce at low price. Hence, the survey result depicted that 78.8% as they had marketing problem. There was no any marketing

institution to safeguard farmer's interest and rights over their marketable produces. Rather, competition among farmers was the usual phenomenon in the area.

Farther more during field observation it was observed that as rural roads and means of communication for efficient flow of goods and market information is a limiting factor. Most of the topography of the farm is not suitable and accessible by vehicle. The products transported to the roadside by donkeys or by people.

4.4.2.5. Pest and diseases

FGD with vegetable producers of the study area revealed that during rainy season, pests and diseases occurrence is high specifically during the flowering stage of the vegetables. However, they stated that this might also occur during dry season. Their method of control for damage caused by pests is application of pesticides. However, the group pointed out that they hardly found pesticides and insecticides from the local market during the infestation.

5. CONCLUSIONS AND RECOMMENDATION

5.1. Conclusion

As in many developing countries, agriculture is the mainstay of the Ethiopian economy employing about 85% of the total working labor force and accounts for 90% of the total foreign exchange earnings. It also accounts for about 50% of the Ethiopian gross domestic product. However, the growth of the agricultural production is very low compared to the high population growth rate.

The most commonly grown vegetables in terms of the number of growers are potato, cabbage, tomato and carrot especially potato is widely grown in the area. The mean cultivated land size of producers and non-producer's households during the 2010-cropping year was 0.577 ha and 0.736 ha, respectively.

The study has found out that vegetable production has a significant contribution to household food security. This was tried to show using the three pillars of food security. In the first pillar, i.e. food availability, vegetable production was shown to support food crop production, by enabling producing households to employ more draft animals, utilize modern agricultural inputs, and hire wage labor with the money from the sale of vegetables.

In the food access pillar, vegetable producers were found to be in a better position to fill their food gaps with the money from vegetable sale and income get through employment in vegetable farm. That is income from vegetable has improved their purchasing power of staple foods and other non food items.

The third pillar, food utilization was used to explain that vegetable producers are in a better position to consume sufficient and nutritious food than their non producers counterparts.

A look at food utilization part highlights low level of difference in number of meals consumed per day per person in time. However, this may not imply that both groups of households consume similar amount and quality of food.

Household food balance model was used to identify Households in to food secure or not. Consequently, it was found out that vegetable producers were food secure than non-producer households. Hence, income from vegetable is the main cause for the significant variation in total mean annual income of households.

However, vegetable production is not without constraints, the study result revealed that weak extension support service, limited land holding, lack of access to credit, limited supply of improved seed, marketing and market information, outbreak of disease and pest are some of the most important problems. The drawbacks in the absence and quality of extension service were among the strong problems mentioned apart from the other challenges.

5.2. Recommendations

Based on the above findings of the study, the following recommendation can be drawn for further consideration and improvement of vegetable production in the study area in particular and in the country at large.

- The study result found that vegetable production has contributed to households' food security and brought change in their life. Farmers participated in group discussion articulated that they were benefiting from vegetable production and improving their way of life. Therefore the local administration with other concerned development organization should give due attention to initiate the farmers to be engage in vegetable production.
- The major problem identified in the study area was weak extension service in which few DAs assigned. Even the assigned DAs lack technical skill in relation to vegetable production. Hence, the local administration should give due attention to assign DAs, where there is no DAs and train DAs that need adequate skills in production management practices.
- The other major constraint of vegetable production in the study area was the absence of reliable seed supply. All of sample households reported that they purchase seed from various merchants who do not have license for sale of improved vegetable seed. In line with this, the sample households were complained about the seed quality they purchased. Hence, the local

administration with its concerned department has to give a due attention to vegetable seed production. Like, that of cereal crops and potato seeds produced on farmers plot there is a need to start with the production of other vegetable seeds in the area either at private or cooperative level and/or create strong and institutional linkage with those that can produce best quality seeds and can provide on time with fair price. On top of this pest and disease, occurrences should be managed, before they cause a destructive impact on production.

