Livelihood Dependence on Urban Agriculture in Addis Ababa, Ethiopia

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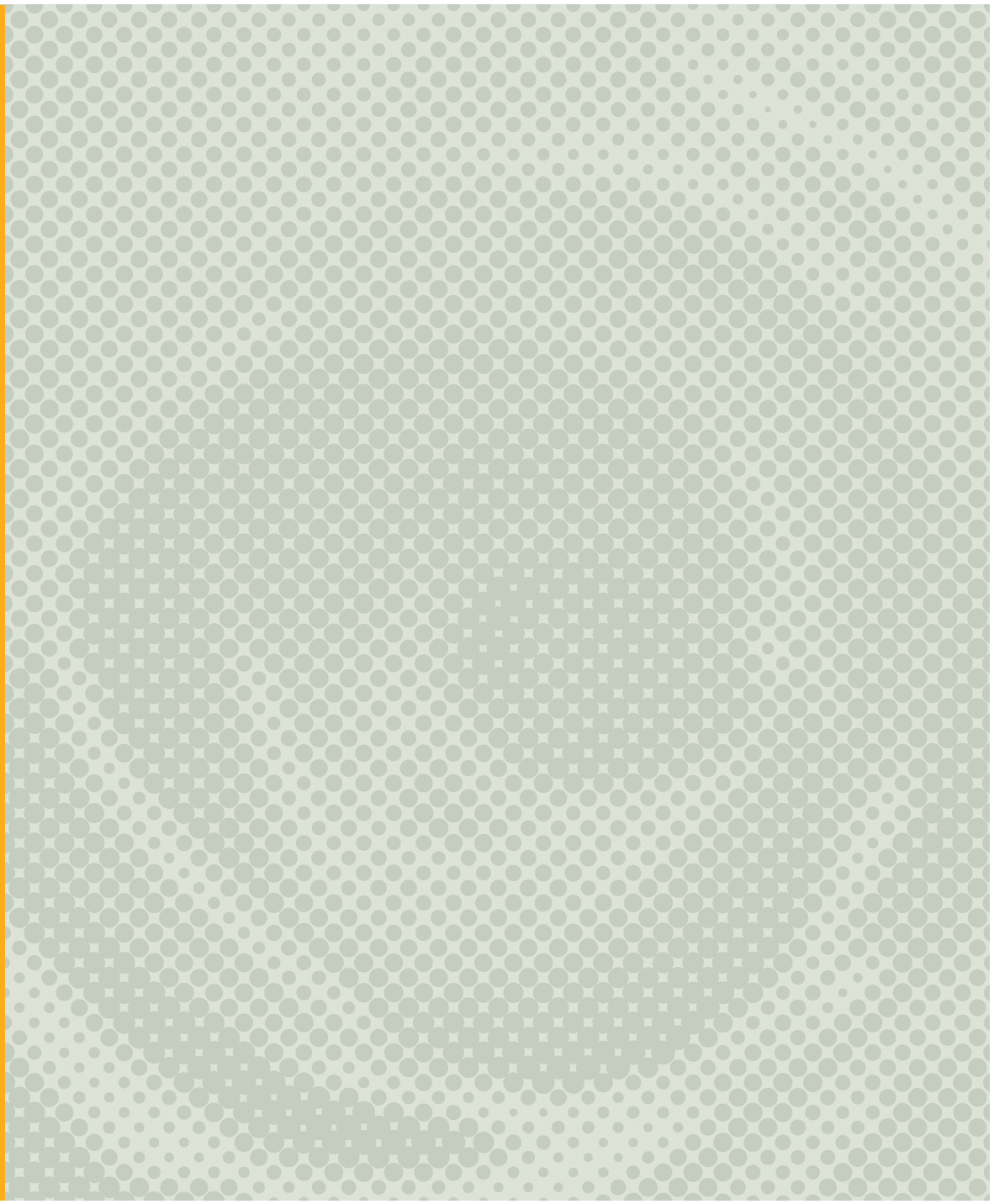

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Photos in page iii: Bole vegetable farm (left), urban farmers (top and bottom right), and livestock at Akaki-Qality (middle right).

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by

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Declaration

I, Tewodros Firdissa Duressa, do hereby declare the originality of my work, and whole-heartedly acknowledge the use of all materials other than my own work. This work has not been submitted to any other university than Norwegian University of Life Sciences (UMB) for any type of academic degree or publication.

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Abstract

Understanding the role that urban agriculture plays in the livelihoods of urban farmers in particular and the urban society at large helps to realize the relevance of the sector in urban poverty alleviation and to give due attention to it during urban development policy reforms. The objectives of the study were to find out the major urban agricultural production systems in Addis Ababa city, and their roles in livelihoods of urban farmer households and urban poverty alleviation, and to provide empirical evidences on socio-economic challenges related to the urban farming. Data were collected based on household survey using a structured questionnaire on 70 urban farmer households which were equivalently and randomly selected from four sub-cities in Addis Ababa. The findings revealed that cultivating vegetable crops and rearing large cattle are the most common agricultural activities by the urban crop producers and livestock owners, respectively. The former are the most dominant groups among all urban farmers in Addis Ababa. Many urban farmers (40 %) also experience mixed farming in the city. Urban farming in Addis Ababa has significant influence on the livelihoods of urban farmer households as compared to other livelihood options, where over 65 % of the households' income is derived from farming. Besides this, it has equal importance in the livelihoods of both the poor and better-off urban farmers, and contributed to income inequality among the farmers. Vegetable production was found to narrow the income gap between the poor (lowest quintile) and the rich (top quintile) urban farmer households, where as large cattle production seems to widen the inequality. In addition, the livelihoods of poor urban farmer households are less diversified, and the strategies of the majority (80 %) are either principally crop farming or non-farm based livelihoods, where as the better-off households follow mostly combinations of farm and non-farm based livelihood strategies. Low land productivity, lack of education (especially for household heads), livestock and credit were the critical assets that distinguished the poor from better-off urban farmer households, and they seemed to limit the productivities of the poor even though the households have better adult work forces. Participations of women and uneducated people in the sector are also widely observed.

Key words: urban agriculture, livelihood, farm income, urban farmers, Ethiopia

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1. Introduction

Many authors wrote about the advents of urban agriculture and its wide spread existence in many cities of the world (RUAF 2007, Bryceson and Potts 2005, Bryld 2003, UNDP 1996, Mougeot 1994). They emphasized on urban resources that urban agriculture utilizes and their opportunity costs, realizing the fact that the resources (such as land) have also high demand for other urban uses (e.g. building houses). Yet, little has been said to justify the economic relevance of urban agriculture in cities. Thus, the motive behind carrying out this research was to improve the understanding that urban agriculture contributes to the livelihoods of urban society.

The research issue was initiated because there will be high rate of urbanization in African and Asian countries in the coming twenty years (Garrett 2000 and Mougeut 2000). Many of the countries in which there are fast urban growths are least-developed nations. These countries are not capable enough to provide sufficient food demanded by the expanding urban population via imports from rural areas. This leads to increased food insecurity and prevalence of poverty in the urban areas. For instance, Ministry of Finance and Economic Development for Ethiopia (2006) reported that urban population of Ethiopia will increase in two folds by 2020, and urban poverty is currently becoming a growing concern especially in large cities of the country. Thus, cities may need to consider agricultural production in urban areas or urban fringe to reduce the food insecurity and prevalence of poverty.

Bryceson and Potts (2005), and Mudimu (1996) argued that urban agriculture in Africa was evolved as a response to scant sources of urban economic sustenance i.e. insufficient supply of staple food to cities coupled with declining purchasing power of city dwellers. Currently, millions of urban dwellers are reinforced to restore farming in urban areas throughout many African cities either to supplement their household income or because they cannot afford to meet their daily food needs (Bryceson and Potts 2005, Lynch et al. 2001).

Urban agriculture is not a phenomenon that is practiced only by urban people in African cities as their survival strategy. Deeltstra and Girardet (1999) have argued that it is also prominently being practiced in the developed world to supplement food imports. For instance, 40 % of agricultural

production was obtained from urban farming in US in 1990, and there were 80,000 urban community gardeners in Berlin in 1999, as it was made evident by Deeltstra and Girardet (1999).Thus, understanding the role that urban agriculture plays in poor urban households is important for any following action to reduce urban food insecurity and improve income of the urban poor.

Urban agriculture includes agricultural productions such as horticulture, floriculture, forestry, fishery, poultry and livestock mainly in public open spaces within cities and fringe of cities (Deelstra and Girardet 2004, and Mougeot 2000). It uses resources, products and services of the city area, and it provides the same. It is viable for efficient urban land use, poverty alleviation, economic development and environmental management as long as it is mainstreamed into urban livelihood policy strategies (Maxwell 1999, Mougeut 2000).

Despite the emerging merits of urban agriculture, most of the urban agricultural produces are not used beyond subsistence consumption (Bryld 2003, and Deelstra and Girardet 1999). Besides this, costs of inputs (e.g. land, water, labour, machineries, chemicals, seeds, energy, etc), know-how for urban agricultural production systems and its waste produces may exceed the benefit. Nugent (1999) said that contributions of urban agriculture to sustainability of cities are measured in terms of its long-term benefit to cities. In addition, land, labour and capital are major assets for urban agriculture like any other economic sector; however, especially land is highly demanded with better value for housing and other urban uses in cities (Bryceson and Potts 2005, Argenti 2000, and Deelstra and Girardet 1999). Thus, there is a doubt about the contribution of urban agriculture to benefits of household economy and macro-economies of cities.

1.1. Problem statement

Urban agriculture is widely practiced as an informal economic sector across many African cities (Bryceson and Potts 2005). Even though urban agriculture is a viable activity to complement food supplies from rural areas to towns and is a means of income for many urban poor, its contribution has been underestimated (Maxwell 1999, Mougeut 2000). Urban agricultural producers are also often discouraged and ignored by the society and in policy reforms (Mougeut 2000). As Deelstra and Girardet (1999:46) put it “planners tend to think that urban food growing is messy business and have little understanding of peoples’ need to grow food in cities”.

This is mainly because national governments, international organizations, and researchers have no substantial experiences with characteristics of urban livelihoods, unlike rural areas in Africa (Bryceson and Potts 2005, Mougeut 2000, and Maxwell 1999). All organizations, whether it is international or regional, cutback their investment policies to urban areas in Africa, perceiving African cities as over-favored as compared to the rural in the past decades. But, as Bryceson and Potts (2005:25) described it, this "…does not apply to the urban poor". The investment cutbacks drove African cities to stagnant economy and prevalence of poverty (ibid).

