ADDIS ABABA UNIVERSITY
SCHOOL OF GRADUATE STUDIES
INSTITUE OF DEVELOPMENT STUDIES
(IDS)

Title

Food Security Contributions of Urban Agriculture: The Case among Households in Akaki Kaliti Sub-City, Addis Ababa.

By
Endale Lemma

Food Security

APPROVED BY THE BOARD OF EXAMINERS: SIGNATURE

Dr. Ali Hassen _____
CENTER HEAD

Dr. Degefa Tolossa _____
ADVISOR

Dr. Abeje Berhanu _____
INTERNAL EXAMINER

ACKNOWLEDGEMENTS

First and foremost, my indebted thanks and gratefulness is to the almighty God in His highest throne.

I am also thankful to Addis Ababa University that gave me the opportunity of attending the M.Sc. program in the School of Graduate Studies.

My heartfelt thanks should goes to Dr. Degefa Tolossa who has been assisting me and critically reviewing this study without which it would have been worthless.

I am whole heartedly express my deepest gratitude for the Addis Ababa City Government Urban Agriculture Extension Core Process of all levels, the key informants, FGD participants, household heads interviewed in the HH survey, the Development Agents of Woreda 01, 02, and 03 in Akaki Kliti Sub-city, MSE Officers of the three mentioned Woredas, and all people met in the entire process of this study.

Also my special thanks and honor should be to my dearest wife Hirut Terefe for her courage to uphold me from the beginning to end of my stay at Addis Ababa University. Finally, I am glad to extend my deepest thanks and appreciation to my extended families for their marvelous support and earnest prayer.

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GLOSSARY

AAU	Addis Ababa University
ACDI	Agricultural Cooperative Development International
ANOVA	Analysis of Variance
CBO	Community Based Organization
CSA	Central Statistics Agency
DA	Development Agent
ESRDF	Ethiopian Social Rehabilitation and Development Fund
FAO	Food and Agriculture Organization
FDRE	Federal Democratic Republic of Ethiopia
FGD	Focus Group Discussion
HDDS	Household Dietary Diversity Score
HFS	Household Food Security
IFPRI	International Food Policy Research Institute
HH	Household
KII	Key Informants Interview
MSE	Micro and Small Enterprises
MDG	Millennium Development Goals
NGO	Non Governmental Organization
SPSS	Statistical Package for Social Sciences
UA	Urban Agriculture
UAECP	Urban Agriculture Extension Core Process
UN	United Nations
UNCCD	United Nations Convention to Combat Desertification
UNDP	United Nations Development Program
UNEP	United Nations Environment Program
UPUA	Urban and Peri-Urban Agriculture
VOCA	Volunteers in Overseas Cooperative Assistance
WB	World Bank

ABSTRACT

Urban agriculture in Addis Ababa city is being implemented by the small holder individual farmers, micro and small enterprises, and the large scale cooperatives for different reasons. Urban agriculture is among those socio economic sectors that are interrelated with food security but undermined and misconceived for long. A thorough understanding and analysis of food security contributions of urban agriculture is the central theme of this research.

The combination of both quantitative and qualitative research method was employed in this study where the data in both types were used as an input for analyzing. In the courses of quantitative methods of analysis, the statistical tools such as linear coefficient of relation using the Pearson correlation coefficient, the coefficient of determination, and the linear regression were used to examine the interrelations between different variables.

Urban agriculture does appear to be associated with greater dietary diversity and the increased number of eating occasions that are the measures of an improved diet at household level. The household food supply from the own production can considerably satisfy the food demand of urban dwellers. The UA production can also fosters the market availability of agriculture products where the urban poor can access UA products in the vicinity. Also, urban agriculture contributes to household's access to food by virtue of increased income of those people engaged in the production, processing and marketing of urban agriculture. It widely utilizes as one of the income generating activities in the city due to that it contributes for employment opportunity and improves the purchasing power of households. Urban agriculture due to its proximity to the huge and potential markets, those nutritionally high food products are easily and timely available for the consumer. Moreover, urban agriculture can be used as an alternative food security through coping mechanism or survival strategy in times of family and social crisis; can complement the low income obtained from the basic livelihood sources; and to cope with the soaring prices of food products in the city. Despite its role for food security urban agriculture faces the problems such as institutional and policy related, socio-economic, and research and technological constraints that are exogenous to the system.

CHAPTER I: INTRODUCTION

1.1 Background of the Study

Urban agriculture is increasingly on the international agenda, recognized as key part of a comprehensive solution to the problems of the runaway growth of cities in developing countries (Mougeot, 2006). After having overlooked for a long time, urban agriculture has attracted more interest in the last years because of its enormous practical relevance for the nourishment of the urban population.

In urban areas where household food security is dependent on household income, work opportunities and an efficient food market system are crucial to improving access to food. To that effect, urban agriculture has the paramount role since food production is typically practiced over smaller and more dispersed areas than rural agriculture, uses land and water more sparingly and efficiently, integrates systems more effectively, and produces much higher yields and more specialty crops and livestock (Mougeot, 2000).

However, urban agriculture is a concept that evokes contradictory images. The literature on urban agriculture as a catapult out of poverty is scant at best. Even in respected published works dedicated to the study of large cities (Ahmed, 1986), urban agriculture as more than mere 'subsistence food production' is not given the attention it deserves. As a result, it has been common for development researchers, policy makers in developing countries, and technical professionals in assistance agencies to overlook the vast numbers of urban poor who generate at least a portion of their livelihood from agricultural production. In very recent years some recognition has been given to food production by urban residents, typically in the context of research on sustainable habitats, or the contribution to nutritional status of food produced within city boundaries (Maxwell, 2000) and (Daniel, 1998). However, as urbanization overtakes demographic trends in developing countries, it is critical that policy makers in developing countries and urban planners in particular heighten their awareness and appreciation of the important contribution that urban food and non-food production is making to the diversity of livelihood activities of the urban poor and the quality of life in urban centers in developing countries (Jac et.al, 2001).

Addis Ababa city is considerably the ideal place for implementation of urban agriculture because of the existence of suitable agro-ecology for both horticultural crop production and animal husbandry. The city's farming is also prominent for its proximity to a huge and attractive market that allows the production of high-value perishable products such as green leafy vegetables and dairy products like fluid milk, yoghurt and cheese. The availability of different kinds of agricultural inputs and services, the existence of convenient infrastructures in the city, and diversification and integration possibilities for those practicing favor urban farming in the city metropolis.

However, urban agriculture in Addis Ababa is encountering challenges that are external to the system. The lack of specific policy and strategy, institutional instability and lack of technical support to the sector, the rapidly growing population pressure, competition of other investment sectors are the profound constraints of urban farming (Mandefro, 2010). The limitation in the area of research related to the food security contributions of the sector is also another shortcoming of urban agriculture.

This research basically focuses on assessing the contribution of urban agriculture to food security and its components with the specific concern to some selected households in Akaki Kaliti sub city of Addis Ababa City Administration. Besides, it attempts to investigate the factors that adversely affect urban agriculture in the study area. It also gives insight for policy makers to pay due attention to the sector and consider urban agriculture as one of the major livelihood and economic sources. Moreover, the study commends development practitioners to gear the food security interventions in favor of developing and sustaining urban agriculture.

1.2 Statement of the Problem

Urban agriculture tremendously contributes to the enhanced food and nutritional security at household and community level. Its implications for food security are the increased supply of fresh and perishable food products like milk and vegetables, satisfying the consumption need of the urban poor and increased income of households engaged in the production, processing and marketing of UA products. Though, urban agriculture in the city administration of Addis Ababa has been undermined and even was not supported by the development policy and/or strategy. The institutional instability and in appropriate organizational setup of urban agriculture office in

the city also brought to the inadequate facilities and limited extension service for the people engaged in urban agriculture.

Generally, researches undertaken in the fields of agriculture are highly focussing on the rural centre; however in the case of urban agriculture it was not given due attention that it deserves. To that effect, the contribution of urban agriculture to the households' food security and the national economy was not statistically measured and made available. The widespread misconception of the sector associated with the limited awareness on the potential role of urban agriculture brought to insufficient consideration by the development actors.

On top of these, the sector is constrained by exogenous factors like the rapidly increasing population growth compounded by urbanisation and expansion of settlements, dwindling of land and water resources used for urban agriculture, lack of technologies appropriate to urban agriculture, competition of other investment sectors, and threats like environmental hazards associated with the sector.

Akaki Kaliti sub city, endowed with natural and manmade resources presumably conducive agro-ecology for crop and livestock, the existence of suitable soil and water resources, its proximity to large markets, the presence of infrastructure facilities, and the tradition of inhabitants in growing of crops and rearing of animals for various reasons. Nevertheless, the Sub city is among those highly threatened by dwindling of land and water resources due to invasive horizontal expansion of settlements, growing of urbanization, and competition of investments like the real estates and industries. In due consideration of the above reasons the researcher has intended to carry out a case study research deliberately selecting the Akaki Kaliti Sub city as the study area or the universe to be studied.

Therefore this study examines the food security contributions of the urban agriculture on those selected urban farmers. It also helps to explore the above mentioned constraints associated with urban agriculture.

1.3 Objective of the study

This general objective of the study is to investigate and explain the food security contributions of urban agriculture in Addis Ababa.

The specific objectives are:

- To identify major components of food security such as Food Availability and Access in terms of households engaged in production, processing, and marketing of urban agriculture.
- To assess and clearly depict the constraints and opportunities associated with urban agriculture in the study area.

1.4 Research Question

The following research questions pose the researcher to look for a desirable response through conducting the case study research.

- What are the major aspects or dimensions of food security addressed by the urban agriculture?
- To what extent can urban agriculture contribute to food security at HH and community level?
- What is being produced, by whom, and for whose consumption?
- What are the challenges and opportunities associated with urban agriculture?

1.5 Significance of the study

This study entails on knowledge generation as well as it attempts to make further contribution to the previously done researches and can be used as a source material for further studies. In this regard, it is imperative to understand the contribution that urban agriculture can make up to the major dimensions of food security mainly availability, and access. Thus, it helps to understand the food security implications of urban agriculture at household level.

The intent of this research thesis is to complement the previous research works in the area of urban agriculture and food security which is not aimed to replicate or duplicate what has been done by the others but to fill the gaps that were not observed in other research works. Thus, it shouldn't be misconstrued as comprehensive work that provides the full idea on the subject matter rather it provides a glimpse of information to develop further knowledge.

The study also heightens the understanding on the food security roles of urban agriculture so that it gives insight for the policy makers to design appropriate urban development policy in the city. The research investigates the pressing factors cause for the undermining of the sector vis-à-vis its incredible role for food and livelihood security. It also gives insight for policy makers to pay due attention to the sector and consider urban agriculture as one of the major livelihood and economic sources. Moreover, the study commends development practitioners to gear the food security interventions in favor of developing and sustaining urban agriculture.

1.6 Scope and Limitations of the Study

The scope of this study is delimited to the urban farmers and the environs in Woreda 01, 02, and 03 of Akaki Kaliti Sub-city whereby the urban agriculture sub-systems such as poultry, dairy, and vegetable production and animal fattening are addressed. The range of coverage in the study is to the extent of survey on hundred households, the FGD and KII participants and assessing those relevant literatures associated with urban agriculture and food security.

Among those limitations in this study is its focusing on only three Woredas out of the 116 in Addis Ababa is clearly insufficient to draw regional or national level conclusions, and those drawn here are only about the case study area. The relevant population from which the sample was derived was the population of urban farmers in Addis Ababa rather than the urban population as a whole. However, sampling procedure does not conform to strict requirements for probability sampling, since purposive selection and sampling were made necessary by resource and time constraints. Given the stratification and subsequent spread of sub-cities that were selected, however, the sample should be broadly representative of urban farmers in Addis Ababa.

Food security in its nature is complex that involves the domains of natural and social sciences, and determined by a number of factors so that a single measuring tool can't give us an absolute finding or result. Thus, the researcher in this study employed the various proxy indicators used for measuring food security. As long as the intent of the study mainly concentrates on the food security contributions of urban agriculture, the other sources of livelihood that can determine the food security status of targeted HHs were not considered in the courses of study, possibly taken as the limitation of the study.

1.7 Organisation of Thesis

The thesis is composed of six chapters of which these chapters are systematically constructed and put in such a way that the information is flown coherently.

Chapter one is the introduction which includes background of the study, statement of the problem, objective of the study, and scope and limitations of the study. The second chapter is review of theoretical and related literatures that describes the conceptual review of urban agriculture and food security, and empirical studies on urban agriculture and food security. The third chapter deals with methodology of the study including description of the study area, sampling procedure and sample size determination, sources of data, tools and corresponding instruments and data analysis and techniques.

Chapter four is about analysis and discussion that comprises background of the study area, socio economic descriptions of the sample households, the food security contributions of urban agriculture, interrelations between different variables such as household consumption, income, assets ownership and others, urban agriculture as alternative food security strategy, and the analytical framework that depicts the interrelations of urban agriculture and food security. Chapter five addresses the constraints and challenges of urban agriculture. Finally, chapter six discuss on summary & conclusion, recommendation and implications for further research.

CHAPTER II: REVIEW OF RELATED LITERATURES

2.1 Conceptual Review

2.1.1 The Meanings, Background and Characteristics of Urban Agriculture

Urban agriculture is defined as,

> *"The practice of food production within a city boundary or on the immediate periphery of a city, it includes the cultivation of crops, vegetables, herbs, fruit, flowers, orchards, parks, forestry, fuel wood, livestock (cattle rearing for dairy products, sheep, goats, poultry, swine, and so forth), aquaculture, and bee-keeping* (Axumite, 1994).

The definition above illustrates that urban agriculture is basically aimed on food production that is either confined in the city boundary or surroundings of the city. Accordingly, the activities practiced in urban agriculture are composed of crop and livestock husbandry. Five years later another definition was explored by scholars as follows.

Urban agriculture has been defined as,

> *"An industry that produces, process and markets food and fuel, largely in response to the daily demand of consumers with in a town, city metropolis, on land and water dispersed throughout the urban and peri-urban area, applying intensive production methods, using and re-using natural resources and urban wastes, to yield a diversity of crop and livestock"* (Koc et. al, 1999).

The second definition differs from the former one in that urban agriculture cannot be only aimed on food production but it can also be oriented at the processing and, marketing of urban agriculture products. It also describes the farming system of urban agriculture that applies an intensive production system and efficiently uses the natural resources and urban wastes.

Urban agriculture can also be defined as the growing of plants and the raising of animals for food and other uses within and around cities and towns, and related activities such as the production and delivery of inputs, and the processing and marketing of products (Veenhuizen, 2006). This definition attempted to synergies the second definition invented by many scholars.

UA comprehends production, processing, and distribution activities within and around cities and towns, whose main motivation is personal consumption and/or income generation, and which compete for scarce urban resources of land, water, energy, and labor that are in demand for other urban activities[1]. Urban Agriculture is located within or on the fringe of a city or peri-urban and comprises of a variety of production systems, ranging from subsistence production and processing at household level to fully commercialized agriculture (Veenhuizen, 2006).

Urban agriculture has been practiced since the ancient period especially in the old and historical cities of the Middle East. Urban farming as a basic urban function is nothing new; in fact it seems to be as ancient as cities themselves. For example more than 1,000 years ago, Baghdad was home to more than one million people. About the same time in China, the city Changan (today called Xi'an) is said to have had 800,000 inhabitants. Thus, if the growth of large cities is nothing new, nor is the practice of urban agriculture being realized (Mougeot, 2006).

At the dawn of the 21st century, Asia is leading the way in the sector, with highly complex and efficient systems for the production and marketing of urban agriculture. Urban food production has expanded enormously since 1970 in major cities of Africa and Latin America. This has been a response to insufficient, inadequate, unreliable and unaffordable food supplies from rural and foreign sources (Koc, 1999).

The United Nations Development Program (UNDP, 1996) estimated that 800 million people are engaged in urban agriculture worldwide. Of these, 200 million are considered to be market producers employing 150 million people on full-time basis. Urban agriculture contributed 15 percent of world food production in 1996 and this is expected to grow to 30 percent by 2005 (Jac et.al 2001).

Some investigations done on the situation of urban agriculture showed that as much as 40 per cent of the populations of some African cities and up to 50 per cent in some Latin American cities engage in urban or peri-urban agriculture (IFPRI, 2002).

[1]It includes small- and large-scale activities in horticulture, livestock keeping, fodder and milk production, aquaculture, and forestry - where several activities may be carried out within one enterprise (Urban Harvest; http://www.cipotato.org/urbanharvest/about_ua.htm; accessed 25.10.2010).