- Vegetable producer cooperatives should be created so that they can act collectively in production planning and marketing of their produce. Being the member of cooperative also positively related with credit, seed, fertilizer, marketing and market information supply, so establishing and strengthening of cooperatives is one means to enhance vegetable production in the area.
- The other problem observed in the study area is unplanned production of vegetable crop. Almost all farmers found in the study area plant the same type of vegetables in the same planting date. The excess amount harvest reaches at the same time and this situation creates favorable condition for merchants to set low price on the vegetable harvest. Therefore, the extension service sector has to take in to consideration this issue, and training is needed for farmers to stagger the planting time and type of vegetables.
- The amount of credit received was found to significantly influence production and productivity. This could imply that households largely needed external financial sources to back-up their own financial constraints to meeting production expenses. Hence, for sustainable increase in agricultural output, farming households should get sufficient amount of credit, so that they can purchase high yielding variety seeds, fertilizer and agro-chemicals. Therefore, to fill this capital deficiency gap, rural financial institutions and local administration should be work coordinately.
- The research result pointed out that, cultivated landholding size was found to be small. But this did not drive to a conclusion that States to increase total cropping land size. Rather intensified agriculture production has to be introduced and implemented in the area.
- The study result revealed that all vegetable producers in the study area use river water to irrigate their land, which is very scarce. Therefore, the interventions through development agencies are

important to help the farmers in awareness creation about rainwater harvesting and facilitating ways that may help them to solve the food security problem as well as improve their living conditions needs coordination of research center and government extension services.

- Undertaking continuous assessment of the contribution of vegetable production to household food security has to be overtaken, to identify the gap and to support the producers.

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Appendix I

FGD Checklist

I. Discussion points with woreda Agriculture and Rural Development office and Holeta town Trade and Industry department

1. Area coverage of each kebele
2. Agro-climate
3. Land-use and land-cover (type and distribution) of each kebele
4. Land holding sizes (maximum, minimum, average)
5. Major types of field Crop grown in the kebele
6. Major type of vegetable production in the kebele
7. Growing seasons of vegetable in the area
8. Main agricultural extension services and input provision situation in the area

9. Major Constraints to delivering proper extension services to the community and individual farmers
10. Major problems of farmers in the community with regard to:
 - Major Field crop production
 - Major vegetable production
11. What are the constraints of vegetable production in the area?
12. What are constraints of vegetable marketing in the area?
13. Why not non-producers produces vegetable in the area?
14. How do you perceive food crop production and vegetable production in the past 5 years?
15. How is availability of credit facility and loan process in the area?
16. Is the food produced by the non-vegetable producer farmers adequate to cover their annual consumption requirement?
17. If they are unable to produce sufficient amount at home, can they purchase from local markets.
18. Is there any significant life standard variation between vegetable producers and non-producers in the kebeles? Which of them are most vulnerable to food shortages?
19. Is there any Off-farm and nonfarm activities incomes in the area?
20. How is the food security situation of the kebeles? If there, has been deficit, why? Since when? Trends over time: increase or decrease
21. What are the major coping mechanisms of the farmers during food shortage?

Appendix II

Checklist for observations

i. Physical Environment

1. Area coverage
2. Agro-climate
3. Land-use and land cover
4. Soil aspects
5. Water use and water cover
6. Major sources of water

ii. Population

1. Population size

2. Settlement patterns
3. Ethnicity
4. Religion
5. Culture and traditions

iii. Economy/Sources of livelihood

1. Main source of livelihood: crop production, vegetable production non-farm and off-farm activities, others.
2. Major crop types: dominant in terms of area cultivated and size of harvest and source of staple food
3. Major vegetable type: dominant in terms of area cultivated and size of harvest
4. Situations of infrastructure: transport, water, marketing, extension services.

iv. Food security/situation

1. is food supply for most households adequate/are household's food self-sufficient? If not, why not?
2. Status of households in community in terms of access: secure/insecure
3. What types of households are most vulnerable to food insecurity?

Appendix III

III. Questionnaire for the household survey

A. Identification and basic particularity information regarding household head

1. Date of interview _____
2. Kebele name 1.Madda Guddina ☐ 2. Burka Walmara ☐ 3.Barfata tokkoffa ☐
3. Name of the respondent if willing _____
4. Sex: 1. Male ☐ 2. Female ☐
5. Age: _____
6. Religion: 1.Protestant ☐ 2.Orthodox ☐ 3.Muslim ☐ 4. Other, specify _____
- 7 Ethnicity: 1.Oromo ☐ 2. Amhara ☐ 3. Gurage ☐ 4.Walayta ☐ 5. ☐ Other, specify _____

8. Marital status: 1.Single ☐ 2. Married ☐ 3. divorced ☐
4. Other specify _____
9. Continuous duration of stay at current place of residence (year): 1.1-5 ☐ 2. 6-10 ☐ 3. 11-15 ☐
4. 16-20 ☐ 5. More than 20 ☐
10. If your place of birth is different from the present, reason for coming here
1. Marriage ☐ 2. Join relative ☐ 3. Displacement because of food shortage ☐
4. to get access to land ☐ 5. Other specify _____
- 11 Educational statuses attained 1.Illiterate ☐ 2.read and write ☐ 3.1-4 ☐ 4. 5-8 ☐
5. 9-10 ☐ 6. Other specify _____
13. Number of permanent household members at the time of survey:
- Total _____
14. The roof of the house for the household is made of 1. Grasses/straw ☐ 2. Iron sheet ☐
3. Other specify _____
15. Number of oxen you have _____

B. vegetable and Crop production activities

1. Would you tell us the size of farmlands and the amount of vegetable you harvest within a period of one year (2010) in addition to crop production?