Urban environment is more complex and diverse, and urban livelihoods are dynamic. "Without a better understanding of how urban dwellers organize their livelihoods and how they cope with vulnerability and risk to protect their household food security, little progress can be made in improving their conditions" (Hervey N. 2002).

Research on the role that urban agriculture plays in livelihoods of urban people is, therefore, helpful for better understanding of the urban poor livelihood strategies and realizing its contribution in urban poverty alleviation. For instance, the Ministry of Finance and Economic Development for Ethiopia (2006) reported that the poverty gap between the urban and rural Ethiopia is narrowing, not because the poverty in the rural Ethiopia is reducing down to poverty levels in the urban areas, but it is because of the rise in the number of urban people below the poverty line (based on the country's standard)[1] over time. The report also emphasized the unsatisfactory nation's urban development policies as major reasons for rise in the urban poverty.

The situation is not different in Ethiopia. Lee (1997) and Egziabher (1994) stated that the livelihoods of many urban citizens in Ethiopia (e.g. Addis Ababa: economic capital and which accounts for over thirty percent of the total urban population) is heavily dependent on urban farming, but urban policy makers fail to give due attention to urban agriculture during urban planning policy reforms. According to the Office for the Revision of the Addis Ababa Master Plan (ORAAMP 2000) report, there are a large number of households whose livelihoods are associated with farming in Addis Ababa city, and directly support over 51,000 families and indirectly have an influence on the lives of other parts of the urban society. Thus, understanding

[1] Poverty line for Ethiopia was 3 ETB (or 0.34 USD) for per adult household total consumption expenditure per day in 2004/05. Source: Ministry of Finance and Economic Development for Ethiopia (2006).

the role that urban agriculture plays in livelihoods of urban poor people will definitely help urban policy makers to design better urban development policies.

1.2. Significance of the study

In line with the problems mentioned above, studying the contribution of urban agriculture to urban farmers' livelihoods in particular and the society in Addis Ababa at large should be applauded. The research will improve our knowledge about the role that the sector plays in urban farmers' livelihoods, and will add information to the limited researches done so far on the role of urban agriculture in the region.

In this research, no new alternatives to urban agriculture or vise versa are presented since urban agriculture is not a new phenomenon in Addis Ababa; instead, the extent of urban agriculture in Addis Ababa and its influence on urban farmers' livelihoods are deeply examined. Different contextual factors that determine urban farming based livelihood activities are also addressed.

In this research, nature and size of urban agricultural income, and people's dependence on urban farming are measured which will imply for issues of urban poverty alleviation and better use of urban natural resources. The study also helps to raise the understanding on the role of urban farming, especially for effective urban development policy reforms in the region.

1.3. Objectives of the study

The study had three objectives: The first was to find out major types of agricultural production systems practiced in the city. The second was to realize the role of urban agriculture in household income and urban poverty alleviation. And, last but not least was to provide empirical evidences on socio-economic challenges related to urban agriculture in the study area.

1.4. Research questions:

Given all the objectives, the following questions were addressed in the research:

1. What are major types of urban agricultural production systems practiced in Addis Ababa?
2. Which parts of the urban people are associated with urban agriculture in the city?
3. How much important is urban farming in the livelihoods of the urban farmer households?

4. What are the pull factors to adapt/adopt urban farming as part of one's livelihood in Addis Ababa city?
5. What are the constraints that urban farmers face to carry out farming in the study area and that have effects on distribution of farm income among the urban farmer households?

2. Literature Review

2.1. Urban agriculture: Definition

Urban agriculture is a recent phenomenon as compared to rural farming. Different authors described urban agriculture in various ways on the basis of location or time of agricultural activities. In short, any agricultural activity that is practiced in cities is considered as urban agriculture. Yet, Bryld (2003:80) stated that

> Activities related to urban agriculture are rarely isolated from rural areas. Activities in rural and urban areas are often inter-linked across space and sectors. … city borders are fluent, which is further emphasized by the active rural-urban interactions taking place in the peri-urban areas. It is, therefore, important that urban agriculture is seen as dynamic concept.

Thus, examining urban agricultural activities is essential to understand urban agriculture and identify its unique features. Mireri et al. (2006) further defined features of urban agriculture as follows: Any kind of crop or livestock production and agro-foresty or fuel wood production that is practiced within and outskirt of cities is urban agriculture. As Mireri et al. (2006:3) put it,

> The choice of what to produce and how to produce is determined by the culture, tradition, markets, water supply, rainfall, climate, exposure to sun, soil condition, plot size and distance to home. Family and individual resources, land availability and location are critical determinants of the type of urban agriculture practiced.

Deelstra and Girardet (2004) put urban agriculture broadly as any agricultural production such as horticulture, floriculture, forestry, fishery, poultry and livestock mainly in public open spaces within or fringe of cities. UNDP (1996) considered urban agriculture as one kind of city industry where its produces are supplied to market to meet daily demands of urban consumers.

An IDRC report emphasized that comparing urban farming in different cities might be misleading, because cities structures and their linkage with surrounding villages are different (Tinker 1994). Defining cities, by itself, has an implication that which farming categories would be considered as urban agriculture and which are not. The report focused especially on East

African cities, where cities are sprawling and continually engulfing the nearby villages, and hence, the farmers in the villages which still continue farming after being part of the cities. Thus, understanding the nature and structures of cities and setting specific boundaries is helpful for standardization of definition of urban agriculture.

2.2. Potentials and constraints of urban agriculture

Since urban agriculture is practiced mainly within boundaries of cities, it has unique features with distinct potentials and constraints. Long-term benefits of cities from urban agriculture imply the contributions of the sector to sustainability of cities (Nugent 1999). Nugent reported that studying urban agriculture from three dimensions, social, economic and ecological, is helpful to realize the net benefit; hence, its sustainable contribution to the selected city.

2.2.1. Potentials of urban agriculture

Urban agriculture is mainly practiced in city open spaces, along river sides and urban fringes where land is not suitable for building construction. As Bryld (2003:81) puts it "urban agriculture brings with it great potentials for enhancing the situation of the urban citizens, especially those with the lowest incomes who are dependent on the access to locally grown food". How does urban agriculture enhance the situation of urban poor?

Food security

Acceleration of urbanization in developing countries has been accompanied with increased demand for food consumption. Yet, the number of poor urban households has also significantly being rising along with urbanization, so do many households who cannot afford to buy enough food for their own consumption (Bryceson and Potts 2005).

Most of urban farming is practiced by the urban poor who consume most of the production and supply the surplus to market (Bryld 2003, Mireri et al. 2006). The major expense for most of the urban poor is purchasing of food; thus, they will be left with nothing for health, education and other necessities. They also hardly consume varieties of food. Thus, it is not surprising that urban farming contributes to improving livelihoods for the urban poor. It improves not only quantity of food intake but also the nutritional value if the poor self-grow vegetables, fruits, chickens and so

on (Smith 1996: in Bryld 2003: 81, UNDP 1996). RUAF (2007:2) report emphasized the role of urban agriculture as follows:

> The contribution of urban agriculture to food security and healthy nutrition is probably its most important asset. Food production in the city is in many cases a response of the urban poor to inadequate, unreliable and irregular access to food, and the lack of purchasing power.

Economic potential

Urban farming can also be a good source of income for the urban poor, if it is especially practiced as a formal sector. However, (Bryld 2003) doubted if it has a significant contribution to macro-economies of cities although he stated that urban farming has an economic relevance because it is helping urban farmers, especially the poor, to use their non-farm income for other purposes instead of purchasing food, i.e. it improves the welfare of urban farmer households. RUAF (2007) reported that the poor households in developing countries spend 50-70 % of their income to purchase foods; hence, it appreciated the benefits of self-growing crops and/or participating in other forms of urban agriculture by the urban poor. The report also confirmed "in Addis Ababa, above-normal profits are earned by even the smallest-scale backyard producers with very low capital" (Staal 1997: in RUAF 2007:5)

Social advantage

Actors in urban agriculture came from various groups of urban society. They can be the poor or the rich, women or men, natives or migrants, and so on. The participation of mostly women and other vulnerable households in the sector draws attention, and implies the role of the sector in poverty alleviation and integrating urban societies (RUAF 2007, UNDP 1996). UNDP put in its 1996:165 report "urban farming improves social equity by improving the health and productivity of poorer populations and by providing them an opportunity to earn additional income."

Environmental advantages

In most cases, urban agriculture is practiced in marginal spaces in cities and outskirts where lands are not suitable for other use. It, therefore, creates beautiful scenarios and landscapes, and improved microclimate, and nutrient recycling (Bryld 2003, and Deelstra and Girardet 1999).

2.2.2. Constraints of urban agriculture

Despite the advantages of urban agriculture mentioned above, it has some limitations worth noticing. In many cities, it is being practiced as an informal sector and has little support from local councils (Bryceson 2005, Bryld 2003, and Deelstra and Girardet 1999).

Space for cultivation

Agriculture requires land. However, there is lack of space for growing crops in cities. As Bryld (2003:82) said it, "besides feeding the poor in the cities, there is an urgent need for providing shelter for the homeless". Knowing that growing food in cities requires land, it may not be prioritized in urban land uses since the demand for urban spaces to build houses is by far higher than using spaces for agricultural activities. Argenti (2000:1) further emphasized that "…agricultural productive lands are likely to be lost in this competition."

Health problems

Urban agriculture can be a health hazard. It uses resources of cities such as water and urban wastes for production. Use of wastewater/polluted rivers and untreated compost may contaminate crops/livestock and become health hazards to human beings. There are a number of cases when urban farming brought health problems (UNDP 1996).

Besides these, the major constraints of urban farming in Addis Ababa include lack of policy issues about urban agriculture which resulted in less attention to the sector, limited working capital for farming and over-use of resources (ORAAMP 2000).

2.3. Modes of urban farmers

As with the definitions of urban agriculture, many authors characterized urban farmers based on different socio-cultural and economic parameters. Most of them, though, agree that urban farmers are usually not new migrants in cities, and/or are not only urban households with lowest income levels (RUAF 2007, Bryld 2003, Lynch et al. 2001, Mougeot 2000, UNDP 1996, Egziabher 1994). According to RUAF (2007), urban farmers are mostly poor urban dwellers who have access to productive resources for farming, and are mostly not recent migrants since accessing the resources requires time and other contextual factors. It also reported that better-off households are

also found to involve in urban farming, and that is mainly either for investment, earning additional incomes or home consumption. Bryld (2003:83) mentioned that most of the urban farmers who cultivate in cities in developing countries don't have ownership rights to the land they cultivate. As he puts it "Those residents who have resided in the city for several decades have been the first to seize land. Consequently, urban cultivators are not necessarily the poorest residents." New migrant, however, either lack information about land renting/ tenuring in cities or the initial costs may not be affordable.