Table 1: Urban Agriculture in Africa

Country	Status of Urban Agriculture in Cities
Burkina Faso	36 percent of families in Ouagadougou are engaged in horticultural cultivation or livestock breeding activities
Cameroon	In Yaoundé 35 percent of urban residents are farmers
Gabon	80 percent of families in Libreville engage in horticulture
Kenya	67 percent of urban families farm on urban and peri urban sites; 29 percent of these families farm in the urban areas where they live.
Mozambique	37 percent of households surveyed in Maputo produce food; 29 percent raise livestock
Tanzania	68 percent of families in six Tanzanian cities engage in farming; 39 percent raise animals
Uganda	33 percent of all households within a five-kilometer radius of the center of Kampala engage in some form of agricultural activity
Zambia	A survey of low income households in Lusaka showed that 45 percent grow horticultural crops or raise livestock in their backyards or gardens on the periphery of the city.

Source: *Streiffeler 2000, p. 171 cited on Devereux and Maxwell, 2001*

In Ethiopia, urban agriculture is the final sequence of survival strategies exhibited by households. Households in the urban areas respond to the extreme threat of poverty and food insecurity by carrying out urban farming on any vacant space available. Urban agriculture is also practiced because of shortage of income and unemployment in the urban centers (Lamba, 1993).

Urban agriculture has also been studied as a contributor to improved nutritional levels among the urban poor. In Ethiopia, they carry out urban agriculture on land in transitional use and where usufruct rights are at issue. This problem leads to low investment in urban agriculture and therefore poor productivity (Lamba, 1993).

A characteristic of Urban Agriculture that makes it especially relevant to the situation of poor people is the use and re-use of urban waste in the technology of production. A good deal of Urban Agriculture is based on the recycling of organic materials, the supply of which is rooted in the nature of urban living. Vacant land that suddenly or even temporarily becomes available is quickly exploited, if only for cut and carry of forage (Streiffeler, 2000).

Urban agriculture, including food production, is typically practiced over smaller and more dispersed areas than rural agriculture, uses land and water more sparingly and efficiently, integrates systems more effectively, and produces much higher yields and more specialty crops and livestock. As with other land uses, urban agriculture adapts to city development, with the less space-dependent forms surviving in central areas and the more land-demanding forms migrating to less coveted locations (Mougeot, 2000).

The World Bank characterizes UA with that production system is close to urban consumers, it can be well connected in terms of input and output markets. UA products may reach urban consumers and processing points the day they harvested. These systems are also characterized by the small scale of production, high proportion of perishable crops (especially leafy vegetables), disease and insect pressure, intensity of input use, crop diversity, and low use of mechanical power (World Bank, 2005).

Urban agriculture is generally characterized by closeness to markets, high competition for land, limited space, use of urban resources such as organic solid wastes and wastewater, low degree of farmer organization, mainly perishable products, high degree of specialization, to name a few. By supplying perishable products such as vegetables, fresh milk and poultry products, urban agriculture to a large extent complements rural agriculture and increases the efficiency of national food systems (Veenhuizen, 2006).

Urban farmers are closer to markets than their rural farmers and have an advantage in targeting specific consumer segments like the high income and responding quickly to change in the demands of these, provided they have good access to market information (World Bank, 2005).

Urban farmers are mainly small-scale family enterprises, but also medium sized and large enterprises are encountered. Urban agriculture (especially and more so intra-urban agriculture) is often done in addition to other employment. Urban producers cope with greater competition over resources, environmental stress, tenure and crop insecurity, and inadequate or nonexistent legal, financial, and technical support (Mougeot, 2000).

UA is so typically opportunistic because practitioners have evolved and adapted diverse knowledge and know-how to select and locate, farm, process, and market plant, tree, and livestock types in the urban fabric (Mougeot, 2005).

2.1.2 The Concepts of Food Security

In this section, it is found to be crucial to elaborate the definitions of food security and its dimensions that are required ahead of discussing its linkage with the urban agriculture.

Food security exists when all people, at all times, have physical and economic access to sufficient, safe, and nutritious food to meet their dietary needs and food preferences for an active and healthy life (FAO, 1996). This definition was adopted by the heads of the world states when gathered for the world food summit in Rome, called by the Food and Agriculture Organization of the United Nations. It was also used as the basis for the first objective of the MDGs, *"Eradicate Extreme Poverty and Hunger"*, adopted by the world leaders in the year 2000 and set to be achieved by 2015.

The food security definition comprises four key dimensions of food supplies: *availability, stability, access, and utilization* (Schmidhuber & Tubiello, 2007).

The first dimension relates to the availability of sufficient food, i.e., to the overall ability of the agricultural system to meet food demand. Its sub dimensions include the agro-climatic fundamentals of crop and pasture production and the entire range of socio-economic and cultural factors that determine where and how farmers perform in response to markets.

The second dimension, stability, relates to individuals who are at high risk of temporarily or permanently losing their access to the resources needed to consume adequate food, either because these individuals cannot ensure *ex ante* against income shocks or they lack enough' reserves'' to smooth consumption *ex post* or both. An important cause of unstable access is climate variability, e.g., landless agricultural laborers, who almost wholly depend on agricultural wages in a region of erratic rainfall and have few savings, would be at high-risk of losing their access to food (Schmidhuber & Tubiello, 2007).

The third dimension, access to food refers to the ability of individuals, communities, and countries to purchase sufficient quantities and qualities of food. It also covers access by individuals to adequate resources (entitlements) to acquire appropriate foods for a nutritious diet (Schmidhuber & Tubiello, 2007). Entitlements are defined as the set of all those commodity bundles over which a person can establish command given the legal, political, economic, and

social arrangements of the community of which he or she is a member. Thus a key element is the purchasing power of consumers and the evolution of real incomes and food prices (Schmidhuber & Tubiello, 2007). Food access depends largely on household purchasing power, which varies in relation to market integration, price policies and temporal market conditions (UNDP et.al, 2009).

Finally, utilization encompasses all food safety and quality aspects of nutrition; its sub dimensions are therefore related to health, including the sanitary conditions across the entire food chain (Schmidhuber & Tubiello, 2007). Also food utilization is determined by food safety and quality, how much a person eats and how well a person converts food to energy, all of which affect proper biological use of food, nutritional status and growth (UNDP et. al., 2009).

2.1.3 Food Security in Urban Context

Specific aspects of food security in the urban context are, on the one hand, the necessity to purchase most of the food required by the household and, on the other, a greater dependence on the market system and on commercially processed food. Employment and income are, therefore, the main prerequisites for attaining food security in urban setting (Baumgartner & Belevi, 2001). Sustainable production, processing and production of food in and around cities and towns contribute to the goal of safe, affordable, and reliable food supply for the urban poor, and provide income and employment to a large number of poor specially women (World Bank, 2005).

There are two major forces driving people from all walks of life, particularly those on low incomes and the poor, to cultivate the city: food security and income generation. There is evidence to suggest that UA's contribution to urban food supply and household urban food security is significant and in many instances is growing (Mougeot , 2005). Growth in urban food production depends on poverty level, household size, city lay out, access to land and water, official attitudes, and climate (Koc et.al, 1999).

Urban food supplies in developing countries can no longer be taken for granted and there is ample evidence from world cities that food is turning into a "basic luxury" for the urban poor in particular. Urban food production has grown into a complex and thriving industry, in terms of practicing households and its supply of many nutritious food items to urban markets. Also, there is a growing body of data on the benefits accruing to practicing households, in terms of self-

grown food intake, child nutritional status and general health, cash savings and generated income (Mougeot, 2005).

Many of those engaged in UA are not doing just for self provisioning. Although, UA is a main occupation for only a minority of those who farm in cities, it is a very important second or even third occupation for many people. Growing and processing food in cities creates a lot of employment, many thousands of part-time and full-time jobs, and has a potential to create many more. For many families it helps to reduce the economic uncertainty that comes with unemployment and employment instability, meaning there will always be food on the table (Mougeot, 2006).

2.1.4 The role of Urban Agriculture towards Reducing Urban Food Insecurity

Despite persistent economic growth around the world, food insecurity and unemployment remain pressing problems in many parts of Africa ((UN-Habitat, 2006); (Mougeot, 2005), especially in and around the major urban centers. The FAO (2002) suggest about 33% of people in sub-Saharan Africa, undernourished and United Nations (UN-Habitat, 2006) reports that the percentage of urban residents in Sub-Saharan Africa is expected to rise from 39.7 to 53.5% between 2005 and 2030. This will bring new and severe challenges for assuring household food security and access to basic services.

Many studies such as (Daniel, 1998), (Devereux & Maxwell, 2001), and (World Bank, 2005) reveal that urban agriculture has been used as a household strategy to respond to both chronic and emergency food insecurity. The responses of urban households to the economic crisis are normally the focus of efforts to combat poverty and food insecurity (Maxwell, 1999). Urban agriculture can be seen as a survival strategy for the urban poor during crisis periods, and contributes to household food security especially for women and elderly (World Bank, 2005).

Food supply crises in developing world can come about as a result of a number of factors: political instability, climate change, market globalization, and so on. Whatever the cause, a crisis in food supply tends to affect people in urban areas more than in rural areas, and women and children are particularly vulnerable when food is in short supply (Mougeot, 2006).

As a response of the urban poor to inadequate or costly food supply, food (crops and livestock) production in urban backyards became worldwide a common feature. But the related increase in urban food demand opened also the door for farming systems in and around cities specialized on perishable products, such as vegetables, taking advantage of every open space, market proximity and the general lack of functional cold chains. All these farming systems are part of a phenomenon called Urban Agriculture (UA) (IFPRI, 2002).

Urban households respond to food insecurity by virtue of diversifying their sources of food and income through increased own production of food or increased labor force participation (including children), send out wage labor migrants, substitute cheaper foods, borrow or buy on credit, reduce other expenditures, sell assets, send household members to stay with kin elsewhere, and reduce their food intake (Devereux & Maxwell, 2001).

Urban agriculture or food production conducted in or around urban regions, seems to provide a realistic and pragmatic solution (Mougeot, 2005). For example, reports indicate that urban agriculture is an important source of food throughout developing-country food systems and a critical food security strategy for poor urban households (Mougeot, 2000); (Klemsu & Maxwell, 2000). Urban agriculture may improve household nutrition as it provides a source of fresh, locally grown crops that increase the micronutrients in poor households' diets and it can increase household incomes (IFPRI, 2002).

According to (Maxwell, 1999) the nature of urban food insecurity has changed from the problem of "feeding the cities" (or maintaining aggregate supply), to that of access at household and individual level. The responses of urban households to the economic crisis are normally the focus of efforts to combat poverty and food insecurity. Poor urban consumers can spend from 60% to 80% of their limited income on food. Here, urban agriculture becomes an interesting option as it contributes to the aggregate supply, in particular of fresh and perishable plant and animal food, as well as to food production at home for home consumption and better nutrition.

2.2 Empirical Studies on Urban Agriculture

2.2.1 Urban Agriculture as Source of Livelihoods

Although agriculture is usually perceived as only a rural activity, it can also be an element in urban livelihoods, serving as a source of food and employment for poor households and for

entire cities. The extent of urban agriculture varies widely depending on land availability and legal restrictions. Studies show that as much as 40 percent of the population in African cities and up to 50 percent in Latin American cities are involved in urban or peri-urban agriculture. In the 1980s urban and peri-urban agriculture in China's largest cities met more than 90 percent of vegetable demand and more than half of meat and poultry demand (IFPRI, 2002).

In light of the livelihood security, the study conducted in city of Lima, capital of Peru located in the western of Latin America revealed that urban producers use a variety of assets, which they combine in order to deal with risks and vulnerabilities. These assets are divided into five categories: natural, physical, human, financial and social. Here, one of the principal threats to urban producers is rampant urban sprawl. In addition, urban households involved in agriculture contend with a lack of recognition and understanding from policy makers (Villavicencio, 2008).

Studies undertaken in the capital of Zambia, Lusaka revealed that the basis for urban agriculture is the availability of resources. Also, the same study showed urban agriculture can act as an alternative income-generating activity and as a buffer for household food security (Drescher, 2000)

The study carried out in five East African cities: Addis Ababa; Dar es Salaam; Kampala; Kisumu and Nairobi. found that urban livestock keeping, the one segment of UA, benefits the poor and provides a way of diversifying livelihood activities that are accessible to vulnerable groups such as female-headed households, children, retired people, the sick and widows, as well as providing a source of locally produced food projects for people living near the livestock keepers. The study also revealed that Livestock are kept as social safety nets, retirement policies, deposits for funerals, sources of food and income. Urban livestock keeping is of great relevance to those in need of a social security strategy (Richards & Godfrey, 2003).

The case study research conducted in the city of Nairobi indicated that several land holdings potentially increase the diversification and intensification of food-production systems. As a result of this diversification of crops and livestock-rearing, household income increased in several ways. First, if they were marketed, the surplus food crops and livestock as well as their products fetched extra income. Second, the increased availability of food crops relieved the households'

income from food purchases. Therefore, households' food security was enhanced by increased availability and access to diversified diets (Njogu, 2008).

In Ethiopia, urban agriculture has been shown to be a final stage by households in their sequence of survival strategies. Households in the urban areas respond to the extreme threat of poverty and food insecurity by carrying out urban farming on any vacant space available. Urban agriculture is also practiced because of shortage of income and unemployment in the urban centers (Lamba, 1993).

An exploratory research conducted by Axumite (1994) in Addis Ababa on five horticultural cooperatives found out that urban households in Addis Ababa start urban agriculture when they lack options and/or fail to satisfy their needs with better income options. She also put the survival strategies of urban farmer households as that urban farmer households passed through three common sequential stages while looking for better income and better survival options for themselves and their family members.

> *Most head of households worked in the informal sector, then they became tenants and waged farm laborers, and finally they all became state land occupiers, after which they formed a producer cooperative The same scholar has also discovered that in Ethiopia like in other African countries, although UA is significantly contributing for fulfilling the basic demands of the low income, it still lacks proper consideration and the right full place from policy makers, urban planners and authorities* (Axumite, 1994).

2.2.2 Urban Agriculture and Food Security

Empirical evidence from a sample of 15 developing countries, by use of the nationally representative household survey data, analyses in a comparative international perspective of the importance of urban agriculture for the urban poor and food insecure (Zezza & Tasciotti, 2010). The study underlines the potential of urban agriculture to play a substantial role in urban poverty and food insecurity reduction should not be overemphasized, as it shares in income and overall agriculture production. Thus, in those countries where the study conducted agriculture provides a substantial share of income for the urban poor, and for those groups of households to which it constitutes an important source of livelihoods. The study finds out there is a fairly consistent

evidence of positive statistical association between engagement in urban agriculture and dietary adequacy indicators. Thus, urban agriculture does appear to be associated with greater dietary diversity and calorie availability, both measures of an improved diet and hence closely related to food security.

Urban agriculture can be seen as a survival strategy for the urban poor during crisis periods, and contributes to household food security especially for women and elderly. Investigations carried out in the city of Hanoi, capital of Vietnam showed that urban agriculture supplies about one half of the food demand, and engages 10 percent of the urban labor force in processing and marketing, retailing, input supply, seed and seedling production (World Bank, 2005).

An empirical study carried out by (Tewodros, 2007) evidenced the role that urban agriculture plays in the livelihoods of urban farmer households in Addis Ababa city. The role of urban agriculture in household income and urban poverty alleviation, and socio-economic challenges in relation to urban farming were investigated by the researcher.

> *Urban farming in Addis Ababa was found to contribute significantly (65 %) to livelihoods of urban farmers at both sectoral and household levels, for which livestock and crop production accounted for 40 % and 45 %, respectively. The urban farmers produce a variety of crops and livestock for home use and/or market. The fact that mixed farming is the most common activity by many urban farmers in the city implies farmers' options for diversification. Cultivating vegetable crops is the most common practice for crop producers, and this may be associated with the size of landholdings (being small), and suitability of vegetables for cultivation, piece by piece harvesting and their liquidity. Despite its substantial sectoral contribution, livestock production, mostly rearing of milk cattle, is practiced by few urban farmers, and it may be because of capital (credit) constraints since the sub-sector requires high initial investment* (Tewodros, 2007).

Many of the urban development studies in developing countries concentrate on housing, urban services, and nonagricultural informal activities (Mougeot, 2006). However, they mainly exclude or give little attention to UA; even those studies that were conducted in the area of UA, they paid attention to the environmental concerns and a little concern to all food security dimensions so that the researcher built a heartfelt aspiration to show the significance of UA in addressing the

two basic dimensions of food security, *availability and access* and its converging role to the achievement of the food security goal at household and community level.

On the basis of the reviewed literatures, this study has intended to empirically examine the food security contributions of UA using the food security measuring tools such as food frequency assessment that comprises the measurement of HH food consumption, dietary diversity score and the 24 hours recall that are indicating the households food availability and access. In addition, those relevant indicators in connection with the study such as the agriculture yield, ownership of resources or assets, and the seasonal food supply at household and community level, and the market availability of the urban agriculture products will be employed in the courses of measuring the HFS.