No	Vegetables type	Farm size(hectare)	Production time per year	Amount Of harvest per production time within a year (Quintal/Kg)	Total produce per year(Quintal/Kg)
1	Tomato				
2	Potato				
3	Cabbage				
4	Carrot				
5	onion				
6	Green paper				

7	Others				

2. Tell us about your income from the vegetable produce in question number one.

N o	Vegetables type	Amount sold (in Qunt/Kg)	Income per harvest time (Birr)	Total income per year (Birr)	Annual amount of expense for each type of vegetable(Birr)	Annual total profit from each produce
1	Tomato,					
2	Potato					
3	Cabbage,					
4	Carrot					
5	onion					
6	Green pepper					
7	Others					

3. Would you tell us the size of farmlands and the amount of field crop you harvest in the year (2010)?

No	Crop type	Farm size(hectare)	Amount of harvest/ year/ per hec.	Total amount of harvest per year	Amount sold in the year (Qunt)	Annual total Purchase of grain from market
1	Wheat					
2	Teff					
3	Barley					
4	Pea					
5	Bean					
6	Chickpea					
7	Others					

4. Do you consider that your crop output over the last years has been?

A. Increasing ☐ B. Constant ☐ C. Decrease ☐

5. If your response is C, for question 4 what do you think is the reason? _____
-
6. Do you think that your annual crop output is sufficient to your household?
- A. yes ☐ B. No ☐
7. If not for question number 6 how do you cope with food grain shortfalls?
- A. Reducing number of meals ☐
- B. Consuming wild foods ☐
- C. Borrowing cereals from relatives or friends ☐
- D. Selling assets ☐
- F. other / specify/ ☐
-
8. In the last three years , you used most of your land for production of
- A. Vegetables ☐ B. cereals ☐ C. others _____
9. How many times do you produce vegetables in a year?
- A. One ☐ B. two ☐ C. three ☐ D. others _____
10. In addition to cereal crops, what major vegetable crops you produce (give rank according to its land coverage)
- A. potato ☐ B. tomato ☐ C. cabbage ☐ D. pepper ☐ E. onion ☐ F. carrot ☐
- G. others _____
11. If you do not produce vegetables why not?
- A. lack of input ☐
- B. Lack of land suitable for vegetable production ☐
- C. Lack of knowledge ☐
- D. Others _____
12. In the last three years the size of your land for vegetable production
- A. Increased ☐
- B. Remained the same ☐
- C. Decreased ☐
- D. Others _____

13. If your answer is increased, has the increase for vegetable production decreased your staple food production for the family?

A. yes ☐ B. no ☐

14. If your answer is yes, how did you fill the food gap / shortage /

A. Grain borrowing ☐

B. Cash borrowing ☐

C. Relatives / friends support ☐

D. Buying by income from vegetable sale ☐

E. Buying by income from live stock sale ☐

F. Others _____

15. If the size of your land for vegetable crops remained the same, why didn't you increase farm size for vegetable production?