Mireri et al. (2005:4) characterized urban farmers in Africa, particularly in Kenya, as "Urban farming is undertaken by two groups, the traditional farmers, who have been engulfed by urban development, and recent migrants." The rapid urbanization in the region in the past decades resulted in absorbing much land from neighboring countryside; hence, gulped the countryside farmers. And, the new migrants whether the poor or the rich took up lands for farming, and that was for economic sustenance in case of the poor households, and for investment and/or supplement for better-off households. Egziabher (1994) 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 puts the survival strategies of urban farmer households in Addis Ababa as follows,

> … 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 (Egziabher 1994:84).

Most of the authors also mentioned something in common, that is, women are predominantly among the individuals who are involved in urban farming. However, access to the production resources such as land and water are not the same for both man and woman farmers (Bryld 2003, RUAF 2007, Egziabher 1994). Mireri et al. (2005) reported that the majority of urban farmers in Nairobi, Kenya, are women (62 %), and the number is also higher in other towns. And, Egziabher (1994) found out that women actively participate in cultivating lands, especially if their households own the lands they cultivate.

2.4. Urban farmer livelihood perspectives

There is something in common between urban and rural farmers, that is, both are actively engaged in farming-based activities. Both farmers, though, have different resources endowments, opportunities and constraints. As it is discussed later in the methodology, an approach, which was developed for analyzing rural livelihoods by Ellis (2000), was adopted to analyze the urban farmers' livelihoods in this study. Some modifications were made so that the framework (see Appendix I) would be suited to address urban farmers' livelihoods in a better way. An attempt made by Mkwambisi (2005) to analyze the role that urban agriculture plays in poverty reduction was also appreciated. And, institutional and social forces that influence the urban farming activity as described by Mkwambisi, which were also important for this study, were identified and incorporated in the modified Ellis-livelihood-framework (Appendix I).

Components of livelihood analysis

To carry out livelihood activities, farmers have to have basic agricultural resources like land, water, livestock, money, labour and so forth. In particular, urban farmers need land and water which is often scarce in urban areas because of high demands for other opportunistic purposes. In this study, the asset holdings were classified in to five categories: natural, physical, financial, human and social capitals. All the definitions and classifications of asset types are according to Ellis (2000:28-50).

There are various institutional and organizational factors/forces that intervene in urban farmers' livelihoods, and limit their accesses to resource uses for farming activities. Mkwambisi (2005) tried to show potentials and constraints of Ellis-livelihood-framework for analyzing urban farmers' livelihoods. According to him, the framework is rural centered which focuses on migration, rural based economies, rural environmental issues (e.g. soil erosion, deforestation), rural poverty and agricultural based policy. And, he developed a modified framework which was adopted from Parkes-prism framework (Parkes et al. 2003), for analyses of urban farmers' livelihoods. Parkes used the prism framework for three main reasons: one was to study ecological and health systems in an area, two was to study different institutional and social factors that determine the systems, and three was to investigate the relations between those factors in the area. According to Mkwambisi's (2005) argument, the modified prism framework is suitable because it

integrates the three methods for policy consideration and sustainable development to understand the role of urban agriculture in alleviating poverty as well as mitigating environmental problems.

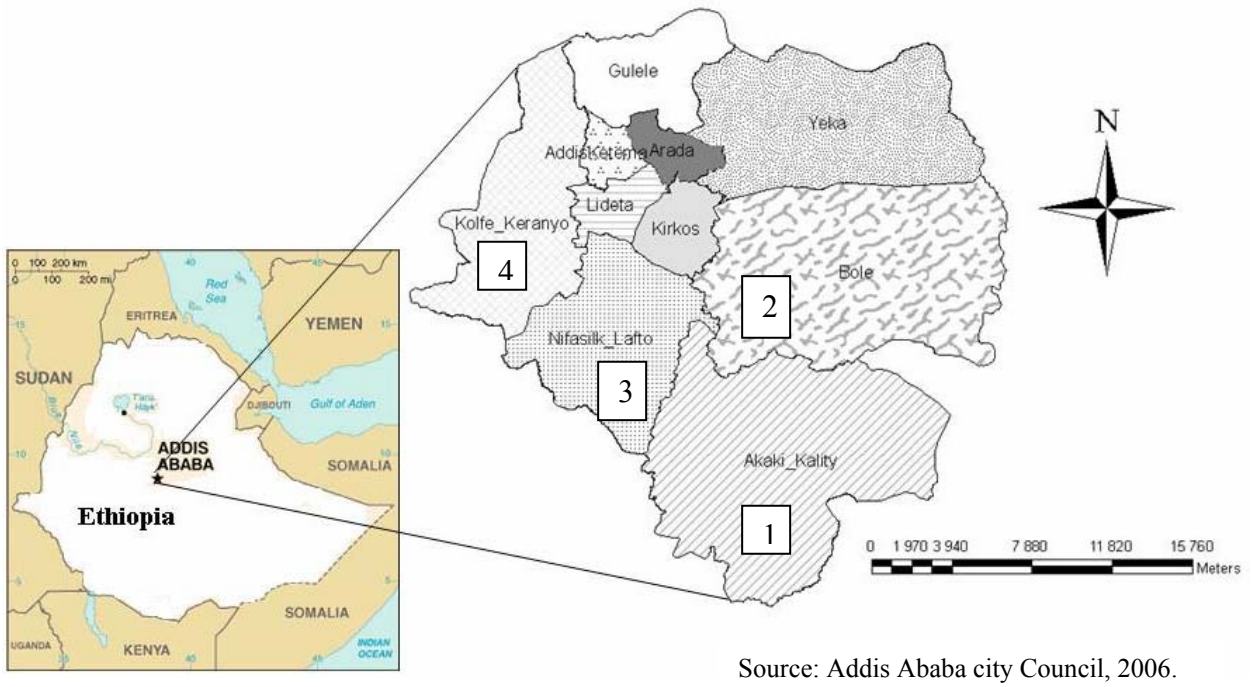
He further characterized the prism framework as urban centered, and focused on urbanization instead of migration. It is market oriented instead of rural based economy, and addresses urban environmental issues (e.g. waste management, pollution, sewage) instead of that of rural. It is made for analyzing urban poverty, and is developed upon needs for greater policy integration instead of agricultural based policy. However, he did not overlook the commonalities of the two frameworks (Ellis- and Parkes-frameworks), where both are people centered, developed based on participatory tools, start from asset holdings, focus on policy integration and role of institutions, and address poverty, gender, development and environmental policy. The Prism framework adopted by Mkwambisi (2005) study can be found on Mkwambisi (2005: 13).

Understanding the commonalities, considering potentials and detailed approaches of Ellis-livelihood framework and given the study objectives, it was decided to incorporate some of the important elements from the prism-framework into Ellis-framework, and use the later for analyzing urban farmers' livelihoods in Addis Ababa.

3. Methodology

3.1. Description of study area: Addis Ababa city

The study was carried out in Addis Ababa, economic and political capital of Ethiopia (see Figure 3.1). According to Ethiopian Central Statistical Authority (2005), Addis Ababa has a mild climate and is found at 2408 meters above sea level. Its average daily temperature is about 16^{o}C, mean annual precipitation is about 1180 mms and has unimodal rainfall regime starting from June to September. Dry seasons occur in October through February. During dry season, many urban dwellers engage in urban farming.



Source: Addis Ababa city Council, 2006.

Figure 3.1. Map of Addis Ababa city, Ethiopia

Population of Addis Ababa is about 3,000,000 with growth rate of 3.7% according to Central Statistical Authority for Ethiopia (2005). Some of the city residents are indigenous people in the area, while the other part of the population consists of migrants from other regions of Ethiopia. The city is made up of urban and peri-urban areas, and is divided into ten sub-cities which are Addis Ketema, Akaki-Qality, Arada, Bole, Gulele, Kirkos, Kolfe-Keranio, Lideta, Nifasilk-Lafto, and Yeka sub-cities (see Figure 3.1). The Addis Ababa city Council is responsible for

administration of the city. Seven of the sub-cities have urban agriculture offices under their sub-city capacity building program offices; that is, except Arada, AddisKetema and Kirkos sub-cities. Based on Addis Ababa urban land use plan report (ORAAMP 1999), the total land area of Addis Ababa is 530.14 square-kilometers.

Urban farming in Addis Ababa city can generally be divided into two categories: the first category is farming on back yard and open spaces around houses, low-lying areas and along river sides in the city core areas; and the second category is found in peri-urban areas within commuting distance, that is, as far as public and private city transport in Addis Ababa can take the farmer. In the study, the first category was considered as urban area because it is mainly occupied by residential houses, offices and other facilities with and without space for farming, and the second category as peri-urban area since it is away from the city core area and consists mainly of some residential houses with comparatively larger areas for farming than the urban area. Urban fringes can be included under either of the two categories depending on their association with the city and the surrounding rural areas. Places which were under neither of the categories were considered as rural and were not included in this study.

3.2. Sampling methods and Data collection

The framework for sustainable livelihood analysis (Ellis 2000) was used as a guide for studying the role that urban agriculture is playing in livelihoods of urban farmers in the study area. The framework was somehow modified as it was mainly developed for analyzing the rural livelihoods. The framework is shown in Appendix I, and more descriptions about the framework can be found in literature review chapter.

3.2.1. Sampling methods

The sampling frame had included study sites and sample respondents (urban farmers in our case). Target groups for this study were urban farmer households. At the beginning, sub-cities were selected based on different criteria, and consequently urban farmers in the selected sub-cities were selected using relevant sampling techniques at the time. Despite financial and time constraints, great attention was given to improve reliability of the information during both site and respondents selection.

Study site selection

The study was carried out in four sub-cities in Addis Ababa city, Ethiopia. The city was selected for three main reasons. One, it is the largest city in Ethiopia harboring more than 30 % of the total urban population in the country; thus, it was assumed that it holds many of the urban farmers. Two, knowing that few researches are done so far in this issue, the study improves knowledge about the role that urban agriculture plays in the study area and can be one of the baseline references. And last but not least, it was assumed that research findings have good representing value for other cities in the country and similar urban areas elsewhere.