CHAPTER III: METHODOLOGY OF THE STUDY

3.1 Description of the Study Area

3.1.1 Location

This is study was conducted on those selected households of Akaki Kaliti Sub-city of Addis Ababa. Among those 8 Woredas prominent for urban agriculture in the sub city, this study is confined within 3 of them where urban agriculture is one of the livelihood sources of inhabitants. The three Woredas were purposely selected because of that there are significant number of urban farmers found in the area that can represent the population in the subcity. Akaki Kaliti is situated in the south east part of Addis Ababa that shares boundary with Bole and Nefas Silk Lafto Sub cities in the northeast and northwest directions respectively, and the rest with the Finfine Zuria, Special Zone of Oromiya Region.

3.1.2 Demographic Features

Addis Ababa is one of the two city-administrations of FDRE and is the capital city of Ethiopia[2]. It is the largest city in Ethiopia, with a population of 2,917,295 according to the 2009 statistical projection of CSA. Administratively the city is subdivided into 10 sub cities and the sub cities are subsequently subdivided in to 116 Woredas, the smallest administrative structure in the city.

The sub city is populated with a total of 181,202 inhabitants out of whom 51 percent are females (CSA, 2007). The sub city is composed of 11 Woredas where urban agriculture is widely practiced among eight (8) Woredas except those three Woredas located in the northeast, east, and southern fringes called Woreda 09, 10 and 11 and in these peri-urban and rural agriculture are predominantly practiced (*Unpublished source: Akaki Kaliti Sub City UAESP*).

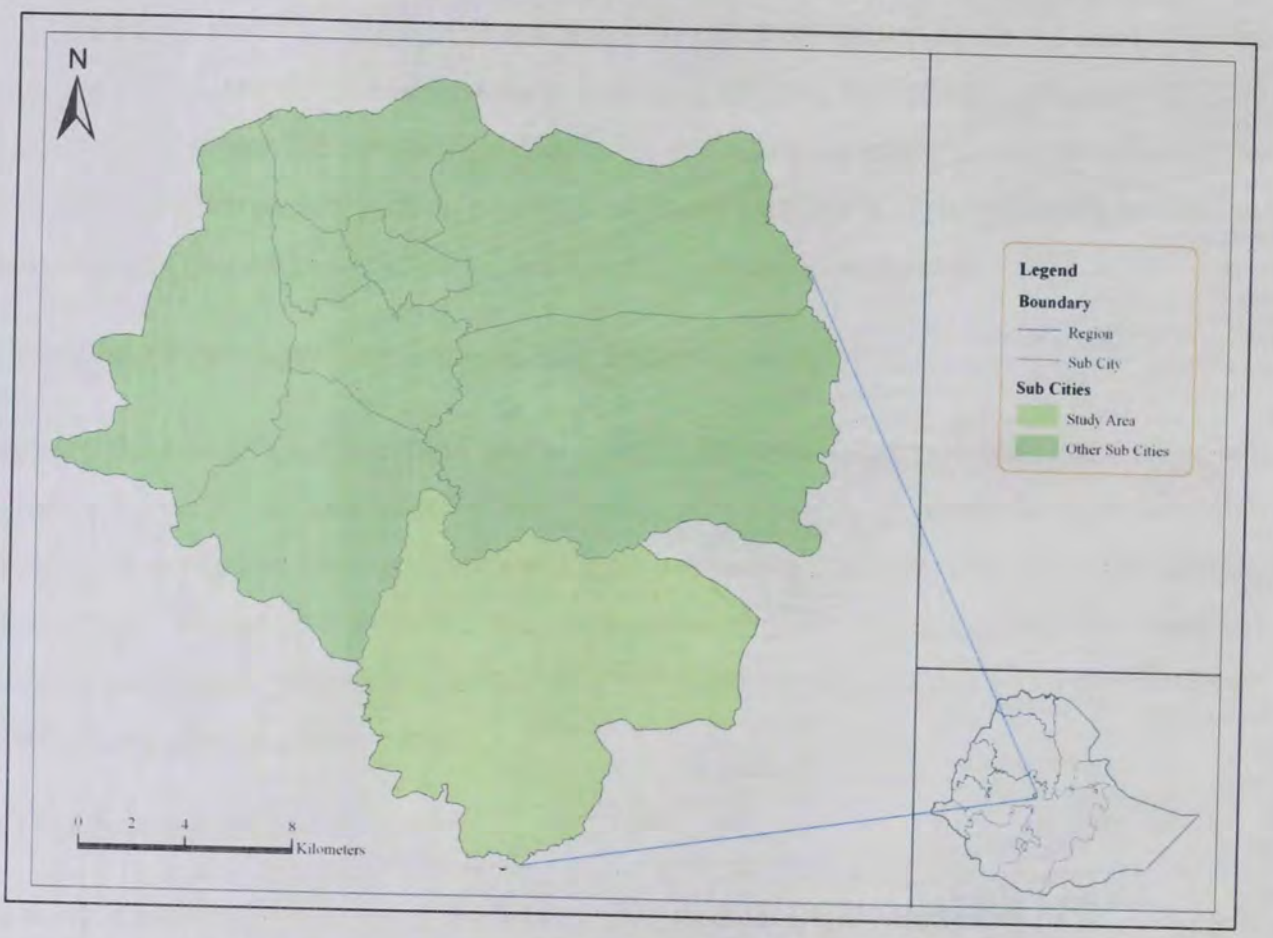
3.1.3 Bio-Physical Characteristics

The CSA data for the year 2007 indicates that in Addis Ababa the cultivated area was 10,586.2 hectares of the total city area, while forest and range lands cover 7,900 and 2,943 hectares, respectively. Addis Ababa city has perennial rivers; suitable soil and agro-ecology that help

[2] As a chartered city (*ras agez astedader*), Addis Ababa has the status of both a city and a state. Addis Ababa is therefore referred to as "the political capital of Africa", due to its historical, diplomatic and political significance for the continent (http://en.wikipedia.org/wiki/Addis_ Ababa_ City)

inhabitants to practice crop and livestock production, raising seedlings of ornamental plants and trees (Axumite, 1994). The sub city is endowed with an abundant soil and water resources suitable for crop and livestock productions. Based on the data collected from the UAESP, the sub city has the livestock population among which 23, 301 are cattle sheep and goat, 5,812 are equines and 27,580 are poultry chicken. The UAECP has also affirmed that there are two perennial rivers flowing across the sub city named as Akaki and Fanta (*Tinishu Akaki*) along with 120 hectares of land is covered by irrigation.

Figure 1 Location Map of Akaki Kaliti Sub-City



3.1.4 Situation of Urban Agriculture in Akaki Kaliti Sub-city

Urban agriculture is practiced in Addis Ababa city by the individual farmers, MSEs, and the large scale cooperatives for different reasons where as the focus of this study is on those organized under the MSEs and engaged in the UA activities such as poultry, dairy and vegetable production and livestock fattening. Recently, the situational analysis on urban agriculture made

through the UAESCP demonstrates that there are 461 micro and small enterprises engaged in urban agriculture mainly in production of vegetables, dairy, poultry, mushroom, beekeeping and livestock fattening (Mandefro, 2010).

Based on the information available at the MSE Office of Akaki Kaliti the sub city, it was noted that urban agriculture is considerably paid due emphasis like other income and employment generating micro and small enterprises for which those interested people are coming together and organized as a collateral parties. Thus, the office has exerted a relentless effort to organizing and legalizing the organized interest groups having a minimum of three members, provision of credit facilities for initial capital and input supplies, constructing shades used as work place, capacity building trainings, and market linkage facilities.

It was learnt from the office's report in that a total of 106 MSEs organized in the eight Woredas so that granted legislations, and functionally operating in urban agriculture, composed of 1,733 members out of whom 795 are females. Basically, the MSEs are engaged and specialize in the urban agriculture sub sectors such as poultry production, dairy production, vegetable production, animal fattening, mushroom production, bee keeping, and swine production.

3.2 Sampling Procedure and Sample Size Determination

Generally, the research method used in this study is the combination of both quantitative and qualitative approach so that data in both types were used as an input for analyzing and discussing. Accordingly, both qualitative and quantitative data type were used from both primary and secondary sources. However, the procedure followed in the courses of data collection and analysis is tilted to the quantitative method thus the qualitative data was used as a supplementary while analyzing the quantitative data.

3.2.1 Study site selection

The study was carried out in one of the 10 sub-cities of Addis Ababa known as Akaki Kaliti sub-city considered as the universe. The purposive sampling technique was employed for the selection of study site. The sub-city was selected for many reasons. The first one is that based on the preliminary observation of the researcher the study site is prominent for urban agriculture activities endowed with an abundant natural and socio-economic resources. The second,

knowing that few researches are done so far on this issue, the study improves knowledge about the food security contributions of urban agriculture plays in the study area and can be one of the baseline references. And finally, it was assumed that research findings have good representing value for other cities in the country and similar urban areas elsewhere. Despite financial and time constraints, great attention was given to improve reliability of the information during both site and respondents selection

The use of Woreda was found to be suitable to select representative study sites within the sub-city. Each Woreda has independent administration council which represents directly the sub-city administration council. Different criteria were considered in selecting representative Woredas for the study. A major criterion was the availability of significant number of urban agriculture practitioners within each Woreda. This information was obtained after contacting the Akaki Kaliti Sub-city UAECP and MSE offices.

The sub city is composed of 11 administrative Woredas where urban agriculture is widely practiced among eight (8) Woredas except those three Woredas located in the north east, east, and southern fringes called Woreda 09, 10 and 11 where the peri-urban and rural agriculture are predominant (*unpublished source: Akaki Kaliti Sub City UAESP*).

Finally, as per the information obtained from the UAECP and MSE offices of the sub-city, three Woredas namely, Woreda 01, 02, and 03 have been selected where the four sub-systems of urban agriculture such as poultry, dairy, livestock fattening and vegetable production are widely implemented by the urban dwellers.

3.2.2 Household selection

In the courses of conducting the household survey reliable samples or sampling units were selected among those urban agriculture practitioners in Woreda 01, 02, and 03 of Akaki Kaliti sub-city, engaged in poultry, dairy, and vegetable production, and animal fattening (Beef Farmers).

The list of the household heads who are engaged in urban was obtained from the respective MSE office of Akaki Kaliti Sub-city. Thus, the 745 individuals practicing urban agriculture and organized under 25 MSEs in the 3 Woredas of the sub city were used as a "sampling frame" as

much as they are potential data sources for the study. To that effect, the sample size was determined from the entire population based on the following formula.

Formula used for sample size determination:

$$n= 0.25/SE^2$$

Where, n is the sample size,

SE is the Standard Error or desired margin error

Thus, the standard error (desired margin error) is 0.05 or 95% confidence interval (Singh, 2007). According to the above formula the sample size for conducting the household survey among the total population of 745 HHs has to be 100. Proportional and equivalent sample sizes were selected for all Woredas because the intention of the study was to understand the modes of farming at various locations of the city, contributions of farming to food security of the urban farmers and adaptations of the farmers to various farming-based activities across locations. Hence, it was assumed that the sampling technique provides a good representative sample of urban farmer households for the sub-city.

The systematic random sampling method was employed to draw the samples from the population meant to avoid the biasness while selecting the samples or reduce statistical error. The sampling procedure was carried out in each of the Woredas by disaggregating the list of MSEs and beneficiaries of the urban agriculture. Thus, the population was subdivided into three Woredas or sub-populations called *strata* and then the individual HHs among each stratum were selected in a systematic random sampling method. The sampling interval is taken from the ratio of the total population i.e. 745 to the sample size i.e. 100 that was approximately equal to 7. Thus, the first sample in each Woreda is drawn by the lottery among the lists from 1 to 7 (Singh, 2007). Based on that, the next sample was selected by adding the decimal number 7 then again using the range of 7 to find the subsequent sample and goes to the end of the total population.

With regard to the sample size of each Woreda or stratum, the method of proportional allocation was used under which the sizes of the samples from the different strata were kept proportional to the sizes of the strata. That is, if P_i represents the proportion of population included in stratum *i,*

and n represents the total sample size, the number of elements selected from stratum *i* is equal to n multiplied by P_i or n x P_i (Kothari, 2004).

$$i = n \times pi \quad \text{and} \quad Pi = Ni/N$$

For instance, suppose the total sample size of n is 100, to be drawn from the population size of N is 745 in which the population is divided into three strata of size N_1=313, N_2 = 149 and N_3 = 283. Adopting the proportional allocation, we shall get the sample sizes as under for the three mentioned Woredas.

Table 2: Calculation of the determination of sample size in each Woreda

List of Woredas/Strata	Total population	Calculation	Sample size
Woreda 01	313	100 (313/745)	42
Woreda 02	149	100 (149/745)	20
Woreda 03	283	100 (283/745)	38
Total	**745**		100

3.3 Sources of Data and Techniques of Data Collection

3.3.1 Primary Data Sources

The instruments used for collecting the primary data are household survey, Key informants interview, FGDs, a case study on some selected HHs and observation of the study area.

The household survey was carried out for the collection of quantitative information from those selected households. It was conducted by using interview tools (using both structured and semi structured questionnaire) on the 100 sample households practicing urban agriculture and organized under 25 MSEs in Woreda 01, 02 and 03. Questionnaires have been translated to Amharic, the local language of the community in the study area that helps to ease the process of conducting the survey. Before conducting the survey, questionnaires were pre-tested to modify some of the questions that could be either irrelevant, missing or are out of context. A total of 7 enumerators were hired and trained to administer the questionnaire.

The key informants interview and focus group discussions are the second important instruments employed in the courses of this research next to the household survey. The purpose of using the KII and FGDs is to collect the qualitative information that couldn't be obtained through conducting the household survey overwhelmed by the quantitative data.

As to the individuals and group interview, the non probability or purposive sampling was found to be the convenient method. The KIs were drawn from various organizations and offices such as UAECP, Cooperative and MSE offices, NGOs that work on UA in the study area (Example: ACDA/VOCA), and DAs that are closely working with the urban farmers. Therefore, the five key informants drawn from the above mentioned organizations and offices were contacted and the interview was held separately.

Concerning FGDs, the samples were drawn on the basis of non probability sampling grouped as men, and women. Thus, seven individuals were selected for the interview in each FG from the three Woredas, totally 14 participants.

It was understood that there are two big and open air markets found in the vicinity of the study area to which urban farmers are delivering their products to the consumers, retailers and whole sellers namely Akaki and Saris markets. Thus, the interview with randomly selected consumers, retailers/street food vendors and whole sellers available on the spot was conducted in that it focuses on the type of UA products being sold on the market, the situation of consumers interest for UA products, challenges encountered with the processing and marketing of urban agriculture products.

Group discussions have been carried out with KIs and FGDs by use of the early prepared qualitative tools such as semi structured questionnaires and checklists.

The case study was conducted on the two selected UA activities (poultry and vegetable production) among three HHs to grašp further knowledge on improvement of their food security situation, quality of life and any difficulties faced while engaging in the UA employing the research tools such as semi structured questionnaire and checklists.

Observation of the study area (bio-physical and socio-economic conditions) was made; and photos of the UA activities were captured. Thus, the tools used for the observation were the pre-prepared checklists and digital camera.

3.3.2 Secondary Data Sources

The secondary data was collected from published and unpublished works on urban agriculture, situation of the study area (demographic, geographic and physical, crop and livestock production, and the socio economic conditions). These data were collected from the works of researchers and academia, national state, city administration, sub city and Woreda level administrations as well as those available in worldwide websites.

3.4 Corresponding Instruments to Measure Household Food Security

The food security status of sample HHs was investigated by the food security measuring instruments described here below.

3.4.1 Impact Indicators for Improved Household Nutrition

According to "A Technical Guide for Measuring Household Food Consumption", (Swindale & Punam, 2005) and "Household Dietary Diversity Score" for Measurement of Household Food Access: Indicator Guide (Version 2), (Swindale & Paula, 2006), there are two major impact indicators developed to measure improvements in household food consumption or food availability and food access called *the food frequency assessment* that are discussed briefly here under,

i. Increased Number of Eating Occasions per day

The number of daily eating occasions is a proxy indicator for gauging the adequacy of household macronutrient (calories and protein) intake (Swindale & Punam, 2005). An advantage in selecting this as an indicator of household food security is that data are relatively easy and inexpensive to collect.

The major daily eating occasions are:

- A morning meal
- A midday meal

- Any food between midday and evening meals
- An evening meal

ii. Increased Number of Different Food Groups Consumed

The number of different foods or food groups consumed in a household provides a measure of the quality of the diet by reflecting dietary diversity, thus serving as an important complement to the eating occasion's indicators.