A. To maintain staple food production ☐

B. Income from vegetable production is unsatisfactory ☐

C. Vegetable production is tiresome and costly ☐

D. Others _____

16. If the size of your land for vegetable production decreased what are your reasons?

A. To increase staple food production ☐

B. Decline in the price of cash crops ☐

C. Others specify _____

C. Production processes and constraints

1. Did you apply the following farm inputs to your farmlands?

A. Fertilizer ☐ B. Herb / insecticides / ☐ C. Selected seeds ☐

1.1. What amount of these farm inputs did you apply during 2010 crop year?

A. Fertilizers ☐ B. Herbicide / insecticide ☐ C. improved seeds ☐

1.2. Do you think that you obtain farm input on appropriate time?

A. yes ☐ B. No ☐

1.3. If not for question 1.2 Explain it _____

1.4. How do you rate the current costs of fertilizers? It is

A. Beyond your capacity ☐

B. High but I can afford ☐

C. fair ☐

D. Cheap ☐

1.5. How much quintals of fertilizer you apply for one hectare of land.

A. 1 Qunt ☐ B. 1.5 Qunt ☐ C. 2 Qunt ☐ D. Others _____

1.6. Are you supported by, shared development agent in your farm activities?

A. yes ☐ B. No ☐

2. What are your sources of water for drinking and vegetable production?

2.1 What are your major sources of drinking water?

A. Spring ☐ B. River ☐ C. well ☐ D. pond ☐ E. piped system ☐

F. other _____

2.2 Do you think that there is a problem of drinking water in your community?

A. yes ☐ B. No ☐

2.3 If yes how do you rate the problem?

A. Very high ☐ B. high ☐ C. not as much ☐

D. Household member's profile

1. Household members by age: A. 1-13 _____ B. 14-60 _____ C. > 60 _____

2. Household members by sex: A. male _____ B. Female _____

3 Educational statuses: A. 0 -4 ☐ B. 5- 8 ☐ C. 9-12 ☐ D. others _____

4. House top type: A. grass/ straw ☐ B. Corrugated iron sheet ☐ C. other _____

E. Agricultural input use and water source for both vegetable production and staple food production

1. Do you use chemical fertilizer for production of both vegetable and staple food crop production?

A. Yes ☐ B. No ☐

2. Do you use improved seeds for both vegetable and food crop production?
A. Yes ☐ B. No ☐
3. How do you get the agricultural inputs?
A. Using loan from micro finance enterprises ☐
B. Purchase from vegetable sales ☐
C. Using other sources ☐
D. Others specify_____
4. What sources of water do you use for vegetable production?
A. surface water ☐ B. Ground water ☐ C. Both ☐ D. Others_____
5. Is the source of water you use enough for your production? A. yes ☐ B. no ☐
6. If not, how do you solve the problem of water for your production explain

F. Agricultural labor force

1. In the last three years was your family labor adequate for agricultural production
A. yes ☐ B. No ☐
2. Which crop production took much of your family labor time?
A. vegetable proportion ☐
B. Cereal crop proportion ☐
C. Others specify_____
3. If you faced labor shortage, how did you solve the problem of labor shortage?
A. friends and relatives ☐
B. Wage labor ☐
C. Debo ☐
D. Others specify_____
4. If your answer for question 3 is wage labor your employment in the last three years
A. increased ☐
B. decreased ☐

C. remains the same ☐

5. Indicate the number of wage laborers employed and the total expenditure paid for the year 2009 /2010 production year.

5.1 Average number of wage laborer /payer _____

5.2. Wage paid in Birr _____

6. What is the source of money you paid for wage labor?

A. Sale of cereal crop ☐

B. Sale of cash crop ☐

C. Sale of live stock ☐

D. Loan ☐

E. Others specify _____

7. For which crop production do you use much of employed labor?

A. vegetable ☐

B. cereals ☐

C. others specify _____

8. The participation of your children in your farm

A. full time ☐

B. part time ☐

C. no ☐

9. If your children do not participate in full time in what other activities do your children participate?

A. school learning ☐

B. wage labor ☐

C. trade ☐

D. others specify _____

10. How many children do you send to school?

A. Male _____

B. Female _____

11. Majority of your income you used to cover expenditure of your children comes from

A. Sale of vegetable crop ☐

B. Sale of cereal crop ☐

C. Sale of livestock ☐

D. Sale of others _____

G. Household food consumption

1. What are the grains you often utilize as the staples that your households consume are:

A. Teff ☐ B. wheat ☐ C. Barley ☐ D. Pulses ☐ E. Others _____

2. What is the total demand of grains for your household consumption? (per month in Qunt) _____

3. Do you meet the all-year round food requirements of your household members from own production. 1. Yes ☐ 2. No ☐

4. If no, how do you supplement it? _____

5. If you purchase from market what is the sources of money to purchase food grain during the shortage? Specify _____

6. According to your own self-assessment is your household: 1. food secures ☐ 2. Food insecure ☐
3. Varies from one year to another ☐ 4. Do not know ☐

8. What do you think are the main reasons for being food insecure? Specify _____

9. how many times you eat per day 1.one times ☐ 2. Two times ☐ 3. Three time ☐ 4. Four times ☐