Use of administrative units was found to be suitable to select representative study sites within the city. Each sub-city has independent administration council which represents directly the city administration council; thus, one sub-city was considered as one administrative unit. Different criteria were considered in selecting representative sub-cities for the study. Major criteria were presence of urban agriculture office and location of sub-cities. This information was obtained after contacting with Addis Ababa urban agriculture office and Addis Ababa city administration.

First, sub-cities were stratified into two categories based on availability of urban agriculture offices, and those with urban agriculture offices were considered for further selection. It was because the majority of urban farmers were reported to reside in these sub-cities, and there were no registered farmers in the other groups. Second, the selected sub-cities were clustered into four based on the locations of the urban farmers, that is, if they are in city core areas, or in the urban fringes and/or peri-urban areas. Finally, one sub-city from each group was randomly selected, and the selected sub-cities are namely Bole, Kolfe-Qeranio, Nifasilk-Lafto and Akaki-Qality sub-cities (see Figure 3.1). However, urban farmers in Kolfe-Qeranio and Nifasilk-Lafto sub-cities were found to carry out cultivation along similar river sides; hence, they were considered as one unit, Lafto-Qeranio.

Household selection

A total of 70 urban farmer households and four key informants were selected for interview. One key informant, i.e. head of urban agriculture officer in a sub-city, was intentionally interviewed to get information about the number of urban farmers, their locations and addresses in the sub-city. A total of 204 urban farmer households in Bole, 154 in NifasSilk-Lafto, 267 in Kolfe-Qeranio

and 303 in Akaki-Qality were obtained based on sub-cities information. Twenty urban farmer households for each sub-city were randomly selected from the sampling frame, except for NifasSilk-Lafto which was 10. Equivalent sample sizes were selected for all sub-cities because the intention of the study was to understand the modes of farming at various locations of the city, contributions of farming to livelihoods 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-cities.

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.

3.2.2. Data collection

Individual urban farmer households were interviewed to collect both quantitative and qualitative information. Quantitative data address patterns, relationships and effects among variables while qualitative data focus on understanding phenomena in the social world (Bryman 2004). In this study, quantitative data were collected for measuring the role of urban agricultural income (also called farm income) in the total household income and quantifying asset holdings by urban farmers. Qualitative data were collected to find out agricultural production systems in the study site, and understand farmers' opinions about urban farming. A self-administered structured questionnaire was used for interviews with the households (see Appendix VI A). Discussions with key informants were also held using a prepared checklist (see Appendix VI B). Field observation, discussion with urban agricultural experts and secondary data sources were used to supplement household interviews and discussions with key informants.

Secondary data sources

Addis Ababa city administration, Urban Agriculture offices, and Central Statistical Authority for Ethiopia were major sources for collecting secondary data. Executive summary of the current land use and city structure of Addis Ababa, and its master plan were obtained from Addis Ababa

city administration. Maps showing existing land use, and location of sub-cities and 'kebeles' (wards) were also collected from the city administration office. Informative discussions were held with experts in Addis Ababa Urban Agriculture office and in the selected sub-city urban agriculture offices. The discussions included issues like extent of urban agricultural systems, locations of urban farming, features of urban farmers, and potential of the sector in the area. Demographic, meteorological and geographical information were collected from the Central Statistical Authority.

Primary data collection

Individual households were interviewed using a structured questionnaire (see Appendix VI A) at sub-city level. The questionnaire covered different topics to capture relevant information about the characteristics of urban farmer households, types of agricultural practices, sources of income, household income from annual farm and non-farm based activities, factors of agricultural production, and asset holdings. Detailed questions were asked about types of crop cultivated and livestock reared by urban farmers, use of agricultural produces, annual products and income from sale of produces, market places for selling agriculture produces, and challenges in practicing urban farming. Monthly earnings from non-farm income sources were also recorded because they were important to predict overall household income and urban farmer livelihood strategies (see Appendix I). All monetary values were reports of annual incomes for 2005/2006 production year.

The questionnaire was prepared as simple as possible taking respondents' various backgrounds (e.g. age, education, etc) into consideration. Later, it was translated into Amharic, the commonly spoken and official language of the city. The questionnaire was also pre-tested on ten urban farmer households, and corrections were made to improve the relevancy of the questions for the study area. One person who was at least secondary school graduate, whose hometown is Addis Ababa city and resides in the respective sub-city, was recruited as an assistant interviewer for each sub-city. Each assistant interviewer was trained about the purpose of the study, contents of the questionnaire and interviewing procedures. Interviews were used to be held for 40 minutes to one hour depending on types of urban farmers.

A survey of individual households was carried out during months of October to December 2006 which is a time when urban vegetable producers start cultivating vegetable, and field crops reach

at maturity. Despite busyness of the farmers, efforts were made to keep in touch and discuss with them at their spare times.

Key informants were interviewed about the extent of urban farming in their sub-cities, locations of urban farming, characteristics of urban farmers, and addresses of urban farmers in the study areas. They were asked about types of common crop and livestock production systems in the sub-cities, common uses of crop and livestock produces, challenges and opportunities in urban farming, and proportion of households involved in urban farming in the sub-cities.

3.3. Data analysis

The collected data were coded, entered into a computer database and analyzed using Statistical Packages for Social Sciences (SPSS) for windows, version 10. Ellis (2000) framework for livelihoods analysis was utilized for organizing data and detailed investigation of urban farmers' livelihoods (see Appendix I again). The framework was somehow modified since it was primarily developed for examining rural livelihoods. MS-Excel was also used for drawing graphs and plots depending on its convenience.

Data analysis was started with calculating frequencies (percentages), mean, standard deviation, standard error, minimum or maximum values of household characteristics. Household characteristics include age, sex, region of origin, occupation and level of education of household head, and household size. Similar statistics were done for summarizing household asset endowments and urban agricultural activities of the year.

Mean, percentage, standard error, minimum and maximum values for different sources of income were calculated. The income sources include household income, farm income, non-farm income, and various sources of farm and non-farm income. Similar calculations were also done for each sub-city. Keep in mind that, all kinds of income from agricultural produces were considered as farm-income, and other income sources were grouped in non-farm income in the analysis. All calculated monetary units are based on Ethiopian currency, i.e. in Ethiopian birr (ETB), which was equivalent to 8.87 USD at the time of data collection. A scatter plot was drawn to show the relationship between household income and farm income.

Regression analyses were done to explore the relationship between household income and farm income using SPSS for windows. First, household per capita income was considered as dependent variable (Y), and was regressed against various explanatory factors (Xs) which were assumed to influence incomes of urban farmer households. The factors were categorized into two groups as household and farm characteristics. The following list shows explanatory variables considered during regression analysis.

Household characteristics:

X1= Per capita farm income,

X2= Sub-city (Akaki-Qality= 1, 0, 0; Bole=0, 1, 0; Lafto-Qeranio=0, 0, 1),

X3= Age of household head squared,

X4= Sex of household head (Female= 0, Male = 1),

X5= Education of household head (No-formal education = 0, Primary and Junior secondary = 1, Secondary = 2, Tertiary = 3),

X6= Non-farm employment for household head (Self-employed = 1,0,0,0; Civil servant = 0,1,0,0; Casual worker = 0,0,1,0; other= 0,0,0,1),

X7= Adult equivalent unit

Farm characteristics:

X8= Plot size for farming,

X9= Number of milk cattle,

The analysis was done using OLS (ordinary least square) regression model ($Y= ßX + e$) with the assumption that the model error, e, is independently and normally distributed or $INN(0, \sigma^2)$, and has expected value of zero and equal variance in the target population (Douglas and Peck, 2001).

Another OLS regression analysis was carried out to measure the level of dependence on urban farming (Y). In this case, relative urban farm income was run against household characteristics, asset endowments, and various contextual factors that could affect faming income. Relative incomes were calculated with similar procedures as it was done by Vedeld et al. (2004: 69-72). Similar regression model was also employed for the analysis. The explanatory variables (both household and farm characteristics) included were:

Household characteristics:

X1= Sub-city (Akaki-Qality= 1, 0, 0; Bole=0, 1, 0; Lafto-Qeranio=0, 0, 1),

X2= Family size (numbers),

X3= Age of household head (years),

X4= Sex of household head (Female= 0, Male = 1),

X5= Education of household head (No-formal education = 0, Primary and Junior secondary = 1, Secondary = 2, Tertiary = 3),

X6= Non-farm employment for household head (Self-employed = 1,0,0,0; Civil servant = 0,1,0,0; Casual worker = 0,0,1,0; other= 0,0,0,1),

X7= Adult equivalent unit,

X8= Number of food deficit months in a year,

X9= Dependency ratio

X10= Non-farm income,

Farm characteristics:

X11= Size of plot for farming,

X12= Number of milk cattle,

X13= Formal credit amount,

X14= Informal credit amount,

Analysis of variance (ANOVA) and least significant difference (LSD) analyses were done to compare urban farmers' mean household income among different sub-cities. Household income quintiles and Gini-coefficients were calculated to measure income inequalities among the farmers. A similar procedure with Vedeld et al. (2004:72) was followed for calculating Gini-coefficient, and MS-Excel was used for the analysis.

Livelihood diversification indices were calculated to compare degrees of livelihood diversity across sub-cities and against different income groups. Simpson diversity index formula was used for estimating the indices. Scatter plots were drawn to understand the influences of different incomes (farm income, non-farm income and household income) on livelihood diversification, and to find out relationships between relative incomes (relative crop income, relative livestock income, relative non-farm income) and diversity index. An ordinary least square (OLS)

regression was done to further explore the relationships between the incomes and diversity index. And, formulas for calculating Simpson index and relative incomes were adopted from Vedeld et al. (2004).

A summary of different livelihood strategy categories was prepared to group urban farmers on the basis of income sources and their share in total household income (see Table 4.12). A 75 % total income share was considered as a threshold level for the classification. It is because a livelihood activity by which a farmer makes income up to that threshold level was judged to have major influence on the household's livelihood strategies. Cross tabulations were made for summarizing the livelihood strategies against households in different income quintile groups and across sub-cities.

Finally, asset endowments for the households were classified into five categories according to Ellis (2000) framework: natural capital, physical capital, human capital, financial capital and social capital. Means, percentages and/ correlations for selected assets were estimated for households in each sub-city and different income groups. An asset plot was also drawn to show the distribution of selected asset holdings among households in different income groups. The scales for each asset were standardized so that they were all measured out of one.