Dietary diversity can be defined as the number of different foods or food groups consumed over a given reference period usually measured by summing the number of foods or food groups consumed over a reference period (Ruel, 2002). The reference period usually ranges from one to three days, but seven days is also often used, and periods of up to 15 days have been reported (Ruel, 2002).

To accurately capture dietary diversity, this indicator will be evaluated in terms of the variety of food groups (meats, milk, fruits, and vegetables) consumed, rather than by simply totaling all types of foods consumed (Swindale & Paula, 2006).

> *The rationale for emphasizing dietary diversity in developing countries stems mainly from a concern related to nutrient deficiency and the recognition of the importance of increasing food and food group variety to ensure nutrient adequacy. Lack of dietary diversity is a particularly severe problem among poor populations in the developing world, because their diets are predominantly based on starchy staples and often include little or no animal products and few fresh fruits and vegetables* (Ruel, 2002)

The Dietary Diversity was chosen as an attractive indicator for at least three reasons. First, a more varied diet is a valid outcome in its own right. Second, such questions can be asked at the household or individual level, making it possible to examine food security at the household and intra-household levels. Third, obtaining these data is relatively straightforward (Hoddinott & Yisehac, 2002).

As a food-security indicator, dietary diversity is usually highly correlated with such factors as *caloric and protein adequacy, percentage of protein from animal sources (high quality protein), and household income*. For ease of analysis, the number of different *food groups* consumed will

be calculated, rather than the number of different *foods*. Knowing that households consume, for example, an average of four different food groups implies that their diets offer some diversity in both macro- and micronutrients.

Table 3: List of Food Groups and Content of each group

Food group	Content of the group
Food group 1	Enjera bread (Teff)
Food group 2	Other cereals (Wheat bread, rice, sorghum, maize)
Food group 3	Roots and Tuber crops (potato, sugar beet, carrot, beetroot)
Food group 4	Sugar and sugar products (Jam, Honey etc)
Food group 5	Vegetables (cabbage, lettuce, Swiss chard, tomato,
Food group 6	Fruits (Orange, Mango, Papaya, Banana etc)
Food group 7	Beef, mutton, poultry, and pork
Food group 8	Eggs
Food group 9	Fish (Fresh and dried)
Food group 10	Lentils, Beans, Chick peas, Ground nut
Food group 11	Milk and, milk products (Fresh milk, yoghurt, cheese)
Food group 12	Oils, fats, any food prepared with butter

In this research work, the HDDS was computed from the quantitative dietary assessment using the 24 hours and 7 days recall methods. Thus, a 24-hour and 7 days recall of food consumption collects information on food intake over the previous 24- hour period for the above two data required i.e. the increased number of eating occasions and Household dietary diversity score.

3.4.2 Employing the major HFS indicators

Food security indicators are summary measures of one or more of the dimensions of food security used to demonstrate change or static situation of food security (Maxwell & Frankenberger, 1992).

> *By carefully looking at a household's qualitative and quantitative information, it is possible to understand situations of livelihood, well-being and food security. Thus, if gathered and documented on the basis of appropriate and relevant methods, these data will complement each other in an endeavor to analyze household food security* (Degefa, 2005)

To that effect, the data was collected on the following indicators of HFS in order to measure the household food availability and access as stated in Maxwell and Frankenberger (1992),

- Agriculture production or outputs such as milk yield per cow per day or year, crop yield per ha per year, egg produced per hen per year etc
- Income obtained from the sale of agriculture products per year since the beginning.
- Assets such as liquid and productive assets owned by the households.

3.5 Data Analysis and Techniques

The examination of households' responses and opinions and statistical comparison of variation in their food security situation as well as the contributions associated with urban agriculture were analyzed by using both qualitative and quantitative methods.

Following the completion of data collection, data was coded and entered into SPSS version 16 or statistical software for analysis. The specific quantitative methods of analysis employed in this study include the statistical tools such as descriptive statistics such as frequencies, percentages, and quartiles, measures of central tendency and dispersion such as Mean and SD, and measures of variation such as Linear Coefficient of Relation using the Pearson correlation coefficient, the Linear Regression and coefficient of determination to examine the interrelations between different variables.

Additionally, maps, graphs, and charts have been used to organize and illustrate the data clearly and precisely.

The document analysis and referring to those relevant literatures invaluably used as input are also found in the domains of the research work.

CHAPTER IV: URBAN AGRICULTURE AND FOOD SECURITY

4.1 Demographic and Socio Economic Descriptions of the Sample Households

4.1.1 Gender, Family Size, Marital Status, Ethnicity and Education Level

The gender composition of urban agriculture practitioners among the sample households in the study area is explained as the female headed HHs constitutes the larger share i.e. 52.5 percent.

Table 4: Gender, Family Size, Marital Status, Ethnic Composition, and Education Status of the sample household heads

Demographic Variables	Category	Frequency
Sex of HH heads	Male	47 (47.5)[3]
	Female	52 (52.5)
	Total	99 (100.0)
Family Size	1-3	38 (38.5)
	4-7	49 (49.4)
	8-11	12 (12.1)
Marital Status	Single	18 (18.2)
	Married	55 (55.6)
	Divorced	10 (10.1)
	Widowed	16 (16.2)
Ethnic Groups	Oromo	37 (37.4)
	Amhara	39 (39.4)
	Tigre	10 (10.1)
	Guraghe	11 (11.1)
	Tigri Worji	1 (1.0)
	Others	1 (1.0)
Education Level	Unable to read and write	20 (20.2)
	Read and Write	16 (16.2)
	Grade 1-4	4 (4.0)
	Grade 5-8	20 (20.2)
	Grade 9-12	21 (21.2)
	Diploma or Certificate	13 (13.1)

[3] Decimals in the parentheses in all tables across the document indicate the percentage of corresponding figures in the respective table.

Demographic Variables	Category	Frequency
	Degree	5 (5.1)

Source: *Own survey, 2011. N.B Numbers in parentheses describe the percentage value of each category*

The family size of sample households ranges from 1-11 where as 38.5 percent of the households are having the family size of 1-3 members, 49.4 percent of the total households are having the family members ranging from 4-7, and the rest are 8-11.

The marital status of the sample households also varies in that it is explained as single, married, divorced, and widowed. The divorced and widowed women constitute 26.3 percent of the total sample household which implies urban agriculture is practiced in study area by those vulnerable, and marginalized families specially women.

The major ethnic groups among the sample households are Oromo, Amhara, Tigre and Guraghe and the minorities of Tigri Worji, and others. The Amhara Ethnic constitutes the largest share with 39.4 percent, followed by Oromo, Guraghe, and Tigre with the percentage distribution of 37, 11, and 10 respectively.

The educational level of the urban agriculture practitioners targeted in this study considerably varies from the one that is illiterate to the level of university graduate. This situation demonstrates people from different corners of life are engaged in urban agriculture using it either as a major source of livelihood, or additional source of livelihood or the adaptive or coping strategy since the differences in the educational level can help the researcher to draw the reason why people from various corners to partake in urban farming.

4.1.2 Types of Urban Agriculture Practiced by Sample Households

The types of urban agriculture practiced by the sample households is categorized into four subsystems including poultry production, dairy production, livestock fattening and vegetable production.

Table 5: Types of urban agriculture practiced by sample households

Type of Urban Agriculture		Frequency		Total frequency of "Yes"
		Yes	No	
Are you engaged in poultry production?	Male	15	32	26 (26.3)
	Female	11	41	
Are you engaged in dairy production	Male	17	30	26 (26.3)
	Female	9	43	
Are you engaged in livestock Fattening	Male	0	47	6 (6.1)
	Female	6	48	
Are you engaged in vegetable production?	Male	15	32	41 (41.4)
	Female	26	26	

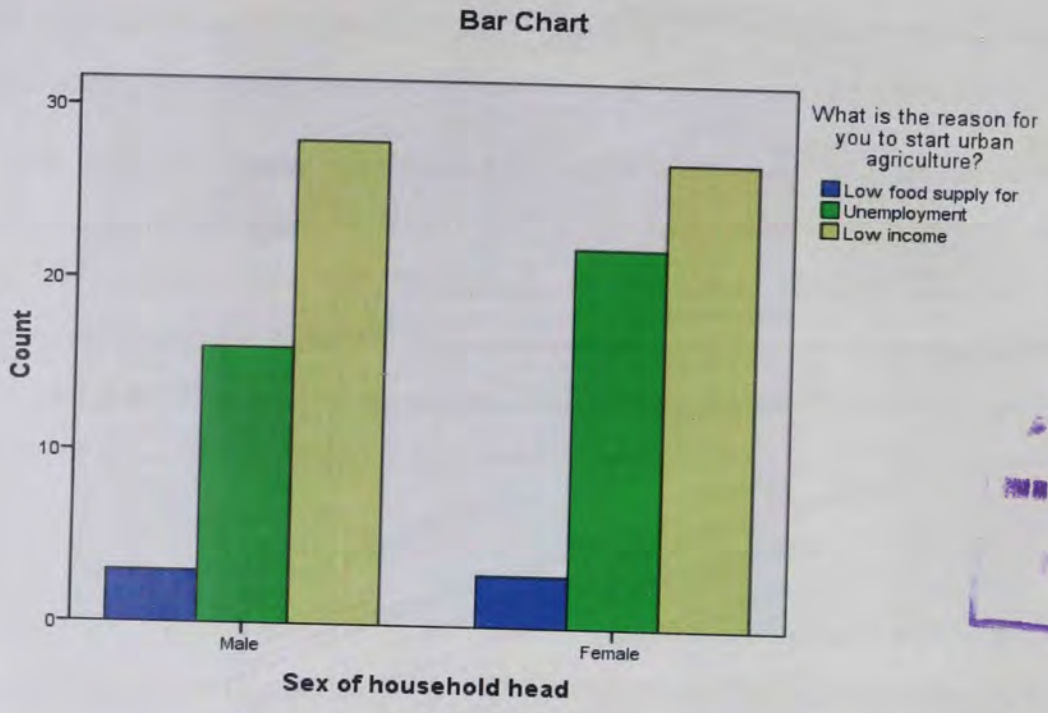
Source: *Own survey, 2011*

4.1.3 Reason to Start Urban Agriculture

The household questionnaire on the reason for households to engage in urban agriculture reveals that urban dwellers are practicing UA for the reasons of low food supply at the household level, unemployment and low income for the families.

Figure 2, describes the frequency and percent distribution of the reason of HHs to engage in urban agriculture. Thus, one can possibly draw the advantages of urban agriculture in that it embraces for the better access and availability to food for the urban poor; access through self-production, and/or purchase.

Figure 2: Reasons to start urban agriculture



Box -1: Urban Agriculture used as the livelihood option for the destitute families in the city

Kasech Reda, 48 a mother for 3 children (two boys and one girl) is among those UA farmers in Woreda 03 being engaged in vegetable production along the side of Akaki River. She has been practicing UA since 1995 when she had chosen it as her livelihood strategy due to lack of income and unemployment. She is a divorced woman and suffering from the livelihood insecurity for long years. Previously, she had to look for the relief food aid assisted by ESRDF due to that she belongs to those vulnerable families who were displaced from Eritrea because of the then civil war. As she explained to the researcher, the life style of her family radically changed, she is relieved from dependency, her family is properly nourished from her farm, the consumption pattern of the household improved, and she earns adequate income from the sale of vegetables (i.e. an average income of Birr 36, 000 per year). She produces cabbage, potato, onion, carrot, lettuce, and switchyard. Her children are attending school of grade 10, 9 & 4. (Source: own survey, 2011)

4.2 Food Security Contributions of Urban Agriculture

Data on the dietary diversity and food frequency of households are easy to collect and have proven reliable proxy indicators of diet quality and quantity across a range of settings (Ruel, 2002). The researcher also argues the food frequency assessment for the urban agriculture practitioners can

also be the appropriate measurement of improvement in household food consumption that is briefly discussed here below.

4.2.1 Determining Food Security by Setting Food Diversity Targets

An increase in the average number of different food groups consumed provides a quantifiable measure of improved household food access (Swindale & Paula, 2006). In general, any increase in household dietary diversity reflects an improvement in the household's diet.

Employing the indicator known as household dietary diversity score to assess improvements in food security of the target HHs, the changes in HDDS must be compared to some meaningful target level of diversity. The Indicator Guide of Household Dietary Diversity Score for Measurement of Household Food Access publicized by Swindle and Bilinsky (2006) provides two major options to determine the appropriate HDDS target for which the researcher has chosen one of the given alternatives relevant to the objective of the study.

Accordingly,

> *The dietary diversity patterns of wealthier households can be used as a target, under the assumption that poorer households will diversify their food expenditures as incomes rise, and thereby mirror the consumption patterns of wealthier households. If income data are available, the sample could be divided into three income groups (terciles of income), and the average dietary diversity calculated for the richest income tercile. The average HDDS in the richest 33 percent of households can then serve as a guide for setting the target level of HDDS for the purpose of performance monitoring (Swindle and Bilinsky, 2006).*

The "*If statement*" was used in this study to create quartile variable drawn from the percentiles of household incomes and HDDS values. Thus, If (Income <= 5000) Quartile = 1, If (Income >5,000 and Income <= 8,000) Quartile = 2. If (Income > 8,000 and Income <= 12,000) Quartile = 3. If (Income> 12, 000) Quartile = 4.

Similarly, If (HDDS1 <= 6) Quartile = 1, If (HDDS1 >6 and HDDS1 <= 8) Quartile = 2. If (HDDS1 > 8 and HDDS1 <= 10) Quartile = 3. If (HDDS1> 10) Quartile = 4.

Table 6 : Quartile Distribution, and Income level, Sample Size and Average HDDS1 in each Quartile

Quartile Distribution	Income category (birr/year)	Sample Size	HDDS1 Category	Sample Size	Average HDDS1[4]
Quartile 1	<= 5000	29	<=6	26	5.31
Quartile 2	>5,000 & <= 8,000	23	>6 & <=8	32	7.5
Quartile 3	> 8,000 & <= 12,000	24	>8 & <=10	31	8.96
Quartile 4	> 12, 000	23	>10	10	11
Total		99		99	

The mean and standard deviation of the data collected for the household dietary diversity score to examine the household food consumption shows 7.983 and 1.981 respectively. Now, it is possible to draw findings from the data in table 6, thus, the average dietary diversity among the 25 percent better off households whose annual income obtained from UA is greater than 12,000 is to be 10 and average diversity for the sample HHs is found as 7.9. It is also possible to establish target 10 and baseline 7.9 diversity levels for the target population. This implies the 99 respondents can obtain 66.6 percent of the 12 food groups set in this study for measuring the HDDS1 shows the households' access for food security due to the potential contributions of urban agriculture.

The empirical study conducted on urban agriculture by Zezza and Tasciotti (2010) asserts, households that engage in farming may have access to comparatively cheaper food and to a wider variety of particular nutritious foods such as vegetables and products of animal origin (milk, egg, and meat). The same study highlights urban agriculture does appear to be associated with greater dietary diversity and calorie availability, both measures of an improved diet and hence closely related to food security.

Similarly, one of the FGD participants in the women group confirms this finding in her word as follows:

" prior to the time I begun to engage in urban agriculture my family was deprived of nutritious food even we have been worried to our daily need for food, but now we are not running out of vegetables for home consumption unless the season affects its production"

[4] In this study "HDDS1" represents the measurement of Household Dietary Diversity Score by use of 24 hours recall method.

Figure 3: Partial view of Vegetable production in the study area

(Left: W/ro Kasech Reda standing in her vegetable farm (Yehabesha Goman), and right: partial view of cabbage grown along the side of Akaki River)

4.2.2 Determinants of Household Food Consumption

Multiple linear regression model is the most commonly utilized multivariate technique that examines the relationship between a single metric dependent variable and two or more metric independent variables (Singh, 2007). The linear regression model was used to investigate the relationship between household's food consumption with the independent variables of family size, years of experience by the households, annual income obtained from urban agriculture and the assets owned by households. In the case of multivariate regression, the dependent variable should preferably be measured on an interval, continuous scale, though an ordinal scale can also be used. Independent variables should preferably be measured on interval scales, though ordinal scale measurements are also acceptable (Singh, 2007). Thus, the dependant and independent variables are characterized by continuous values which make them easy to fit into the multiple linear regression model.

Accordingly the following equation was used to compute the linear regression

$$Y = a + b1x1 + b2x2 + \ldots + bkxk$$

Where y is a dependent variable and x1, x2 … xk are independent variables and a, b1, b2 … bk are the parameters/regression coefficient. The coefficient of each independent variable signifies

the relation that the variable has with y, the dependent variable, when all the other independent variables are constant (Singh, 2007).

In this regard the multiple regression analysis was done by using the SPSS statistical software package that reveals the following results.