H. Opportunities and challenges of both vegetable and food crop producers

1. Do you have any opportunity for agricultural production 1.yes ☐ 2. No ☐

2. If yes, identify some major opportunities you have _____

3. What have been the main bottlenecks for the expansion of the production of food crop? _____

4. What have been the main bottlenecks for the expansion of the production of vegetable in particular? _____

5. Did the agricultural extension agent or woreda agriculture and rural development experts frequently advice you A. yes ☐ B. no ☐
6. If yes how often did they come to your farmland? A. two wise per week ☐ B. once a week ☐
C. two wise a month ☐ D. once a month ☐ E. others specify_____
7. If they do not come whom do you consult whenever you need technical advice related to your agriculture?
A. some educated farmers in the kebele ☐
B. kebele administrators ☐
C. I myself without any consultation ☐
D. others specify_____
8. Do you get any credit for purchasing of farm input like fertilizer, improved seeds and others A.
yes ☐ B. no ☐
9. If yes, from whom?
A. Bank ☐
B. Credit and saving organizations ☐
C .NGOs ☐
D. Others specify_____
10. If not how do you overcome the problems_____
11. Do you have any problem in selling your farm produce? A. yes ☐ B. no ☐
12. If yes, identify some major problems_____
-
13. To whom do you sale your farm output?
A. to consumers ☐
B. to merchants ☐
C. to both merchants and consumers ☐
D. on market ☐
E. others specify_____

I. For farmers producing vegetables and food crop regularly

1. What are the major factors, which encouraged you to produce vegetable crops in addition of food crops?

- A. The production of vegetables by other farmers in my area ☐
- B. The lack of sufficient grain to cover the annual household's food conception ☐
- C. The better fertility status of my farm soil ☐
- D. The better approximation of my land to water source ☐
- E. The better the market price of vegetable ☐

(rank it as very important, important, not important)

2. When did you start the production of vegetable crops?

- A. 1-2 years ☐
- B. 3-4 years ☐
- C. more than 5 years ☐
- D. others _____

3. Have you regularly produced since then? A. yes ☐ B. no ☐

4. If no what problems had interrupted your

production? _____

5. Do you apply artificial fertilizer for your vegetable production? A. yes ☐ B. no ☐

6. If yes, how do you obtain it?

- A. by purchasing from private merchants in cash ☐
- B. by purchasing from cooperatives on cash ☐
- C. by purchasing from government institutions on credit ☐
- D. by preserving some from what I bought for field crops ☐
- E. others _____

7. If you do not apply artificial fertilizers how do you plant your

vegetables? _____

8. Have you faced the shortage of work force while performing the farming activities during the last three years? A. yes ☐ B. no ☐

9. If yes, how did you overcome the problem?

- A. by hiring laborer ☐
- B. through social group particularly Wanfel ☐
- C. through social work particularly Debo ☐
- D. others _____

10. Did you face the problem of improved seeds for both vegetable and crop? A. yes ☐ B. no ☐

11. If yes how did you overcome the problem? _____

J. For farmers producing field crops only

1. Despite, the availability of irrigation water in your farm area you do not produce vegetable crops. What are the major discouraging factors for not producing vegetable crops?

No	Major factors	Most discouraging	Less discouraging	Not discouraging
a	Sufficient field crop I produce			
b	Difficulty of land preparation			
c	The unreliability of irrigation water			
d	Absence of awareness to contribution of vegetable to food security			
e	Scarcity of farm land to produce vegetable in addition to field crops			
f	Lower fertility status of farm land			
g	Lack of improved variety seed of vegetable			
h	Lack of capital			
i	Lack of technical knowledge to produce			
j	Un availability of marketing place			
k	Perishability of vegetable crops			
l	others			

2. Did you have a plan to produce vegetable crop in the future? A. yes ☐ B. no ☐

3. If yes, under which circumstances are you going to produce vegetable crops, and which support do you need? _____

3. Mention the cereal crops you have produced in the last year 2009/2010

No	Crop type	Farm size(hectare)	Amount of harvest/ year/ hectare in qunt.	Total amount Of harvest per year in qunt
1	Wheat			
2	Teff			
3	Barley			
4	Pea			
5	Bean			
6	Chickpea			

7	Others					
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5. Do you apply artificial fertilizers to your land during production? A. yes B. no

6. If yes how is application rate per hectare?

No	Crop type	Application in hector(qunt)		
		DAP	UREA	TOTAL
1	Wheat			
2	Teff			
3	Barley			
4	Pea			
5	Bean			
6	Chickpea			
7	Others			

7. Identify the major problems of your agricultural activities and possible solutions for them

A. problem_____

B. suggested solutions from your

opinion_____

Thank you!

Declaration

I, the undersigned, declare that this thesis is my original work and has not been presented for a degree in any other university, and that all sources of material used for the thesis have been duly acknowledged.

Name: Getu Gemechu Ejersa

Signature: _____

June 2011