4. Results and discussion

Results that were found to elicit more relevant information on the contribution of urban agriculture are presented and discussed in this chapter. The chapter addressed mainly two critical dimensions of livelihoods, namely assets and activities. And, factors that were found to influence the farming activities are also elaborated accordingly.

4.1. Household characteristics of urban farmers

Some basic features of urban farmer households in Addis Ababa city are presented in Table 4.1. The sub-cities sampled were similar in many of the household characteristics. Average age of the farmer household heads was 50 years, where the many had ages between 46 to 65 years (47 %), followed by 31 to 45 age groups (34 %). And, each household had seven members on average. Dependency ratio was 0.49, which shows roughly equal number of dependents and productive members within a household. The ratio increased slightly for Akaki-Qality (0.62) and Bole (0.57) sub-cities implying more number of dependents in a household. Among the households interviewed, 87 % were male headed and 13 % female headed households. Fewer female headed households (5 %) were captured for interview at Akaki-Qality.

The selected sub-cities differed mainly in their household head region of origin (see Table 4.1). In general, the result revealed that the most dominant ethnic groups of urban farming community were Guragge households, which accounted for 67 % of the urban farmers. They were also found to be major urban farming communities at Bole (100 %) and Lafto-Qeranio (83 %) sub-cities. Amharas and Oromos were found to dominate the urban farming sector at Akaki-Qality (90 %). And, among the farmers at Akaki-Qality, 25 % were Shewa Amhara/Oromo ethnic groups who were also indigenous to the area.

The household heads in the sub-cities were similar in their level of education and occupational status (see Table 4.1). Most of the heads were engaged only in farming based activities (63 %). But, the estimate was lower for Akaki-Qality as compared to the other sub-cities. At Akaki-Qality sub-city, some of the heads were found to be pensioners (25 %) or involve in casual jobs (20 %).

Table 4.1. Household characteristics of urban farmers, by sub-city

Household characteristics	Total	Sub-city		
		Akaki-Qality	Bole	Lafto - Qeranio
Age of household head in years (mean no.)	50	52	49	49
Household size (mean no.)	6.6	6.3	7.0	6.5
Dependency ratio	0.49	0.62	0.57	0.35
Sex of household head (%)				
Male	87.1	95	75	90
Female	12.9	5	25	10
Household head region of origin (%)				
Shewa Oromo/Amhara	7.1	25	-	-
Guragge	67.1	10	100	83.3
Amhara	14.3	35	-	10.0
Oromo	10.0	30	-	3.3
Other	1.4	-	-	3.3
Occupation of household head (%)				
Farmer only	62.9	35	80	70.0
Government employee	7.2	15	-	6.7
Merchant	8.6	5	-	16.7
Casual worker	12.8	20	20	3.3
Other	8.6	25	0	3.3
Household head level of education (%)				
No formal education	37.1	30	55	30
Primary and Junior secondary	34.3	35	35	33
Secondary	21.4	30	10	23
College/University	7.1	5	-	13
Housing (%)	88.6	95	80	90

At all locations, the result revealed that many of the urban farmer household heads had below secondary school education (71 %), i.e. those with no formal education were 37 % and those with primary (and junior secondary) education account for 34 % of the household heads. It was also found that the heads who did not go to school were mainly 46 years and over (84 %), and majority of those who only attended primary (and junior secondary) were between age ranges of 36 to 60 years (75 %). Despite their few numbers, the majority of the heads (67 %) whose ages were 35 or under attended secondary schools.

We can realize that many urban farmer households in Addis Ababa have larger family members, and over half of the members to be dependents. Variation in region of origin, age, occupation, and levels of education show that the farmers came from different social backgrounds. However, the majorities of the farmers have low formal educations and consider farming as major occupation. The Guragge ethnic groups involve predominantly in the farming as compared to people of other ethnicity. Women also participate in farming as household heads, and obviously as supporters to their husbands. Besides this, adults over 40 years old who are heads of households, have no-formal education and have large families are the major social groups in the urban farming community. Participation of the young generation is relatively low in the sector.

4.2. Urban agricultural production systems in Addis Ababa

In Addis Ababa, different agricultural production systems are carried out which include crop production, livestock production or both (i.e. mixed farming). The results are presented in the following sub-sections.

4.2.1. Types of agricultural production systems

The agricultural activities practiced in Addis Ababa can be categorized in to three main groups: crop production, livestock rearing and mixed farming. In the present context, mixed farming means practicing both crop cultivation and livestock production together.

Crop production

A variety of crops are grown across the surveyed sub-cities in Addis Ababa, either for home consumption, for sale or both (see Box 1). Different types of crops and livestock that over 30 % of urban farmer households cultivate in a sub-city are marked with asterisk. Cultivating a variety of vegetables is found to be the most common practice in all of the sub-cities as compared to other kinds of crops. Carrot, different types of cabbage, cauliflower, lettuce, celery and/or potato are the most commonly cultivated vegetable crops, where over 75 % of urban crop producers in each sub-city cultivate most of the vegetables in a year (see Table 4.2 for list of names of the vegetables). All the vegetable producers reported that they cultivate vegetables mainly for selling of the produces. And, they use the money for purchasing their foodstuffs and cover other household expenses. Cultivating field crops or tree planting are less common activities. It is only

at Akaki-Qality that field crops like *tef* and wheat are found to be cultivated, and it is also common to plant tree seedlings like eucalyptus in this sub-city. Urban farmers who cultivate field crops usually use the produce for home consumption; only two households reported that they sell the surplus sometimes. Those who plant trees were found to supply to market tree seedlings or timbers depending on the types of the tree species.

Box 1. Agricultural activities practiced, by sub-city

Agricultural activities	Akaki-Qality	Bole	Lafto-Qeranio
Crop production			
Field crops	*Tef**, wheat*, chickpea*, grass pea*, lentil*, peas, beans, barley, millet, fenugreek		
Vegetables	Carrot*, potato*, tomato*, different kinds of cabbages*, cauliflower*, beet root*, pepper, green beans, cucumber, lettuce, celery, enset, *Rhamnus*	Carrot*, potato*, different kinds of cabbages*, cauliflower*, beet root*, cucumber, lettuce*, celery*, red onion*, enset	Carrot*, potato*, cauliflower*, different kinds of cabbages*, lettuce*, celery*, red onion*, green beans, cucumber, enset
Other	Mango, papaya, banana		Coriander, sesame, castor bean, pearl, apple
Livestock production			
Cattle	Cow*, ox*, calf, sheep*	Cow*, sheep*	Cow*,ox*,calf*, sheep
Poultry	Chicken		Chicken
Draft animals	Donkey*, horse		Donkey
Other	Bees		
Tree and grass planting			
Trees	Eucalyptus*, Jacaranda, Gravilia, *Dovyalis*, Juniperus, others		Eucalyptus*, Juniperus
Grasses	Elephant grass, Bamboo	Bamboo	Bamboo

Note: * represents agricultural outputs produced by at least 30 % of urban farmers within sub-city.

Livestock Production

At least 75 % of the urban livestock producers in all sub-cities keep milk cattle (cows), and about 50 % of the households own oxen in Akaki-Qality sub-city. Some households (20-30%) raise chickens and sheep, and they reported that it is mainly for home consumption. It was generally found that it is less common to keep livestock other than cattle. Milk cattle owners said that they

usually sell the milk and the calves, but heifers are not usually sold unless they fail to deliver milk. In general, livestock production was also found to be not as a common practice as crop cultivation (see Appendix II). Out of the urban farmer households interviewed, few of them (16 %) practice livestock production.

Table 4.2. Types of crops produced by 50 % and 75 % of urban crop producers, and by sub-city

Sub-city		Field crops	Vegetable crops	Trees
Akaki-Qality	≥ 50 %	Tef, wheat	Carrot, cabbage	Eucalyptus
	≥ 75 %	Tef, wheat		
Bole	≥ 50 %		Carrot, potato, different kinds of cabbages, cauliflower, lettuce, celery	
	≥ 75 %		Carrot, potato, cauliflower, different kinds of cabbages, lettuce, celery	
Lafto-Qeranio	≥ 50 %		Potato, cauliflower, different kinds of cabbages, lettuce, celery, red onion	
	≥ 75 %		Potato, cauliflower, different kinds of cabbages, lettuce, celery	

Mixed farming

Urban farmers who cultivate crops and rear livestock together were found to be the most common in all of the survey areas, where over 40 % of the households are involved in mixed farming (see Appendix II). Use of the produces is similar with those for crop producers and livestock owners, where mixed farmers mostly sell vegetable produces and milk from cattle.

4.2.2. Input use and technologies

Farmers basically require land, labour and capital to carry out their farming activities. In this section, agricultural inputs and technologies employed by urban farmers in Addis Ababa are presented, both for crop and livestock producers. Some of the results are presented in Table 4.3.

Inputs and technologies for crop production

It was generally found that urban farming activities in Addis Ababa are not different from the rural Ethiopia in terms of technology uses. It was observed in all the cases that the farmers employ traditional tools such as hand tools and extensive labour to cultivate their fields. Use of irrigation was found to be a common activity across all the sub-cities for crop production, where over 73 % of the crop cultivators irrigate their fields during the production period (see Table 4.3). However, in all the cases, furrow irrigation is the most common activity, which is labour demanding and has risk of flooding during heavy rains. The farmers reported that building dam is a perquisite for cultivating crops every year. It is because the dams are washed away by heavy rains during the summer and sometimes in dry seasons when there are sudden heavy rains.

Use of fertilizer and manure is also common in all cases, where over 80 % of the crop producers apply fertilizers and/or manure before/after planting their crops. Major source for fertilizer is purchasing directly from market (86 %), where as purchasing manure (24 %) is relatively less common. Many urban crop producers in Addis Ababa (42 %) use crop residues and/or animal refuses (if they have animals) for manuring, and some (27 %) collect animal wastes from surrounding livestock keepers who don not actually cultivate crops.

Many crop producers in Addis Ababa (75 %) own some plots of land for farming, and they confirmed that they have title deeds to the lands they cultivate. The ownership rights, however, were found to be diverse. Over 45 % of the crop producers inherited the land from their parents (22 %), or appropriated plots of land from landlords (25 %) during the 1975 “land to the tiller” policy reform. Some (18 %) claimed that they were the first settlers and owners of their land, where as others (15 %) said that they got the land from the government. There were also other forms of land possession for farming in Addis Ababa. A few urban farmers (27 %) were found to possess lands in groups (communal lands), where they cultivate in groups and proportionally share the produce every year. Renting land (20 %) was found to be a less common activity in all areas, but it is mostly practiced by urban farmers (10 %) who do not posses in any other form.