The model summary presented in Table 7 helps in assessing the goodness of fit of a regression equation. It does so by computing a slightly different statistic called R^2-adjusted. The R-squared value for model is 0.546, which means that approximately 54.6 per cent of the variance of household dietary diversity score is accounted for by the model. It has been mentioned in Singh (2007) in that it is widely accepted in the social and psychological applications that an adjusted R^2 of above 75 per cent is very good; between 50–75 per cent is good; between 25–50 per cent is fair and below 25 per cent is poor and in the given case, the model can be termed as good.

Table 7: Linear Regression Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.739[a]	.546	.526	1.363

a. Predictors: (Constant), *the sum of all assets owned by the family, Family Size Total, Year of Experience in Urban Agriculture, What is your annual income obtained from UA activities?*

Table 8 helps in assessing whether regressors/independent variables, taken together, are significantly associated with the dependent variable and this is assessed by the statistic F in the ANOVA part of the regression output (Singh, 2007). In this case, $F = 28.2$, $p < .001$. (SPSS output: Sig. = .000. It can be reported as $p < .001$), which means that the independent variables are significantly associated with the dependent variable.

Table 8: Regression Model: Analysis of Variance (ANOVA[b])

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	209.821	4	52.455	28.227	.000[a]
	Residual	174.684	94	1.858		
	Total	384.505	98	52.455		

a. Predictors: (Constant), *the sum of all assets owned by the family, Family Size Total, Year of Experience in Urban Agriculture, What is your annual income obtained from UA activities?*
b. Dependent Variable: *Household Diet Diversity Score by use of 24 hours recall method*

As it is shown in Table 9 the regression coefficients or B coefficients represent the independent contributions of each independent variable to the prediction of the dependent variable. Now if we look at B coefficient of the independent variables, it can be interpreted from the table that the significance of two variables such as annual income and assets owned by HHs is statistically significant (significance level is less than 0.05 level).

The regression equation can be expressed as:

$$Y = 5.211 + 0.029\ FS + -0.018\ YE + 0.000AI + 0.208AO$$

Whereas: FS, Family Size; YE, Year of Experince; AI, Annual Income; and AO, Assets Owned

Table 9: Standardized Coefficient of Variables Entered in an Equation

Model		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Tolerance	Std. Error
1	(Constant)	5.211	.470		11.094	.000		
	Family Size Total	.029	.068	.032	.427	.670	.859	1.165
	Year of Experience in Urban Agriculture	-.018	.025	-.056	-.699	.486	.753	1.329
	What is your annual income obtained from UA activities?	.000	.000	.504	5.840	.000	.650	1.540
	The sum of all assets owned by the family	.208	.055	.333	3.781	.000	.622	1.608

a. Dependent Variable: Household Diet Diversity Score by use of 24 hours recall method

The data from Table 9 can also show that for instance an increase in 0.208 units of assets owned by the sample households' score for every one unit increase in the variable (Household Dietary Diversity Score) assuming that all other variables in the model are constant

4.2.3 Urban Agriculture as Determinant of Staple Food Sources

The data collected on the staple food consumed by the urban agriculture practitioners reaffirms the above findings in that the urban agriculture products supplement the household food consumption either in the availability of food supplied from the farm or strengthening the purchasing power of household to buy food from the markets.

Table 10: Staple food sources categorized in rank

Sources of food	Food source ranked as 1st		Food source ranked as 2nd		Food source ranked as 3rd	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
own production	22	22.2	59	59.6	9	9.1
purchases from shop or market	77	77.8	22	22.2	--	--
casual labor or food-for-work	--	--	9	9.1	50	50.5
Gifts from friends or neighbors	--	--	9	9.1	40	40.4
Total	**99**	**100.0**	**99**	**100.0**	**99**	**100.0**

Table 10, indicates the staple source of food for the sample households comes from four basic sources that is own production, purchase from shop or market, casual labor or work and gifts from friends, relatives or neighbors. In this regard, urban agriculture can contribute to the households either by the supply of food from farm i.e. own production or accessible from the market through purchase. Accordingly, own production was chosen by 22.2 percent of the respondents as their major source of food, 59.6 percent of the respondents as their second staple source of food and 9.1 percent of the respondents chosen as their third level of staple source of food. Again, 77.8 percent of the respondents ranked purchase from shop or market as their 1st staple source of food and 22.2 percent of the respondents chosen own production as their 2nd source of staple food.

Therefore, it is possible to justify that urban agriculture is contributing to those urban farmers either a the direct source of food supply for the household members or improving their access for the purchase of food from the market in its role for earning of income from sell of UA products.

4.2.4 Number of Eating Occasions as Indicator for Improved Household Nutrition

With the objective of assessing food frequency among the sample households, the researcher has been predefined four major eating occasions and the respondents were asked whether or not the food was consumed in the household during the previous 24 hours period.

Although, the number of eating occasions has its own limitations due to the diversity in food consumption behavior and socio cultural settings, the indicator is used in conjunction with the dietary diversity (Swindale and Ohri-Vachaspati, 2005) to synergize the findings in section 4.2.1 Therefore, the study analyses the food frequency situation at the household level using the measures of central tendency that stipulates the frequency distribution and the Pearson correlation coefficient to investigate the linear relationship between the number of eating occasions and household dietary diversity score.

Table 11: Descriptive Statistics of the Number of Eating Occasions and HDDS1

Food Security Indicators	Mean	Standard Deviation	N
Household Diet Diversity Score by use of 24 hours recall method	7.93	1.981	99
Total number of meals consumed by the household in last 24 hours	3.66	.518	99

Table 12: Pearson Correlation of HDDS1 and Number of Eating Occasions

		Household Diet Diversity Score by use of 24 hours recall method	Total of meals consumed by the household in last 24 hours
Household Diet Diversity Score by use of 24 hours recall method	Pearson Correlation	1	.732**
	Sig. (2-tailed)		.000
	N	99	99
Total of meals consumed by the household in last 24 hours	Pearson Correlation	.732**	1
	Sig. (2-tailed)	.000	
	N	99	99

**. Correlation is significant at the 0.01 level (2-tailed). Source: *Own survey, 2011*

Table 13: Correlation of HDDS2 and Number of Eating Occasions

		Household Diet Diversity Score by use of 7 days recall method	Total number of meals consumed by the household in last 24 hours
Household Diet Diversity Score by use of 7 days recall method	Pearson Correlation	1	.688**
	Sig. (2-tailed)		.000
	N	99	99
Total of meals consumed by the household in last 24 hours	Pearson Correlation	.688**	1
	Sig. (2-tailed)	.000	
	N	99	99

**. Correlation is significant at the 0.01 level (2-tailed). Source: *Own survey, 2011*

As it was shown in Table 12, the correlation coefficient (r) is equal to 0.732** signifies that the linear correlation between the number of eating occasions and household dietary diversity score of 24 hours recall is strong and positive. Similarly, the correlation coefficient (r) in Table 10 shows 0.688** so that the linear relationship between the number of eating occasions and household dietary diversity of 7 days recall is still positive and strong. Therefore, the household dietary diversity score that can indicate the improvement of household food consumption status goes hand in hand with the number of eating occasions contributed by the urban agriculture.

4.3 Interrelations of Household Income & Food Consumption Characteristics

There are a number of ways through which urban agriculture can, in principle, have an impact on urban food security Zezza and Tasciotti (2010) among which this study finds out urban agriculture can contribute to the increased income of households obtained from the direct sell of farm products or through its role to create employment opportunity.

In this regard, data on the annual income of sampled households was collected for that the frequency of distribution of income is shown in descriptive statistics in Table 14.

Table 14: Descriptive Statistics for the annual income of sample HHs

Descriptive Statistics		Statistical Values
Standard Deviation		7,522
Range		0-40,000
Minimum		0
Maximum		40,000
Percentiles	25	5,000.00
	50	8,000.00
	75	12,000.00

As it was indicated in Table 11, the frequency of annual income distribution of samples among the four major urban agriculture subsystems such as poultry, dairy, fattening and vegetable production ranges from birr 0 to 40, 000 with the mean and standard deviation of 9,853.54 and 7,522 respectively. The annual income of 6 sample households engaged in animal fattening was found as birr zero (0) because of that, all of them begun the fattening six months earlier to this study due to that they didn't brought the fattened oxen to the market. Thus, no income was earned from the sale of animal fattening however observation was made on the farm in that the oxen found on the farm are to be brought for the market one month later than the period of this study.

The FGD participants confirm in their words as:

> *"The incomes obtained from other livelihood sources mostly don't suffice to compete with the escalating prices of basic needs in the city especially food and food related products. Therefore, urban agriculture has no vice for the increased income of household engaged in production and processing of UA products"*

This can also reaffirm the contribution of urban agriculture for the increased income of households so that it can have the significance to boost the purchasing capacity of households for food.

An attempt is made to investigate the linear relationship between income of household recorded on an annual basis and household food consumption that was measured by the Household

Dietary Diversity Score results in a higher correlation coefficient (r) of 0.673** implies that there is a strong positive linear correlation between the two variables i.e. Household Annual Income and Household Dietary Diversity Score *(See Table 15)*.

Table 15: Correlation between Household Dietary Diversity and Annual Income using the Instrument of 24 Hours Recall

Variables and Statistical Measure of Pearson Correlation		Household Diet Diversity Score by use of 24 hours recall method	What is your annual income obtained from UA activities?
Household Diet Diversity Score by use of 24 hours recall method	Pearson Correlation	1	.673**
	Sig. (2-tailed)		.000
	N	99	99
What is your annual income obtained from UA activities?	Pearson Correlation	.673**	1
	Sig. (2-tailed)	.000	
	N	99	99

**. Correlation is significant at the 0.01 level (2-tailed). N represents the number of counts or sample size

In similar fashion, the researcher analyzes the relationship between household food consumption on the basis of the collected HDDS data in employing the 7 days recall and the annual income of households' obtained from urban agriculture. Thus, it was found that a correlation coefficient (r)[5] is equal to 0.666** of the two variables implies that there is a strong positive linear correlation between household dietary diversity in the 7 days recall and the annual income of target households *(See Table 16)*.

[5] If the coefficient of relation (r) is greater than 0, it implies the positive relation and if less than 0 it indicates the negative relationship. Also, if r>0.5 the relationship is strong and positive but if r<0.5 and r>0, the relationship is weak and positive. Again if r=>-0.5 and <0, it implies the weak negative relationship and if r<-0.5 it implies the strong negative relationship between the variables.

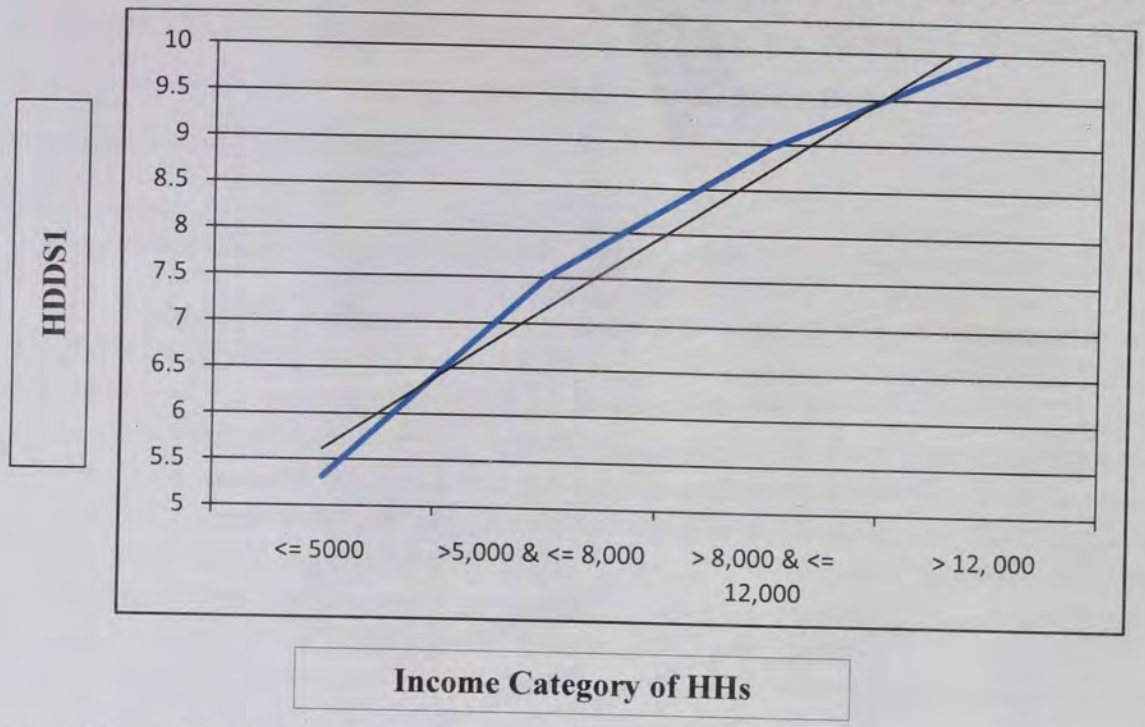
Table 16: Correlation between Household Dietary Diversity and Annual Income using the Instrument of 7 Days Recall

Variables and Statistical Measure of Pearson Correlation		Household Diet Diversity Score by use of 7 days recall method	What is your annual income obtained from UA activities?
Household Diet Diversity Score by use of 7 days recall method	Pearson Correlation	1	.666**
	Sig. (2-tailed)		.000
	N	99	99
What is your annual income obtained from UA activities?	Pearson Correlation	.666**	1
	Sig. (2-tailed)	.000	
	N	99	99

**. Correlation is significant at the 0.01 level (2-tailed). N represents the number of counts or sample size. Source: *Own survey, 2011*

Moreover, the researcher intends to portray the linear relationship between income and consumption to which the horizontal axis denotes the income category of households classified into four quartiles, and the vertical axis stands for household dietary diversity score *(see Figure 4)*. The linear curve shown on the graph implies the direct relationship between income and consumption hence as the income of household increases, the dietary diversity similarly increases. This confirms the study results by Maxwell (2003); Maxwel et.al. (1998); Armar-Klemsu (2001); and Egal et al. (2001) that reveals "at the household level, urban agriculture can be a source of income, can provide direct access to large number of nutritionally rich foods (vegetable, fruit, meat) and a more varied diet, can increase the stability of household food consumption against seasonality or other temporary shortages".

Figure 4: Interrelations of Households Income and Consumption



Source: *Adopted from Table 6*

In a bid to strengthen the previous findings the researcher also attempted to measure the coefficient of determination between HDDS and annual income of households. In this regard the coefficient of determination, r^2 is useful because it gives the proportion of the variance of one variable for instance the HDDS that is predictable from the other variable i.e annual income of households[6].

Accordingly, the value of r for the HDDS in the 24 hours recall is 0.673, then $r^2 = 0.453$, that means 45 percent of the total variation in HDDS can be explained by the linear relationship between households' annual income and HDDS. The other 65 percent of the total variation in HDDS remains unexplained. Similarly, the coefficient of variation for HDDS in the 7 days recall is 0.666, then $r^2 = 0.44$, which means 44 percent of the total variation in HDDS of the 7 days recall is to be described by the linear relationship between households' annual income and HDDS . The rest 66 percent of the total variation in HDDS remains undefined.

[6]The *coefficient of determination* is such that $0 \leq r^2 \leq 1$, denotes the strength of the linear association between HDDS and households income.

To sum up, this study reveals income basically obtained from urban agriculture is a strong determinant of household food consumption. As the urban agriculture generates direct income for the households, it subsequently provides them to have access to the food produced and/or purchased from the local market.

Box 2: Case Study- Poultry Farm contributing for securing individual livelihood/food security

Seid, 22 engaged in poultry production with two of his cousins living in Woreda 01 of Akaki Kalilti sub-city. Seid has begun rearing of chicken since 2008 when he was emigrated from the rural part of the southern region to Addis where his brother lives who is a business man in the city. He has completed the secondary education in 2007 academic year. However because of the unsatisfactory grade he scored in the 10th grade national exam he was not in a position to continue his education. Currently, he owns 1,200 chicken (shared with his cousins) in the poultry farm so that he brought an average of 450 eggs per day for the local market, supermarkets, business centers, hotels and restaurants. He confesses that his income is abruptly increased, his life style changed. He confidently says, "I am food secured". ***Source: own survey, 2011***

Figure 5: Partial view of poultry farm owned by one household in Woreda 01

4.4 Implications of Ownership and Sales of Household Assets for Food Security

Asset represent stores of value for liquidation (liquid assets) that are acquired during the non-crisis years as a form of savings and self insurance; they may include small livestock or personal

possession such as jewelry (Cobett, 1988; Frankenberger and Goldstein, 1991) cited on Maxwell and Frankenberger (1992). Thus, asset ownership ensures household consumption when incomes are insufficient. Households acquire assets that can be sold to compensate shortfalls in consumption and income.