Use of wage labour is also common in most cases, where over 65 % of the crop producers hire labour for variety of activities during cultivation. Family labour is the most common input in almost all of the cases (95 %).

Table 4.3. Use of agricultural inputs and technologies by urban farmers in Addis Ababa

Inputs used by	Total (%)	Akaki-Qality	Bole	Lafto-Qeranio
Proportions of crop cultivators (n= 59)				
Land (private)	74.6	84.6	75.0	69.2
Land (for share)	27.1	0	30.0	38.5
Land (rented)	22.0	15.4	30.0	19.2
Irrigation (water)	72.9	53.8	75.0	80.0
Agricultural tools (possession)	93.2	84.6	100.0	92.3
Use of fertilizer	84.7	84.6	90.0	80.8
Use of manure	79.7	46.2	92.3	85.0
Use of wage labour	67.8	30.8	70.0	84.6
Proportions of livestock owners (n= 40)				
Milk cattle	85.0	82.4	100.0	82.4
Beef cattle	35.0	47.1	100.0	35.3
Use of ground water	10.0	23.5	0	0
Use of tap water	83.0	74.3	91.2	81.2
Use of processed feed	80.0	82.4	100.0	70.6
Wage labour	42.5	5.9	33.3	23.5
Stall feeding	90.0	94.1	100.0	82.3
House for livestock	90.0	88.2	100.0	88.2
Veterinary service	37.5	58.8	33.3	17.6

Inputs and technologies for livestock producers

Most of the livestock owners in Addis Ababa tend to invest more on large cattle such as cows and oxen than other kinds of livestock, and over 60 % of them possess two to four milk cattle (cows). They keep the livestock mostly in backyard barns (see Table 4.3). Majority (80 %) of the producers purchase processed feed for their livestock, and stall feeding is the most common feeding technique in all the sub-cities. Using tap water is the most common way of drinking livestock, and ground water is used by some households at Akaki-Qality. Wage labour use was found to be relatively uncommon in livestock rearing, and family labour is most widely used input by many livestock owners (95 %) in all of the sub-cities.

4.3. Household income and livelihood strategies of urban farmers

In this section, results for the contribution of urban agriculture, dependences on urban farming, income variations and distributions among urban farmer households, and livelihood strategies of urban farmers are presented in detail across sub-cities and against household groups of different income levels. All kinds of annual monetary values in this study show estimates of incomes for 2005/2006 production year.

4.3.1. Contribution and sources of urban agriculture

Contribution of urban agriculture

Urban farmers in Addis Ababa make their livelihood strategies from different farm and non-farm based activities. As it is shown in Table 4.4, over 65 % of total income in the urban farming community is derived from crop production, livestock production, or both. Crop farming contributes to 30 % of the total sectoral income and livestock accounts for 40 %. Income share of non-farm based activities was found to be relatively low, which is 30 % out of the total income.

Table 4. 4. Different sources of income and their contribution to total income (N=69)

Sources Of income		Mean annual income in ETB*	Sectoral income share (%)	Household income share (%)	Standard deviation	Min.	Max.
Agriculture	Crop	7,291.4	29.9	44.9	12,161.10	0	90,740.0
	Livestock	9,692.3	39.7	19.8	32,529.14	0	215,000.0
Sub-total		16,983.7	69.6	64.7	33,029.89	0	215,000.0
Non-farm activities		7,417.0	30.4	35.3	10,411.17	0	48,000.0
Total income		24,400.7	100.0	100.0	39,621.85	600	261,800.0

Note: ETB is Ethiopian birr. The exchange rate was 1USD for 8.87ETB at the time of data collection.
Min. and Max. stand for minimum and maximum values respectively.

It was found that there is a high range of agricultural income variation with minimum of zero income per household per year to maximum of 215,000 ETB, and standard deviation of 33,000

ETB. This is because there are some urban farmers who switch from farming activities to other income generating alternatives for immediate needs. For instance, there were two farmers interviewed, and they did not obtain any production in 2005/2006 production season because of casual job opportunities that were available at the time of cultivation. This factor along with other contextual reasons widened the variation in farm income gains within the farming community. The distribution of farm income was also found highly and positively skewed with mean of 16,984 ETB (equivalent to 1,900 USD), median of 10,000 ETB (1,100 USD) and skewness value of 4.47. This implies that the number of urban farmers who generate annual farm income below the mean (16,984 ETB) is larger than those with higher farm income.

On average, the urban farmers generate over 65 % of their household income either from crop production, livestock production, or both which is similar to the 70 % sectoral contribution of urban agriculture (see Table 4.4). Crop production contributed to larger share of total household income (45 %) that is 15 % higher than its sectoral contribution, but livestock contribution decreased by 20 %. Share of non-farm income was relatively found to be unchanged at both sectoral and household levels, except 5 % increase in the later case. Similar results were also reported elsewhere such as in Cairo and Dare Salaam, where urban livestock producers generate over 65 % of their income from small livestock rearing in Cairo, and urban agriculture was found to be the second major employment sector in Dare Selaam (Mougeot 2000).

Sources of farm income

It was discussed in section 4.2.1 that urban farmers are involved in different farm based activities; hence, they secure incomes from different farm income sources. In Table 4.5 below, major sources of farm income in the study area and their contributions to farm income are shown.

The largest share of farm income (56 %) was derived from large cattle produces such as milk and beef production, and vegetable production was the second largest contributor (36 %). Producing other kinds of crops and livestock together was found to make less than 10 % to total farm income. Thus, we can realize that vegetable production and large cattle rearing are major contributors to farm income in Addis Ababa.

Table 4.5. Sources of farm income (N=69)

Sources of farm income	Mean annual income in ETB*	Contribution to farm income (%)	Standard deviation	Minimum	Maximum
Field crops	831.5	4.9	2,830.6	0	16,800
Vegetable crops	6,139.6	36.1	10,233.9	0	69,490
Other crop types	320.3	1.9	2,557.7	0	21,250
Large cattle (cow and ox)	9,507.0	56.0	32,543.2	0	215,000
Other livestock	164.5	1.0	975.2	0	8,000
Total	16,983.7	100.0	33,029.9	0	215,000

Note: * ETB is Ethiopian birr. The exchange rate was 1USD for 8.87ETB at the time of data collection

Geographic distribution of farm income

The contribution of different farm income sources to total farm income is not similar for all sub-cities (Table 4.6). The largest share of farm income was derived from cattle produces at Akaki-Qality and Lafto-Qeranio sub-cities, where as vegetable production accounted for major portion of farm income in Bole sub-city. Field crops contributed to total income share only at Akaki-Qality, and no farm income records except for vegetable and large cattle produces were reported in the other sub-cities.

Despite the variations in farm income sources, It was found that there are no significant differences ($F=0.545$, $P< 0.58$) in farm incomes among households in different sub-cities (see SPSS output in Appendix III C). Thus, it is likely that farm income contributes similarly to total household income across all locations.

Table 4.6. Distribution of farm income, by sub-cities

Sources of farm income	Akaki-Qality (N=19)			Bole (N=20)			Lafto-Qeranio (N=30)		
	Mean annual income in ETB*	Contribution to farm income (%)	Standard deviation	Mean annual income in ETB*	Contribution to farm income (%)	Standard deviation	Mean annual income in ETB*	Contribution to farm income (%)	Standard deviation
Field crops	3,019.7	14.8	4,826.4	0.0	0.0	0.00	0.0	0.0	0.00
Vegetable crops	3,737.4	18.4	15,924.0	8,263.0	78.8	9,347.4	6,245.3	32.5	4,901.9
Other crop types	1,163.2	5.7	4,866.1	0.0	0.0	0.00	0.0	0.0	0.00
Large cattle (Cow and ox)	11,743.7	57.7	33,132.0	2,220.0	21.2	4,967.3	12,948.3	67.5	41,637.1
Other livestock	597.4	2.9	1,822.0	0.0	0.0	0.00	0.0	0.0	0.00
Total	20,337.1	100.0	36,376.4	10,483.0	100.0	11,201.8	19,193.7	100.0	40,162.8

Note: * ETB is Ethiopian birr. The exchange rate was 1USD for 8.87ETB at the time of data collection

4.3.2. Level of dependence on urban agricultural income

A scatter plot for household per capita income (PHI) of urban farmers in Addis Ababa and per capita farm income (PFI) is shown in Figure 4.1. We can easily observe that increase in farm income contributes to an increase in household income of the urban farmers.

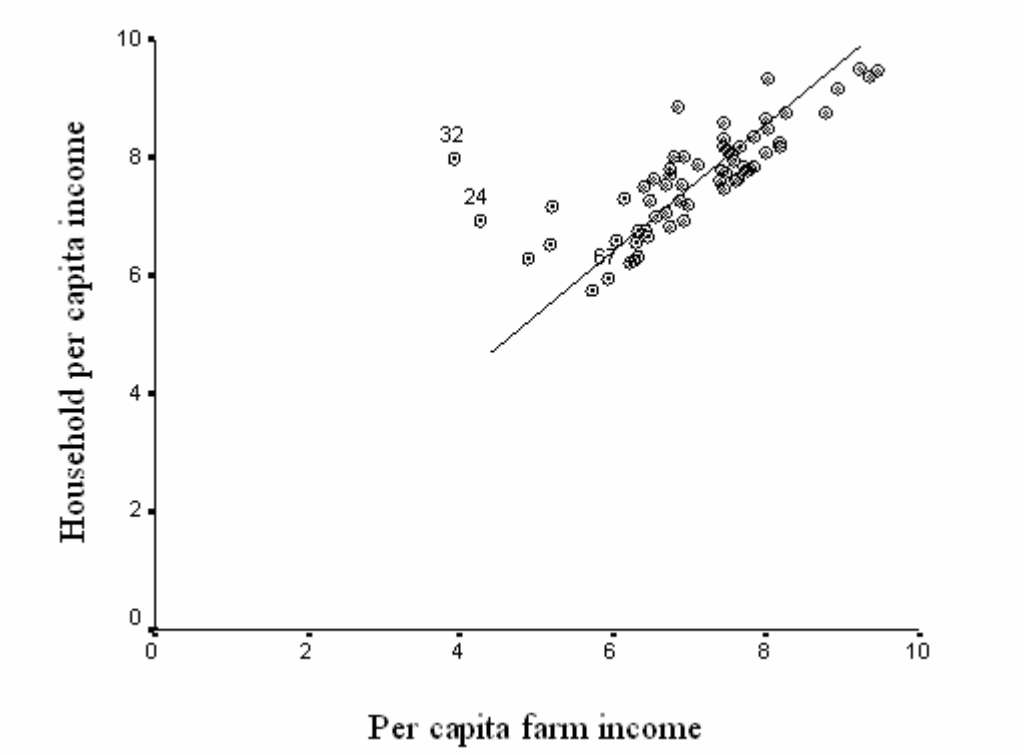


Figure 4.1. Scatter plot for natural logs of household and farm per capita incomes in '000s for sample, 2005/2006 year

Determinants of urban farmer household income

Regression analyses were carried out to further explore the relationship between household income (HI) of urban farmers and farm income (FI) (see Tables 4.7 and 4.8). This is important because it has an implication that how much the variation in the household income among the farmers is explained by the farm income. And, it shows us that how urban farmer households with various socio-economic backgrounds adapt differently towards generating their household incomes. In Table 4.7 below, OLS regression results which show relationship between household per capita income, and household characteristics, per capita farm income and selected farm characteristics are presented.

Table 4.7. Results of OLS regression for household per capita income (in ETB)

Variable	Coefficient	Std. Error	t- value	p-value
(Constant)	184.889	873.243	.212	.833
Per capita farm income	1.168	.037	31.214	.000
Sub-city: Akaki-Qality	-327.151	531.051	-.616	.540
Sub-city: Bole	224.169	493.820	.454	.652
Household head age squared	-.169	.163	-1.037	.304
Sex	610.522	588.806	1.037	.304
Level of education of household head	163.512	191.932	.852	.398
Non-farm self employment	309.952	866.177	.358	.722
Civil servant	569.574	762.925	.747	.459
Pension	1468.251	775.518	1.893	.064
Causal work	-90.622	629.325	-.144	.886
Land size (hectares): owned	100.286	128.517	.780	.439
Number of milk cattle	45.207	40.526	1.116	.269
Adult equivalent unit	-20.193	89.843	-.225	.823

Note: N=69, S=1475, R-sq=0.978, R-sq(adj)= 0.973; F=191.0, P<0.000

Household per capita income of urban farmers is positively and significantly related to per capita farm income (P<0.000). However, neither the household characteristics (age, sex, education, location, occupation) nor other farm characteristics (such as land size, number of cattle) showed significant results.

Level of dependence

The level of dependence on urban farm income sources was measured using relative farm income, which is the proportion of farm income to total household income. Results of OLS regression analysis between relative farm income and household level factors is presented in Table 4.8.

Among the explanatory variables, non-farm employment for the household head (P< 0.005 for civil servant), non-farm income (P< 0.000) and number of food deficit months in a year (P< 0.05) showed significant negative relationships with relative farm income. The relative farm income tends to increase as urban farmers are less likely to involve in some non-farm based activities. Different reasons can be given depending on types of households. In this case, urban farmers who

are also civil servants obtain relatively lower farm income, because they may not have the asset or time for farming activities compared to other farmers. Or, otherwise, households whose head are not civil servants appear to depend more on farming based activities. This is also revealed further by the negative relationship between relative farm income and non-farm income. In a study by Hungwe (2007) in Zimbabwe, it was also suggested that urban farmers who also obtain incomes from non-farm based activities do not take farming as seriously as those farmers who do not have any alternative.

Table 4.8 OLS regression results of relative farm income against household level characteristics

Variable	Coefficient	Std. Error	t- value	p-value
(Constant)	0.707000	0.19	3.69	0.001
Sub-city: Akaki-Qality	-0.032770	0.09	-0.38	0.708
Sub-city: Bole	-0.118000	0.08	-1.46	0.150
Family size	-0.045200	0.03	-1.58	0.121
Age of household head	0.005426	0.00	1.88	0.066
Sex	-0.059680	0.10	-0.60	0.550
Level of education of household head	0.012810	0.03	0.41	0.686
Non-farm self-employment	0.065960	0.13	0.52	0.609
Civil servant	-0.370000	0.13	-2.94	0.005
Pension	-0.283000	0.14	-1.96	0.056
Causal work	-0.151000	0.10	-1.52	0.135
Non-farm income	-0.000016	0.00	-4.35	0.000
Land size (hectares)	0.026640	0.02	1.32	0.194
Number of milk cattle	0.012810	0.01	2.25	0.029
Adult equivalent unit	0.039440	0.04	1.09	0.282
Formal credit	0.000082	0.00	2.47	0.017
Informal credit	-0.000131	0.00	-2.61	0.012
Number of food deficit months in a year	-0.024410	0.01	-2.01	0.050
Dependency ratio	0.022550	0.06	0.37	0.713

Note: N=69, S= 0.2271, R-sq=0.592, R-sq(adj)=0.443; F=3.95, P=0.000

Despite the weak relationships with pensioners (P< 0.06) and causal workers (P< 0.14), there are also negative relationships between these options and relative farm income. This may be because of similar reasons, and/or pensioners and casual workers are not endowed enough with basic assets/inputs to practice farming in the city.

Another interesting result is the relationship between relative farm income and number of food deficit months ($P< 0.05$). Households with many food insecure months earn relatively less from farming than food secured households. This may be because of some urban farmers who are mainly involved in non-farm income generating activities and produce crops/livestock to supplement their livelihoods. Egziabher (1994) found that urban farming as a survival strategy is mostly a second or third choice for many urban dwellers in Addis Ababa. They start farming when they cannot longer satisfy their daily household needs, especially food demands of their families, from non-farm income sources.

Asset holdings also have influences on the level of dependence on urban farming. Possession of milk cattle ($P< 0.03$) and credit availabilities ($P< 0.02$ for formal credit) are positively and significantly related to dependence on urban farming. Farmers who possess relatively many milk cattle are better to support their households with farm incomes than others do. And, urban households who utilize available formal credit options better tend to generate larger share of their income from farming. But, use of informal credits was found to associate with reduced dependence on farming and was statistically significant ($P< 0.01$). This is because informal credit may not be timely available to support farming activities, and/or it as usual may be planned for consumption smoothing and other social expenditures. And, formal credit could be directly linked to input purchases (e.g. seed, fertilizer, and feed for animals) and/or other farm investments (e.g. cow purchase).

4.3.3. Household income distribution among cases

So far, we have seen the overall contribution of urban agriculture to livelihoods of urban farmers in Addis Ababa. Large influence of farm income on the household's livelihood may imply its merit in urban poverty alleviation. However, we have also observed that there is high variation in urban agricultural income among the urban farmer households in the former sections (see Table 4.4 again).

In the statistical work that follows, two households (one from Akaki-Qality and the other from Lafto-Qeranio) were omitted from the analysis because they represented extreme outliers in the data set. One of the households owned 20 milk cattle and oil factory, and the other owned 50 milk

cattle and works in government office. They had an income more than twice the next highest in the sample. Their performances as urban farmers are appreciated and it was believed that they are interesting examples for livelihood variations among the urban farmers. However, their presence in the sample was assumed to distort unduly sample means and variations, and for these reasons, they were excluded in further analysis.

Contributions of various income options for different income groups of urban farmer households are illustrated in Table 4.9. The households were divided into income quintile groups based on their total household per capita incomes. Households in the bottom and on the top quintile groups were considered as relatively poor and rich urban farmer households, respectively. And, average relative per capita incomes (both farm and non-farm incomes) were calculated for households in each income quintile group.

Income inequality among urban farmer households in Addis Ababa was found to be 14.5 and 0.44 based on income ratio (between the top 20 % and bottom 20 % income groups) and Gini-coefficient measures for household per capita income, respectively (see Table 4.9). UNDP (2003) reported Gini-coefficient of 0.57 and income ratio of 24.8 (between the richest 20 % and poorest 20 %) for national income estimates of Ethiopia. And, Ministry of Finance and Economic Development for Ethiopia (2006) provided the overall urban Ethiopia income inequalities based on 2004/05 urban household survey data. The results showed income inequalities between the poor and the rich urban dwellers with Gini-coefficient of 0.44. The indices are actually national estimates, where as ours is for the urban farmers; hence, we can realize that there are high income inequalities among the urban farmers in Addis Ababa.

Besides this, average annual household per capita income for low, middle and high income urban farmer households was found to be 540 ETB (equivalent to 61 USD), 2240 ETB (252 USD) and 7820 ETB (882 USD), respectively (see Table 4.9). Real annual per capita total consumption expenditure and poverty line[2] for urban Ethiopia were 1,909 ETB (219 USD) and 1,075 ETB (124 USD) in 2004/05, respectively (Ministry of Finance and Economic Development for Ethiopia 2006). These results show interesting findings that the poor (lowest quintile) urban

[2] Poverty line for Ethiopia was 3 ETB (or 0.34 USD) for per adult household total consumption expenditure per day in 2004/05. Source: Ministry of Finance and Economic Development for Ethiopia (2006).

Table 4.9. Urban farmer household per capita income portfolios by income quintiles, and Gini-coefficient, 2005/2006 (N= 67)

Per capita income from	Gini-coefficient	Income quintiles									
		Lowest		Second		Third		Forth		Highest	
		Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Total household income (in thousands ETB*)	0.44	0.54	0.21	1.32	0.32	2.24	0.21	3.11	0.42	7.82	3.34
Farm income * (in thousands ETB*)		0.37	0.22	0.76	0.41	1.70	0.69	1.95	0.99	5.23	4.02
Farm income share (%)	0.44	64.5		58.1		75.2		62.2		61.9	
Crop share (%)	0.41	56.3		47.7		47.7		40.8		38.9	
Vegetable share (%)	0.44	52.4		39.8		32.2		35.7		36.0	
Livestock share (%)	0.48	8.4		10.5		27.3		21.4		23.1	
Large cattle (cow and ox) share (%)	0.50	7.8		8.9		26.2		19.1		23.1	
Non-farm income (in thousands ETB*)		0.17	0.17	0.56	0.42	0.54	0.62	1.16	0.89	2.59	2.29
Non-farm share (%)	0.43	35.5		41.8		24.9		37.8		38.1	
Self-employment share (%)	0.64	0		0		1.3		5.3		11.0	
Employment share (%)	0.11	5.7		13.3		14.3		1.5		3.4	
Casual work share (%)	0.26	24.5		9.0		2.4		11.2		2.1	
Renting house share (%)	0.39	3.1		10.0		3.0		8.7		9.1	
Remittance share (%)	0.53	0		6.9		3.8		10.0		11.5	
Other transfer share (%)	0.24	2.2		2.6		0		1.1		0.9	

Note: * ETB is Ethiopian birr. The exchange rate was 1USD for 8.87ETB at the time of data collection. S.D. is standard deviation.

farmer households in Addis Ababa generate average per capita income which is far below the poverty line, i.e. half the poverty line on average. On the other hand, average per capita income for the rich urban farmer households is seven times higher than the poverty line. And, the middle were found to receive average annual per capita income that is relatively similar to annual per capita consumption expenditure, which is twice as large as the poverty line. Hence, we can understand that different urban farmer households in Addis Ababa belong to different income groups in the urban Ethiopia. This finding supports the argument that not all urban farmers are the poorest residents in cities (RUAF 2007, Bryld 2003, UNDP 1996).