Table 17: List of major household assets used in the assessment

1. Table and Chairs	7. Large electric stove/ mitad	13. Bicycle
2. Sofa Set	8. Small gas stove	14. Motorcycle
3. Radio only (working)	9. Refrigerator/freezer	15. Car
4. Television	10. Jeweler (gold/silver)	16. Cell phone
5. Satellite dish	11. Sewing/ Knitting machine	17. Beds
6. Radio with CD/DVD player	12. Cart	18. watch /clock

Data collected from the 99 sample households describes 47 (47.5 percent) respondents have owned more than half of the listed 14 basic household assets *(See the list of major household assets Table 17).* Thus, it is possible to assume the households' ownership of assets is associated with their engagement in urban agriculture in which it manifests the food security status of the targeted households due to that households' asset are indicators that reflect the food access (Maxwell & Frankenberger, 1992).

Table 18: The type and number of assets owned by the family

Type of Asset	Number of HHs own	Number of items	Frequency	Percentage
Table and Chair	88	0	1	1.0
Sofa Set	53	2	7	7.1
Radio	67	3	9	9.1
Television	75	4	10	10.1
Satellite dish	14	5	11	11.1
CD/DVD player	52	6	13	13.1
Electric Stove	30	7	7	7.1
Gas Stove	24	8	15	15.2
Refrigerator	26	9	6	6.1

Type of Asset	Number of HHs own	Number of items	Frequency	Percentage
Sewing machine	1	10	6	6.1
Cart	3	11	4	4.0
Bicycle	6	12	5	5.1
Cell phone	71	13	4	4.0
Own bed	97	14	1	1.0

Source: *Own survey, 2011*

Moreover, the data collected on the selling of assets by the households in the past six months (*The survey question for the households was "Did you sell any of your household assets in the past 6 months?")* shows that only five respondents (5.1 percent from the total) have sold their assets for the purpose of education which possibly indicates the coping ability of households due to their engagement in urban agriculture.

4.5 Association between Household Dietary Diversity Score, Household Income and Socio-economic Status

In section 4.3, it has been discussed about the relationship between HDDS and HH income which was found to be strong and positive. In this section also an attempt was made to demonstrate the details of association between HDDS, HH income and socio-economic status of HHs engaged in urban agriculture.

Socio economic indicators are becoming increasingly more important to food security monitoring systems focusing on HFS (Maxwell and Frankenberger, 1992). The same authors however asserted that the use of socio economic indicators has its own limitations thus researchers and development practitioners should understand the locational specificity of socio-economic variables so that they are not misinterpreted. For instance, the locational specificity of socio-economic indicators may cause for difficulties to make comparisons across regions, or to aggregate the data.

Thus, in light of urban setting and the household's characteristics in the study area the researcher has collected information on basic types of household assets that are owned by the urban agriculture practitioners. Accordingly, there have been 18 types of basic HH assets to which the survey questionnaire was developed and the required data was collected from those samples *(See*

Annex 1, Part IV, Q37). However, for the ease of analyzing the collected data, the summary of only 14 types of assets was undertaken. The frequency distribution for the household assets among the 99 samples of urban agriculture practitioners ranges from 0 to 14 having the mean and standard deviation, 6.74 and 3.167 respectively with the maximum value of 14 types of assets.

As an attempt made to examine the interrelations between the three variables it was found that the HDDS and HH income have a synergetic effect on the socio-economic status of the HHs. To that effect the relationship between household food consumption that was measured by the Household Dietary Diversity Score in 24 hours recall and the types of assets owned by HHs results in a correlation coefficient (r) of 0.605** that shows a strong positive linear correlation between the two variables i.e. Household Dietary Diversity Score and types of assets owned. Also, the linear relationship between incomes of household recorded on an annual basis and the household assets come about the correlation coefficient (r) of 0.516** that reveals a strong and positive relationship between the two variables *(See Table 19)*. This signifies that there is a direct relationship between the households consumption and the ownership of assets or in other words as the number of assets increase in the household the household's food consumption status also improves.

Table 19: Correlation between Household Dietary Diversity Score (24 hours recall), Annual Income and Types of Assets Owned by Urban Agriculture Practitioners

Variables and Statistical Measure of Pearson Correlation		Household Diet Diversity Score by use of 24 hours recall method	What is your annual income obtained from UA activities?	The sum of all assets owned by the family
Household Diet Diversity Score by use of 24 hours recall method	Pearson Correlation	1	.673**	.605**
	Sig. (2-tailed)		.000	.000
	N	99	99	99
What is your annual income obtained from UA activities?	Pearson Correlation	.673**	1	.516**
	Sig. (2-tailed)	.000		.000
	N	99	99	99
The sum of all	Pearson	.605**	.516**	1

Variables and Statistical Measure of Pearson Correlation		Household Diet Diversity Score by use of 24 hours recall method	What is your annual income obtained from UA activities?	The sum of all assets owned by the family
assets owned by the family	Correlation			
	Sig. (2-tailed)	.000	.000	
	N	99	99	99

**. Correlation is significant at the 0.01 level (2-tailed). Source: *Own survey, 2011*

Similarly, the investigation made on the interrelations of HDDS by use of 7 days recall method explain the correlation coefficient (r), of .607** which is still positive and strong *(See Table 20)*.

Table 20: Correlation between Household Dietary Diversity Score (7 days recall), Assets Owned by Urban Agriculture Practitioners

Variables and Statistical Measure of Pearson Correlation		Household Diet Diversity Score by use of 7 days recall method	The sum of all assets owned by the family
Household Diet Diversity Score by use of 7 days recall method	Pearson Correlation	1	.607**
	Sig. (2-tailed)		.000
	N	99	99
The sum of all assets owned by the family	Pearson Correlation	.607**	1
	Sig. (2-tailed)	.000	
	N	99	99

**. Correlation is significant at the 0.01 level (2-tailed).

4.6 Urban Agriculture as Alternative Food Security Strategy

The most common alternative food security strategies are the short term coping mechanisms and the long term adapting strategies of people (Davies, 1996).

> *Coping (strategies): are "the bundle of producers' responses to declining food availability and entitlements in abnormal reasons or years". Adapting strategies involve a permanent change in the mix of ways in which food is acquired, irrespective of the year in question. For instance, Change in livelihood system like from pure pastoralism to*

agro-pastoralism, from pastoralism to sedentary farmer or diversify sources of earnings such as mix crop and livestock based income with income from non-farm activities or else change place of residence like rural-urban migration, and involve in international migration (Davies, 1996).

Poor urban households engage in a variety of approaches to deal with higher food prices. Common strategies include reducing food consumption and diet quality (Cohen & Garrett, 2009).

Having direct access to a wider variety of foods via urban agriculture can play a potentially important role in protecting the poorest urban dwellers as they cope with an economic crisis that hit on the heels of a food price crisis (Zezza & Tasciotti, 2010). This study also reveals the city dwellers living at the low level of income are practicing urban agriculture as the alternative food security strategy to combat the soaring price of food, and social and economic crisis encountered at the household level and community as a whole.

For instance, among the 99 respondents of urban farmers in the household survey, 26 of them are considerably facing the family crisis, of which 10 are divorced and 16 are widowed women. This confirms the World Bank (2005) study asserted urban agriculture as a survival strategy for the urban poor during crisis periods, and contributes to household food security especially for women and elderly.

Table 21: Objectives of Households to engage in Urban Agriculture

Variables	Frequency		
	Yes	No	Total
Major source of livelihood	42 (42.4)	57 (57.6)	99 (100)
Additional source of livelihood/part-time job	36 (36.4)	63 (63.6)	99 (100)
Survival or adaptive strategy	21 (21.2)	78 (78.8)	99 (100)

Source: own survey, 2011

In the Table 21, people are engaged in urban agriculture for three reasons: major source of livelihood (42.4%), additional source of livelihood or part-time job (36.4%), and survival or adaptive strategy (21.2%). The frequency distribution in the three major objectives show that more than half of the survey participants (a total of 57 counts in the second and third column) are

practicing urban agriculture to overcome the exogenous factors causing to livelihood disruptions such as price inflation of food products, low income coupled with single source of livelihood and the social and economic crisis.

In addition, 47.5 percent of the respondents in the HH survey are the low paid employees in government offices and private firms even majority of them are factory workers who are implementing urban agriculture as a part-time job using the family and hired labor to cope up with the inflating food prices and 10.1 percent are retirees who are using UA as an adapting strategy. This can indicate urban agriculture, beyond its role to ensure food security; it can be used as alternative food security strategy in the city so as to cope up with the sky rocket of food prices.

The FGD held with men and women groups separately come about, half of the discussants begun urban agriculture as an alternative food security strategy to cope up the social and economic crisis that encounters their family due to the fact that they were displaced from Eritrea during the fall of the Dergue[7] regime. Also, three of the participants in the FGD are the ex-soldiers of the Dergue regime who have been deprived of livelihood options right after the fall of the former socialist state. Those returnees from Eritrea due to civil war and the ex-soldiers of the Dergue regime have confessed that they had been receiving relief food aid from the Ethiopian Social Rehabilitation and Development Fund and sheltered in plastic made settlements along the streets until 1994. Fortunately, as they begun to engage in urban agriculture since 1995 where the city administration granted them the land following the sides of Akaki River, their lives dramatically changed.

[7] Dergue is the former Ethiopian government came to end of power in May 1991.

Box-3: Case study- Urban Agriculture is one of the profound job opportunities in the city

Nur Dessie, 25, living in Woreda 03 is among those youth engaged in the MSE of poultry production. He launches the farm in 2009 together with his colleague (a teacher in primary school) and his one brother. Nuru was graduated from Wolayta Sodo University with BA in Economics in 2008. He felt great interest in UA while he was attending the university because he spent much of his leisure time in visiting the university farm found in the campus. Then, right after he came out from the university he directly engaged in the poultry farm in his vicinity. The purpose of the poultry farm is for rearing of the three months old chicken (pullets) and production of egg. Thus, currently there are 1,500 chicken found on the farm among that 1,000 belongs to those growing for the three months pullet and sold when they finish their growth, and the rest 500 are egg layers. He says his farm supplies a minimum of 400 eggs per day for the hotels, restaurants and supermarkets. He also supplies the three months pullets for other poultry farmers in and around the city. He confesses that he has earned the net profit of Birr 35,000 in the last years covering all the production costs. Also, in this year he expects double of the previous year's return. ***Source: Own survey, 2011***

4.7 Analytical Framework of Urban Agriculture and Food Security

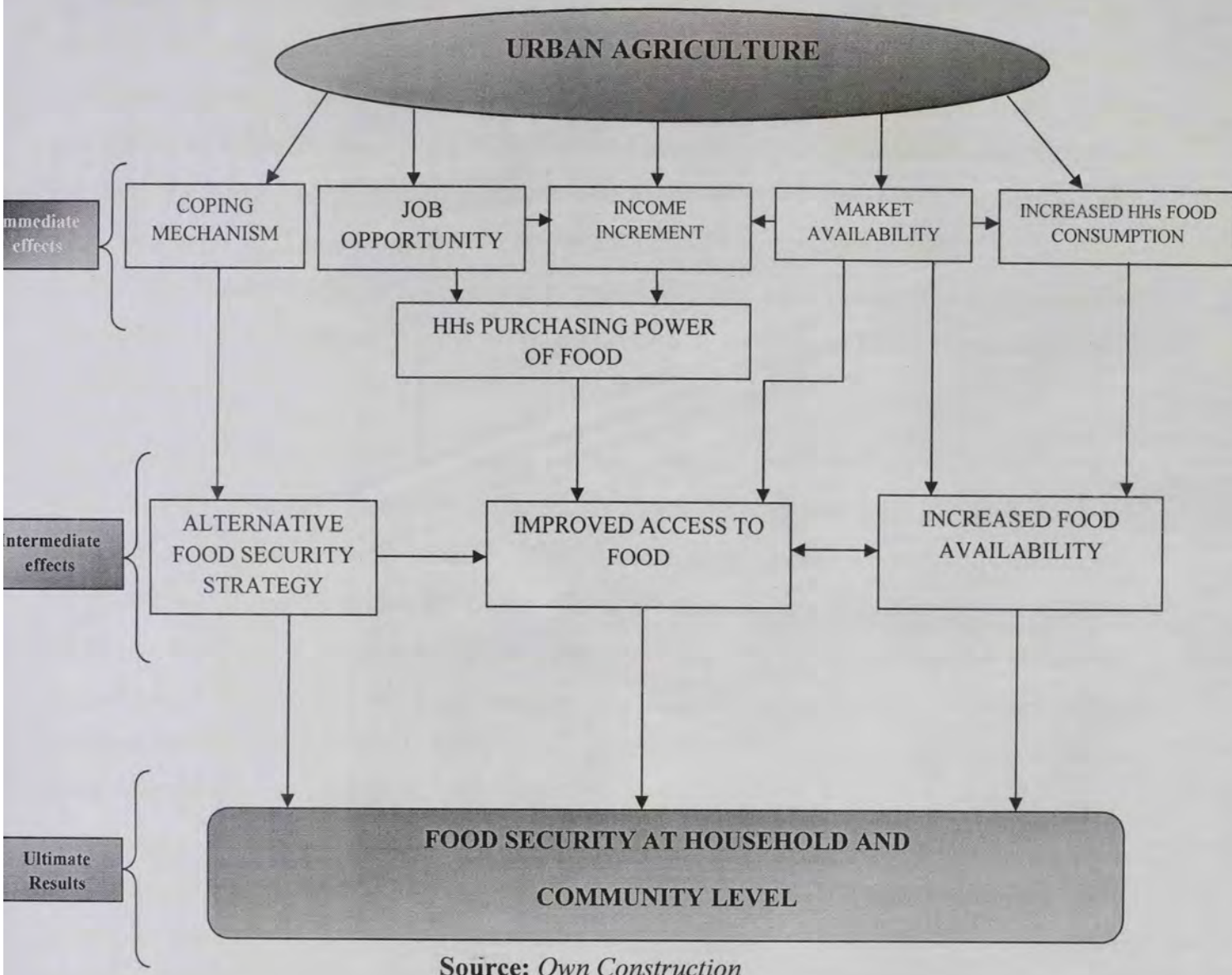
Based on the empirical results of this study, an attempt was made to conceptualize that urban agriculture as highly interrelated with food security. On one hand, it can address at least the two dimensions of food security such as availability and accessibility. On the other hand, it is considerably utilizes as the coping mechanism for the urban poor. In this regard, the researcher has built the schematic representation for that urban agriculture is contributing to the major aspects of food security.

The roles of urban agriculture to satisfy the food demand of urban dwellers is by virtue of household food supply from the own production be it crop or livestock product it addresses the availability dimension of food security. Besides, urban agriculture production fosters the market availability of agriculture products where the urban poor can have the opportunity for accessing UA products in the vicinity.

Also, urban agriculture addresses the accessibility dimension of food security in its role to increase income of those people engaged in the production, processing and marketing of urban agriculture. It is also considered as one of those income generating activities in the city due to that it contributes for employment opportunity and improve the purchasing power of households. Urban agriculture due to its proximity to the huge and potential markets those nutritionally high food products are easily and timely available for the consumer in its vicinity.

Urban agriculture can also be used as an alternative food security strategy by the urban dwellers specially the urban poor. It can be used as a coping mechanism or survival strategy in times of family and social crisis; can complement the low income obtained from the major livelihood sources; and to cope with the soaring prices of food products in the city.

Figure 6: Schematic representation of food security contributions of urban agriculture



Source: *Own Construction*

CHAPTER V: ASSESING CONSTRAINTS AND OPPORTUNITIES OF URBAN AGRICULTURE

5.1 Constraints of Urban Agriculture

5.1.1 Institutional and Policy Related Constraints

The institutional problems of urban agriculture in Addis Ababa city generally and the study area specifically can be explained in the institutional instability, inappropriate structural setup of the UAECP, and the human resources allocation in quality and quantity. To this relation the researcher intends to argue against the statement mentioned in Teferi (2009) as, *"the city government of Addis Ababa has established the Urban Agriculture Department under the Trade and Industry Development Bureau to support well organized urban agricultural activities in the city"*. Similarly, the KII and Mandefro (2010) reveals, the structural setup of UAECP in Addis Ababa City Administration is put under the bureau of Trade and Industry down sized similar structure in each sub city and Woreda to deliver extension services for those people engaged in urban agriculture.

Accordingly, the researcher would disagree on the previously mentioned statement on the basis of the following findings and justifications. In this regard, his argument is the UAECP should be organized as a separate entity in the city administration otherwise the currently operational structure is not properly working for the benefits of urban agriculture practitioners. For instance, urban farmers in the study area don't have sufficient access to appropriate agriculture technologies, training and technical support and agriculture inputs like improved seeds, seedlings, pullets, fertilizers and pesticides. Therefore, these all prevailing challenges of urban farmers would be alleviated if and only if the urban agriculture office has to be established and functioning as an independent institution. Besides, urban agriculture in the city administration is considered as one of the IGAs for the poor urban dwellers where the beneficiaries are being organized in the micro and small enterprises to earn incomes. However, apart from the efforts exerted to organize UA beneficiaries the required technical support from agriculture experts at all levels is not properly delivered to its required level.

As to the institutional instability, one of the key informants affirmed that the organizational structure of urban agriculture office in Addis Ababa has been changed at least three times in the

past ten years. Similarly, Mandefro (2010) asserts the urban agriculture unit of Addis Ababa underwent various structural changes for the last 20 years. It used to be Addis Ababa Administrative Regional Agricultural Development Bureau (1994-2003), Agricultural Office (2003-2004), and Agricultural Department (2005-2009). At present, it is named as Agricultural Extension Service Core Process (AESCP) under Bureau of Trade and Industry of Addis Ababa.

With regard to deployment of human resources at the grass root level the researcher has observed one extension agent in each Woreda that is reporting to and accountable for Trade and Industry Office. It was understood that the human power placement is not found at its desired level to satisfy the ever increasing demand of farmers in the study area. Besides, each extension agent has a single professional background either plant science or animal science or cooperative management or any other agriculture field of study. To that effect, deploying a one-sided professional background for one Woreda seems to be *"one size fits for all"* or *"business as usual"* because of the wide geographic area and diverse UA activities thus the researcher strongly argues, the appropriate agriculture extension service is not being delivered to the beneficiaries. The repeated field observations and visits to the study area also reveal that the agriculture extension agents are mostly engaged in non agricultural activities and devoted to the activities of Trade and Industry Office.

Concerning to the policy related constraints the researcher has confirmed, there is no any policy or strategy developed and implemented on urban agriculture in Addis Ababa so that it becomes one of the major bottlenecks for the sector. Also, (Teferi, 2009) asserts urban agriculture in Addis Ababa encountered multiple challenges like structural changes, limited facilities and above all lack of appropriate policy and strategy that can help set clear direction, develop capacities and structural link to smallholder urban producers.

An attempt was also made to came across the electronically distributed document of the declaration of *Feeding Cities in the Horn of Africa* ratified on the workshop organized by the Addis Ababa City Administration in conjunction with the Food and Agriculture Organization of the United Nations in Addis Ababa on 7 – 9 May 2002 where ministers, mayors, city managers, representatives of governments, cities and local authorities in the Horn of Africa, meeting together with participants from international and nongovernmental organizations (2002).

Accordingly, the participants recognized the following,

- *the right of access to adequate and healthy food for all in our rapidly growing cities;*
- *that cities and local authorities play a key role in enhancing access to food for vulnerable groups;*
- *that food supply and distribution involves many actors whose responsibilities are currently fragmented and uncoordinated and suffer numerous constraints;*
- *that partnerships and networking with and among stakeholders at the local, national and international levels offer significant opportunities for the transfer of knowledge and technologies for improved urban food security;*

Urban agriculture in Addis Ababa lacks appropriate policy and strategy that can help set clear direction, develop capacities and structural link to smallholder urban producers. The researcher understood that there are many reasons that cause for the absence of rigorous policy and strategy on urban agriculture in the city, among these are:

- The wide spread misconception of urban agriculture, neglecting smallholder urban producers as economic unit (Teferi, 2009).
- Limited awareness on the potential role of urban agriculture and insufficient consideration with research and extension services for urban agriculture.
- The limited facilities and institutional instability of UA office in various times.
- Ministry of Agriculture and Rural Development (MoARD) does not consider UA as its mandate areas where research and extension service provisions are not as effectively and intensively as in the rural areas (Mandefro, 2010).

According to a 52 years old informant, recently UAECP has conducted the situational analysis of urban agriculture in Addis Ababa and has drafted Urban Agriculture Policy and Strategy Framework which is too late. The draft policy is even subject to debate by the council of peoples' representatives of the city government, and then if accepted by the council it will be submitted to the city mayor for the final approval.

To that effect, the researcher strongly believes the presence of policy and/or strategy on UA in the city has the paramount role for the betterment of those engaged in production, processing and marketing of urban agriculture.

5.1.2 Socio-economic Constraints

Among the socio-economic constraints, land is the major challenge faced by people engage in urban agriculture. The survey questionnaire on assessing the land problem encountering the urban farmers revealed that 29 people responded that they are facing problem of land, and 39 respondents says they don't have suffice land area to practice UA as long as they are practicing on the marginal and fragmented land area.

Although the UA practitioners in the study are have access to major market sites in their vicinity, the marketing facilities not well developed so that urban farmers are brought to problems such as loss of products especially the perishables such as vegetables, egg and milk, price manipulation by middle-men, fluctuation of consumers interest for UA products. The survey made to assess the problems of market on UA products in the study area results, 67 respondents among the 99 sample HHs suggested that they are facing the problem of market due to the above mentioned factors. Table 22 depicts the details of responses from respondents on the market related constraints of urban agriculture.

Table 22: Market related constraints of urban agriculture

	Response		
Variables	**Yes**	**No**	**Total**
Low price	51 (51.5)	48 (48.5)	99 (100)
Low interest of consumers	25 (25.3)	74 (74.7)	99 (100)
Poor market facilities	52 (52.5)	47 (47.5)	99 (100)
Price manipulation by middle men	36 (36.4)	62 (62.6)	99 (100)

Source: Own survey, 2011

Urbanization and/or expansion of settlement in the study area are among those underlined constraints of urban agriculture that is manifested in eviction of farmers from their parcel, shrinkage of parcel and pollution. Accordingly, Table 23 shows that 62.2 percent of the survey respondents affirmed that they are facing the threats of urbanization, and industrialization.

Table 23: Challenges of Urban Agriculture

Variables	Response		
	Yes	No	Total
Threats of urbanization, investments, and industrialization	62 (62.6)	37 (37.4)	99 (1000
Eviction from parcel	47 (47.5)	52 (52.5)	99 (100)
Shrinkage of parcel	46 (46.5)	53 (53.5)	99 (100)
Pollution	52 (52.5)	47 (47.5)	99 (1000

Source: Own survey, 2011

One of the FGD members who engaged in vegetable production confessed, he and his colleagues during the rainy season they are engaged in collection of plastic sheets released from industries to Akaki River. This implies that pollution does not only affect the soil and water resources even it competes with the time and energy of urban farmers.

The soaring price of livestock feed is also the profound challenge for the dairy and poultry farmers in the study area. As the FGD participants demonstrate the problem the rate for the increment of livestock feed is double fold of the price of UA products so that the return from sell of the products couldn't be compensating the farm production cost.

5.1.3 Research and Technological Constraints

Lack of agricultural knowledge, technology and skills are key factors that constrain productivity growth of urban farmers. Besides, the KII report demonstrates the linkage between research and extension in the study area is almost none. Field observations and FGD report indicates the agriculture practices implemented by the urban farmers totally relies on the traditional farming practices. Reports from UAECP shows the city administration has launched one central veterinary laboratory, one improved poultry multiplication center, one mushroom seed laboratory, fruit and fodder multiplication centers to energize the ongoing extension service however the FGDs demonstrate the required service does not reach to the ultimate beneficiaries in the sector even though the technical support delivered in the veterinary services is better than other sectors. Moreover, the inadequate agriculture extension service in the study area is among those imminent constraints compounded by lack of appropriate technical support and trainings

for the urban farmers, limited or absence of appropriate agriculture technologies, and lack of agriculture inputs.

5.2 Opportunities of Urban Agriculture

5.2.1 The Emergence of Micro and Small Enterprises

The study made by Mandefro (2010) reveals the Micro and Small Enterprise (MSE) office structured under the Trade and Industry Bureau is the current prime mover of the UA activities in Addis Ababa. The office has developed five years MSE development Program since 2007 to serve as Urban Industry and Urban Development packages. Urban agriculture is one of the six packages promoted by this MSE development program

The survey 99 urban farmers also come about MSEs in Addis Ababa have enormous benefits for the UA practitioners. Accordingly, data collected on the merits of MSEs with the following question, *"Do you feel that being organized in a micro and small enterprise has an advantage for implementing the urban agriculture?"*, thus, 93.9 percent of the respondents said "yes". Besides, the advantages of MSEs are described in Table 24.

Table 24: Advantages of Micro and Small Enterprises for Urban Agriculture

	Response		
Variables	**Yes**	**No**	**Total**
Advantageous to get access to credit service	79 (79.8)	20 (20.2)	99 (100)
Advantageous to get access to land or space for work	86 (86.9)	13 (13.1)	99 (100)
Advantageous to get access for technical support	74 (74.7)	25 (25.3)	99 (100)
Advantageous for contribution of labor and inputs among members	55 (55.6)	44 (44.4)	99 (100)

Source: Own survey, 2011

The researcher has drawn findings from the data in Table 24 that the challenges mentioned in the previous section such as land and the weak technical support delivered to urban farmers are tend to be resolved by the opportunities created through MSE thus it would be better for them to engage in the organized efforts rather than individual basis.

One of the key informants from the NGO called ACDI/VOCA says that his organization intends to support the MSEs organized under the dairy production with the feed processing machine. To this effect, the ever increasing of the livestock feed would be resolved for the dairy farmers.

In relation to the development of MSEs in the city, it was observed that the Woreda 01 Micro and Small Enterprises office has constructed shades in the isolated area away from residences where the selected and interested urban dwellers are engaged in poultry, dairy and livestock fattening *(See Figure 7)*. Thus, it shows that the city government has made a glimpse of efforts to improve urban agriculture considering it as one of those income generating activities for the poor urban dwellers. However, the previously discussed challenges of the sector are remaining as usual.

Figure 7: Outside view of the shades constructed by Woreda 01

Figure 8: Partial view of urban agriculture implemented by MSEs. Left: the dairy farm. Right: poultry farms

5.2.2 Market Access and Infrastructure Facilities

As it was discussed in previous section, the marketing facilities are not well developed in the study area due to the less attention given to the sector. Data collected from the field observations and HH survey shows there are two open air markets nearby to the study site called as Akaki and Saris for which the respondents say "yes" in the ratio of 90.9 percent and 9.1 percent respectively. This implies that urban agriculture practitioners have access to the nearby market and the proximity of the market can itself plays the significant role in strengthening the production, and processing of urban agriculture products thereby enhance the food security of households and the community. It also reduces the post harvest loss of the UA products and strengthens the linkages between producers and consumers which subsequently contribute to the food availability in the community and household level.

On the basis of the field observation of the researcher and the FGDs confirmation it was understood that the

Table 25: Buyers of UA products

	Response		
Variables	**Yes**	**No**	**Total**
Sell UA products for consumers	58 (58.6)	41 (41.4)	99 (100)
Sell UA products for whole-sellers	62 (62.6)	37 (37.4)	99 (100)
Sell UA products for retailers	53 (53.5)	46 (46.5)	99 (100)

Source: Own survey, 2011

CHAPTER VI: SUMMARY, CONCLUSION AND RECOMMENDATION

6.1 Summary and Conclusion

Urban agriculture in Addis Ababa city is being implemented by the small holder individual farmers, micro and small enterprises, and the large scale cooperatives for different reasons. Among these reasons are food supply for household's consumption, generating income for supplementing the low income of basic livelihood sources, farming for the commercial purposes, and survival strategy in times of family and social crisis. The major urban agriculture systems carried out in the city are the production of vegetables, dairy, poultry, mushroom, beekeeping and livestock fattening.

The objective of this study was to identify the food security contributions of urban agriculture and the constraints and opportunities encountered with the sector in the three Woredas of Akaki Kaliti Sub-city.

The quantitative and qualitative methodologies are employed whereby structured questionnaires were prepared for the survey of randomly selected HHs among the smallholder city farmers organized in the MSEs and the thorough discussion made with the purposively screened key informants and focus group members. An in-depth case study on the selected HHs and observation of the study area were also the other statistical tools used by the researcher in the courses of the study. In addition to that, observations of the market places, interview with the retailers and whole sellers, and discussion with government officials were used for the researcher to have an insight about the realities of the study area. Thus, analysis of data was made based on the collected information through the stated research approaches that was fed into the computer software system for analysis, and interpretation and then came to concluding remark.

The study reveals, people that are engaged in urban agriculture are diverse in their background and social status also they start urban agriculture for various reasons primarily due to the low food availability at the household level, low income and unemployment. In an educational parameter the type of people engaged in urban agriculture varies from illiterate to a level of university graduate that signifies the need to engage in urban agriculture is not only for a single reason but using it either as the major source of livelihood, or an additional source of livelihood or as a survival strategy.

It was also found that urban agriculture contributes to those practitioners either as the direct source of food supply for the household members or improving their access for the purchase of food from the market. Thus, urban agriculture can be a source of income, can provide direct access to nutritionally rich foods (vegetable, fruit, and meat) and a more varied diet, and can increase the stability of household food consumption against seasonality or other temporary shortages. The study results in the average dietary diversity of 7.9 for the entire households surveyed that implies the whole urban agriculture practitioners have got an average of 66.6 percent of the 12 food groups listed in the Household Dietary Diversity Score (HDDS). The result indicate that the role of urban agriculture for food security is manifested through the improved household food consumption and the availability of freshly and nutritious food for the family. The linear regression model tested in the study also demonstrates the association between the dependent variable (HDDS1) and independent variables such as family size, year of experience, annual income obtained from UA products, and the number of assets owned by the households is highly significant. Additionally, the determinant effect of the combination of independent variables on the dependant variable is considerably high.

Besides, the survey of 99 households engaged in urban agriculture results in 47.4 percent of the households earn the annual income ranges from birr 5,000 to 12,000 and 23.2 percent of them reap more than birr 12,000 that extends to birr 40,000. The rest of households that constitute 29.4 earn an income below birr 5,000. These results also show the income obtained from urban agriculture is contributed for the households' food access through its role in improving their purchasing power and strengthen their coping capacity.

The study also attempted to portray the linear relationship between income and consumption of households to which the income category of households classified into four quartiles, and the household dietary diversity score ranges from the food group of 1 to 11. The linear curve shown on the graph implies the direct relationship between income and consumption hence as the income of household increases, the dietary diversity similarly increases.

An investigation on the socio economic status of the households was made for an assessment of the food security status of urban agriculture practitioners using the ownership of liquid assets as an indication of the food access by the households. The frequency distribution for the household assets among the 99 samples of urban farmers is ranges from 0 to 14 with the mean and standard

deviation, 6.74 and 3.167 respectively having the maximum value of 14 types of assets. This implies that urban agriculture contributes for the households' ownership of assets for which the targeted households in the survey owned an average of about 7 assets among the 14 types of assets assessed in the study. As an attempt made to examine the interrelations between the three variables, it was found that the HDDS and HH income have a synergetic effect on the socio-economic status of the HHs. To that effect, the relationship between household food consumption that was measured by the Household Dietary Diversity Score in 24 hours recall and the types of assets owned by HHs results in a correlation coefficient (r) of 0.605**[8] that shows a strong positive linear correlation between the two variables i.e. Household Dietary Diversity Score and types of assets owned.

This study also reveals the city dwellers living at the low level of income are practicing urban agriculture as the alternative food security strategy to combat the soaring price of food, and social and economic crisis encountered at the household level and community as a whole. This can indicate urban agriculture, beyond its role to ensure food security; it can be used as alternative food security strategy in the city so as to cope up with the sky rocket of food prices.

Assessing the prevailing constraints of urban agriculture reveal that the major challenges of urban agriculture in the city are institutional and policy related, socio-economic, and research and technological constraints. The institutional problems of urban agriculture in Addis Ababa city generally and the study area specifically can be explained in the institutional instability, inappropriate structural setup of the UAECP, and the human resources allocation in quality and quantity. As to the policy related constraints, the researcher has confirmed there is no policy or strategy developed and implemented on urban agriculture in Addis Ababa so that it becomes one of the major bottlenecks for the sector.

Among the socio-economic constraints, land is the major challenge faced by urban agriculture practitioners. Although the urban farmers in the study area have access to major market sites in their vicinity, the marketing facilities are not well developed so that urban farmers are brought to problems such as loss of products specially the perishables such as vegetables, egg and milk, price manipulation by middle-men, and fluctuation of consumers interest for UA products.

[8] The r value is greater than 0.5 means the relationship between the two variables is strong and positive. And the two asterisks denotes the 95% level of confidence interval

Urbanization and/or expansion of settlement in the study area are among those underlined constraints of urban agriculture that is manifested in eviction of farmers from their parcel, shrinkage of parcel and pollution. The soaring price of livestock feed is also the profound challenge for the dairy and poultry farmers in the study area.

Lack of access to appropriate agricultural knowledge, technology and skills are the key factors that constrain productivity growth of urban farmers. Besides, the linkage between research and extension in the study area is almost none.

Among those opportunities for urban agriculture in the city is the emergence of micro and small enterprises is the major one. MSE office is prime mover of the UA activities in Addis Ababa. The office has developed five years MSE development Program since 2007 to serve as Urban Industry and Urban Development packages. Thus, urban agriculture is one of the six packages promoted by this MSE development program

Marketing facilities are not well developed in the study area due to the less attention given to the sector. Data collected from the field observations and HH survey shows there are two open air markets nearby to the study site called as Akaki and Saris for which the respondents say yes in the ratio of 90.9 percent and 9.1 percent respectively. This implies that urban farmers have access to the nearby market and the proximity of the market can itself plays the significant role in strengthening the production, and processing of urban agriculture products thereby enhance the food security of households and the community.

Conclusively, urban agriculture has an incredible contribution towards the food security via its increased food supply and nutrition, creation of job opportunities, and the means or source of income that will increase the food purchasing power of HHs. Apart from its positive impact on the household food security of those engaged in production, processing and marketing of UA products, urban agriculture is considerably playing the significant role to satisfy the growing demand of the urban consumer.

Urban agriculture is also used as a response to insufficient, unreliable and inadequate food supplies from rural parts of the country. In addition to that, urban agriculture has the role to reduce poverty, and improving the national growth that deserves due attention from leaders at all levels, policy analysts, researchers and academicians.

However, urban agriculture remains as the undermined socio-economic sector in Addis Ababa city vis-à-vis its magnificent contributions for food security. Recognizing the significant potential of urban agriculture to fight against the food crisis in the cities should be the major emphasis of the state.

6.2 Recommendation

Based on the findings of this study the following possible recommendations could be used as the remedies for those constraints and shortcomings encountered in the courses of the study.

- The continuous assessment of urban agriculture benefits for food security and consideration it with the national food production records could be the first hand measure to be taken by those concerned bodies.
- The inclusion of urban agriculture interventions in the national food security programs should be the concern of the state. Also, city government must pay attention to the potential of urban agriculture for improving households' food and livelihood security.
- The researcher believes that urban agriculture is beyond its mere contribution for income generation that needs a wide range of subject matter specialists such as horticulturalists, agronomists, animal husbandry and veterinary specialists. To this reason, the institution in charge of urban agriculture in Addis Ababa which is currently led by Trade and Industry Bureau should be given due emphasis from all concerned officials to ensure its independency.
- Improving urban agriculture requires a more direct, more focused, and more integrated approach. However, urban agriculture has been excluded and poorly defined in the formulation of policies and strategies of other relevant institutions. Thus, UA should be formulated into a policy framework to exploit the potential contribution of UA to food and livelihood security and environmental protection through the sustainable use and management of the existing resources.
- It was understood that urban agriculture practitioners do not enjoy the same support from the governments as do their rural counterparts. The exclusion of urban agriculture created poor structural linkages of UAECP with the ministry of agriculture which significantly reduced

effectiveness and efficiency. Thus, emphasis should be given for the effective institutional set up of urban agriculture and extension. Also, a considerable attention should be given for the improvement of urban agriculture extension and allocation of resources specially deployment of agricultural expertise with the desired quantity and quality.

- The issue of urban agriculture should be shifted from the scientific and research concern to the urban development and policy agenda.

- Foundation should be laid down for the linkages and integrations of research and technologies with urban agriculture extension. Integrate the urban agriculture into the urban planning and management, allotting a certain areas for urban agriculture, the master plan should encompass the zoning of urban agriculture and land use. Besides, effective coordination & integration of all stakeholders (GOs, NGOs, & Public Sector etc) involved in the production, processing and marketing of urban agriculture.

- In a bid to improve the wellbeing of people engaged in urban agriculture, efforts should be exerted to develop marketing facilities that would have the significant role to reduce the post harvest loss of UA products and price manipulation by the middle men while UA products are brought to the market.

- Finally, the issue of sustainability of the scarce natural resources mainly land, and water should be emphasized for the betterment of urban agriculture in the city that needs the leverages to reduce the incidences of cultivating the marginalized lands susceptible to erosion and degradation, introduce waste water treatment technologies for irrigation purpose, and empowering the capacity of urban agriculture practitioners to relieve them from the traditional farming system approach.

6.3 Implications for further Research

As it has been iterated the research conducted in the area of urban agriculture and food security from the urban perspective was insufficient. Thus, it is imperative to forward possible research orients for urban agriculture. Accordingly,

- Studies should also explore what existing food production and distribution structures can do to improve the availability and accessibility of food for the urban dwellers and how they can contribute to alleviating food shortages in the cities.
- Researches will have to focus on the reparation of the prevailing challenges of urban farmers with the particular concern to environmental health, and urban land use planning and management.
- Researches should also look for the solutions on how urban agriculture can foster the development of the cities in a sustainable approach.

"As more and more people make cities their home, cities will be the arenas in which some of the world's biggest social, economic, environmental and political challenges will be addressed, and where solutions will be found" **Kofi Annan, Secretary General of the United Nations, June 2001**

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ANNEXES

Annex 1: Household Survey Questionnaire (Quantitative Tool for data collection)

Interviewer: Name: _____ **Supervisor:** Name: _____

Signature: _____ **Signature:** _____

Date: _____ **Date:** _____

I. Household Characteristics

1.	Household identification number		
2.	Date of interview:		
3.	Name of interviewer:	Signature: _____	
4.	Name of supervisor:	Signature: _____	
5.	Woreda:	1. Woreda 01 2. Woreda 02 3. Woreda 03	
6.	Name of household head		
7.	Sex of household head	1. Male 2. Female	
8.	Age of household head		
9.	Religion of household head	1. Christian (Ortodox) 2. Christian (Protestant) 3. Christian (Catholic) 4. Muslim 99. Other (specify)	
10.	Ethnicity of household head		
11.	Marital status of household head	1. Single 2. Married 3. Divorced 4. Widowed 5. Separated 6. Polygamous	
12.	Family size: *number of permanent household members including household head*	Male: Female: Total:	

13.	Education status attained by household head	1. Illiterate 2. Read and write 3. Literate 99. Others (specify) N.B: *If literate write the academic status*	
14.	Age distribution of other members of household	Under 10 years:	
		Between 10 and 20:	
		Between 21 and 30:	
		Between 31 and 60:	
		Above 60:	

II. General information on urban agriculture

15.	Type of activity of urban agriculture practiced by the family	1. Poultry 2. Dairy 3. Fattening 4. Vegetable	
16.	When did you start to engage in urban agriculture?	Month: Year:	
17.	Who was initiated you to engage in urban agriculture?	1. Own interest; 2. Government support/awareness and training/ 3. Others specify_____	
18.	What is the reason for you to start urban agriculture?	1. Low food supply for HH; 2. Unemployment; 3. Low income	
19.	What is the main objective of the HH to engage in UA?	1. Major Source of livelihood; 2. Additional source of livelihood/part time job; 3. Survival/adaptive strategy; 4. Others specify_____	
20.	What is the ultimate use of UA products?	1. HH food supply/own consumption;	

		2. Market sale; 3. Both 1 and 2	
21.	What are the products of the urban agriculture undergone by the household?		
22.	Who did contribute labor for the farm undergone?	1. Family labor; 2. Hired labor	
23.	To whom do you sell your product?	1. Consumers; 2. Wholesalers; 3. Retailers	
24.	Where is the market place for sell of UA products in the area	1. Akaki 2. Saris 99. Other Specify _____	

III. Measurement of HFS Household food consumption

25. The 24 hours and 7 days recall for dietary diversity score

In last 24 hrs and 7 consecutive days have you and your family members consumed the below listed food stuffs	last 24 hrs consumed Yes=1, No=2	How many times does it consumed at your home during the last seven days? (in number 0-7)	Sources of food ingredients Own farm=1, purchased=2, Remittance=3
25.1 Enjera bread (Teff)			
25.2 Other cereals (Wheat bread, rice, sorghum, maize)			
25.3 Roots and Tuber crops (potato, sugar beet, carrot, beetroot)			
25.4 Sugar and sugar products (Jam, Honey etc)			
25.5 Vegetables (cabbage, lettuce, Swiss chard, tomato,			
25.6 Fruits (Orange, Mango, Papaya, Banana etc)			
25.7 Beef, mutton, poultry, and pork			
25.8 Eggs			
25.9 Fish (Fresh and dried)			

25.10 Lentils, Beans, Chick peas, Ground nut			
25.11 Milk and, milk products (Fresh milk, yoghurt, cheese)			
25.12 Oils, fats, any food prepared with butter			

26. Return to Q 25 and count the number of food groups consumed in last 24 hours, then sum up them and fill the total in this box: ☐

27. In last 24 hours for how many eating occasions the food was prepared for the HH members?

Eating Occasions	food consumed during the eating occasion Yes=1 and No=2
A morning meal	
A midday meal	
Any food between midday and evening meals	
An evening meal	
Total	

28. What are your CURRENT three main sources of staple food **(rank them)**?

A	__	**B**	__	**c**	__

Source codes:

1 = Own production/garden	2 = Casual labor/work	3 = Borrowed
4 = Gifts from friends/neighbors	5 = Purchases from shop/market	6 = Others specify _____

29. What share of your total food from each source of the three main sources? CURRENT *(Use proportional piling if needed) - Total may not =100% if more than 3 sources of food)*

A	____%	**b**	____%	**c**	____%

IV. Measurement of HFS by use of food security indicators (income, yield, owned production resources, assets)

30. Is the household income changed/improved due to your engagement in UA?

1. Yes 2. No

31. If yes to Q 30 above, can you give information of your yearly/monthly income that you obtained from the UA activities? _____

32. Do you have other income sources apart from urban agriculture?

1. Yes 2. No

33. If yes for Q 32 above, what are the other sources of income for your family?

1. Employee government/private firm
2. Remittance
3. Petty trading
4. Others specify _____

34. How much did you get from your farm this season? *(Write '0' if no sell)*

_____

35. How is the yield you gained from the UA activity?

If dairy, milk yield per cow per day and for how long _____

If vegetable, yield per Ha per one season and for how long (No. of seasons) _____

If poultry, egg yield per hen per year and for how many chicken totally _____

If fattening how much weight gained per one bull _____

36. How are the owned resources by the household in relation to urban agriculture?

If dairy, how many cows do you have? _____

If vegetable production, how much ha of land under cultivation? _____

If poultry production, how many chicken owned? _____

If fattening, how many bulls or beef animals? _____

37. How many of the following assets are owned by your household?
If "Yes" use "1" or "No" use "2"

1. Table and Chairs	⌊_⌊_⌋	7. Large electric stove/ mitad	⌊_⌋	13. Bicycle	⌊_⌋
2. Sofa Set	⌊_⌋	8. Small gas stove	⌊_⌋	14. Motorcycle	⌊_⌋
3. Radio only (working)	⌊_⌋	9. Refrigerator/freezer	⌊_⌋	15. Car	⌊_⌋
4. Television	⌊_⌋	10. Jeweler (gold/silver)	⌊_⌊_⌊_⌊_⌋**Birr**	16. Cell phone	⌊_⌋
5. Satellite dish	⌊_⌋	11. Sewing/ Knitting machine	⌊_⌋	17. Beds	⌊_⌋

6. Radio with CD/DVD player	☐	12. Cart	☐	18. watch /clock	☐

38. Does your household have savings/bank account?

1. Yes 2. No

39. Did you sell any of your household assets in the past 6 months?

1. Yes 2. No

40. What were the main reasons for selling assets? Yes=1; No=2

1 = Fees/levies	
2 = Funeral expenses	
3 = Medical expenses	
4 = school fees and uniforms, etc	
5 = Purchase food	
6 = Pay debts	
7 = Other_____	

41. Do you pay to live in this dwelling?

1. Yes 2. No

42. If you pay in **cash**, how much money per month does your household pay to live in this dwelling?
_____Birr/month

43. Does your household own any residential or industrial land? ☐

1. Yes (How much _____m^2) 2. No

44. Type of dwelling unit – (*Observe and note the type of dwelling*) ☐

44.1	Muddy wall and corrugated roof	
44.2	Bricks wall and corrugated roof	
99	Specify if any	

45. Are you feeling food secured due to the engagement in urban agriculture? Yes=1; No=2

45.1	Food secure	
45.2	Food insecure	
45.3	Varies from one year to another	

45.4	Varies from season to season	
45.5	Do not know	

46. If "food secure" or "1" for Q. 36, to what aspect the family feels food secured?

	Aspects of food security	1. Yes 2. No
46.1	Increased food availability at HH	
46.2	Diversified sources of income	
46.3	Increased income in absolute terms	
46.4	Job opportunity	
46.5	Other (specify)	

47. If the answer for Q 45 above is "food insecure" or "2", give the reason why you still become insecure? Yes=1; No=2

47.1	Lack of sufficient space for production (Land);	
47.2	Lack of inputs (seeds, breeds, fertilizer, credit facilities);	
47.3	Low market access (low price, low demand of products etc);	
47.4	Threat of pollution	
47.5	Other (specify)	

V. Assessing Challenges and opportunities

	Challenges and Opportunities	**Choices**	**Answer**
48.	Do you face challenges in practicing urban agriculture?	1. Yes 2. No	
49.	If yes to Q 48, do you have problem in getting the land?	1. Yes 2. No	
50.	Do you have sufficient area of land to implement your activity?	1. Yes 2. No	
51.	Have you faced labor challenges?	1. Yes 2. No	
52.	Do you have market problem?	1. Yes 2. No	

53.	If yes for Q 52 above, what type of market problem?	1. Low price of UA products 2. Low interest of consumers in consuming UA products 3. Low market facilities/availability of market place 4. Price manipulation by middle men	
54.	Do you obtain extension service?	1. Yes 2. No	
55.	If yes for Q 54, do you feel it is sufficient?	1. Yes 2. No	
56.	Have you got credit service?	1. Yes 2. No	
57.	For what purpose you have used the credit money?	1. Purchase of inputs (seeds, livestock breeds, fertilizer, chemicals, drugs) 2. Renting of land	
58.	Do you face problems in accessing of inputs?	1. Yes 2. No	
59.	If yes for Q 58 above, what type of problem you face with regard to accessing inputs?	1. Low/no availability of inputs in my vicinity 2. Price increment or manipulation by middle men 3. Less quality of inputs	
60.	Do you feel threat because of urbanization, investments, and industrialization in your vicinity?	1. Yes 2. No	

61.	If yes for Q 60 above what are the adverse impacts of the externalities of UA mentioned above?	1. Eviction from my parcel 2. Shrinkage of my parcel 3. Pollution 4. 1 and 2 99. Others specify: _____	
62.	What is the name of the Micro and Small Enterprise in which you are a member?		
63.	Do you feel that being organized in a micro and small enterprise has an advantage for implementing the urban agriculture?	1. Yes 2. No	
64.	If yes for Q 63, what are the advantages for being organized under the micro and small enterprise?	1. Access to credit service 2. Access to land or space for work 3. To get access for technical support 4. Contribution of labor and inputs among members 99. Others Specify _____	
65.	Do you think organizing the UA practitioners under micro and small enterprise has encountered problems?	1. Yes 2. No	
66.	If yes for Q 65, what are the challenges encountered with organizing UA farmers in micro and small enterprise?	1. Conflict among members 2. Slow implementation of the activities 3. Limitation in labor and inputs contribution 4. Disagreement in sharing of resources 99. Others specify: _____	

Annex 2: Checklists for Focus Group Discussion (Qualitative Tool for data collection)

1. What are the kinds of urban agriculture activities implemented in your vicinity?
2. Why are people engaged in urban agriculture in your vicinity?
3. Who are engaged in urban agriculture?
4. What are the major benefits obtained from practice of urban agriculture by those beneficiaries engaged in the sector?
5. How is the significance and contribution of urban agriculture for food security at household and community level? Discuss the issues separately and thoroughly.
6. What are the challenges faced by the urban agriculture practitioners in the process of production, processing, and marketing of the products?
7. What do you think about the solutions for those challenges faced by the urban agriculture practitioners?

Annex 3: Checklist of Key Informant Interviews (Qualitative Tool for data collection)

1. What is urban agriculture means to you? What are the major types of UA activities practiced in the area and by whom?
2. Who are engaged in urban agriculture in the sub-city?
3. Why people are engaged in urban agriculture?
4. What are the roles and contributions of urban agriculture for food security at household and community level? Discuss both contributions separately.
5. What kind of government support is rendered to the urban agriculture practitioners and what would be its future perspective?
6. What is the situation of connecting the UA practitioners with research findings and appropriate technologies as well as the situation of agriculture extension service? Discuss the issues separately.
7. What are the challenges and opportunities for urban agriculture in the sub city? (discuss the two cases separately)
8. What are the challenges faced by the government offices that are working with urban agriculture? Discuss the roles of all stakeholders thoroughly.
9. What will be the future fate of urban agriculture versus the challenges faced by the sector nowadays?