Poor urban farmer households (the bottom quintiles) obtain over 65 % of their income from agriculture and 35 % from non-farm income sources. And, the rich (the top quintiles) obtain 60 % of their income from agriculture and 40 % from non-farm options. This result shows that agriculture is similarly important for both the poor and the rich urban farmer households. However, middle income urban farmer households show a relatively higher dependence (75 %) on farm income, at which case there is at least 10 % rise on dependence level (see Figure 4.2).

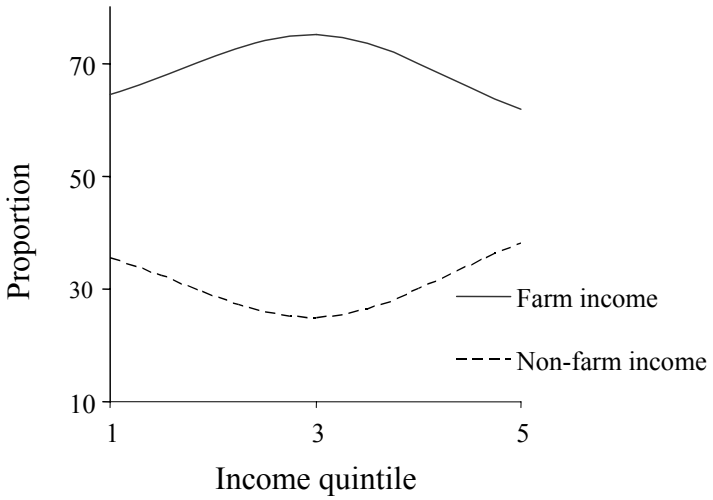


Figure 4.2. Proportions of farm and non-farm per capita incomes to household per capita income, by income groups

Farm incomes contributed much of the income inequality mainly because of additional increments of livestock income, particularly that of large cattle such as cows and oxen (see Figure 4.3). This is in line with the previous finding that farmers who possess relatively many milk cattle are better to support their households with farm incomes than others do. On the other hand, increments of crop income, and particularly vegetable production, were found to moderate income inequalities among the urban farmers, implying that vegetable production is a big stake for the poor.

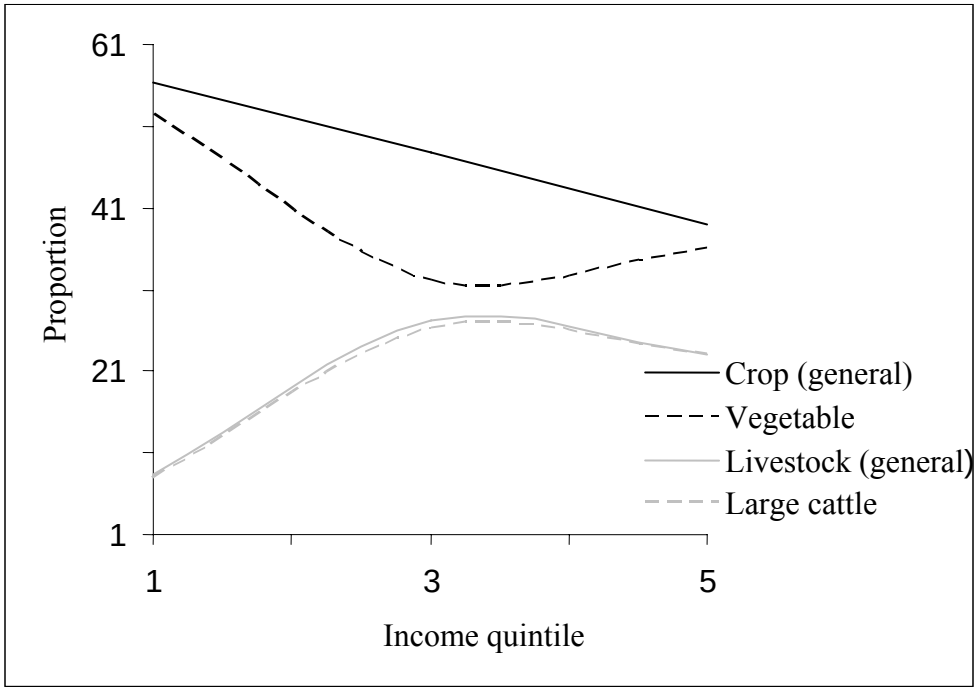


Figure 4.3. Contributions of selected farm income options to per capita income, by income group

Non-farm incomes were found to have comparatively little role in the livelihoods of all income groups of urban farmers, but contributed equally and significantly to livelihood variations among the farmer households. Among the non-farm income options, remittance, renting house and non-farm self- employment (e.g. trading) were major contributors of income inequality among the farmer households (see Figure 4.4). Additional increments of incomes from casual work or other transfers (e.g. pension) were found to reduce the inequality. In between was non-farm employment (e.g. civil servant) where middle income urban farmers enjoy the highest incremental share.

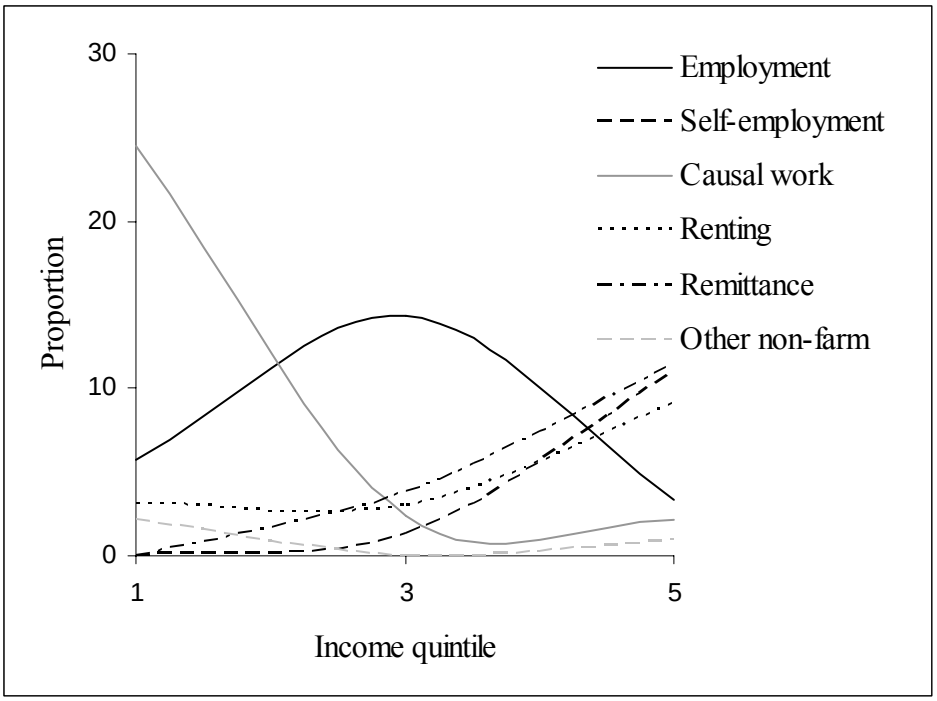


Figure 4.4. Proportions of non-farm income options to per capita income, by income group

4.3.4. Livelihood strategies of urban farmers

So far, we have seen that there is income inequality among urban farmer households in Addis Ababa, and the overall variation in urban farm income was found to be insignificant among the sub-cities. Further analyses were carried to realize the distribution of households with different income groups across sub-cities. Households with similar income quintile groups are found to be equally distributed across the sub-cities (see SPSS outputs in Appendix IV). In this section, types of livelihood specializations and strategies that urban farmers follow are illustrated against different income groups and across sub-cities.

Diversification index

Livelihood diversification indices were calculated for the sampled urban farmer households to show the variations in livelihood strategies among them based on their income groups and sub-cities. Variations in livelihood strategies were found to be insignificant ($P<0.96$) among the sub-cities (see Table 4.10). However, livelihood strategies in the poor urban farmer households (bottom quintile) were less diverse than that of the better-off groups, and the result was statistically

significant (P< 0.05). No significant differences in degrees of diversity were found among other income groups i.e. between the relatively middle and rich urban farmer households.

Table 4.10. Mean Simpson diversity indices, by sub-city and by income quintile group

	Simpson diversification indices			
	Mean*	Standard deviation	Minimum	Maximum
Sub-city				
Akaki-Qality	0.44z	0.14	0.19	0.73
Bole	0.37z	0.26	.00	0.70
Lafto-Qeranio	0.38z	0.21	.00	0.70
Note: F= 0.37, P< 0.962				
Income quintile group				
Lowest	.2267a	.2312	.00	.62
Second	.4027b	.1596	.14	.64
Third	.4132b	.2185	.00	.70
Forth	.5125b	.2090	.00	.73
Highest	.4285b	.1709	.00	.65
Note: F= 3.651, P< 0.01				

Note: *means with different alphabets are statistically different at P<0.05.

There is a substantial variation in degrees of livelihood diversification within each income quintile group, with minimum of zero to maximum of 0.73. The variability is also higher within the poor households (standard deviation = 0.23) as compared to other income groups.

Regression analyses were run to show the relationships between livelihood diversification index (DI) of urban farmer households and relative incomes (which are relative farm income, relative crop income, relative livestock income and relative non-farm income). SPSS outputs of the regression results are presented in Appendix V A. All of the results show significant relationships (P<0.00) between diversity index and relative incomes (see also Figure 4.5).

Thus, increased dependence on an income from one source raises the diversification index up to a point where the income is roughly equal to incomes from other options. Beyond this point,

diversity index decreases implying that the urban farmer household adapts/chooses fewer and similar livelihood strategies. In all of the cases, we can understand that livelihoods of the urban farmers with low or high dependence on either income options (farm or non-farm) are less diverse than that of urban farmer households with medium dependence.

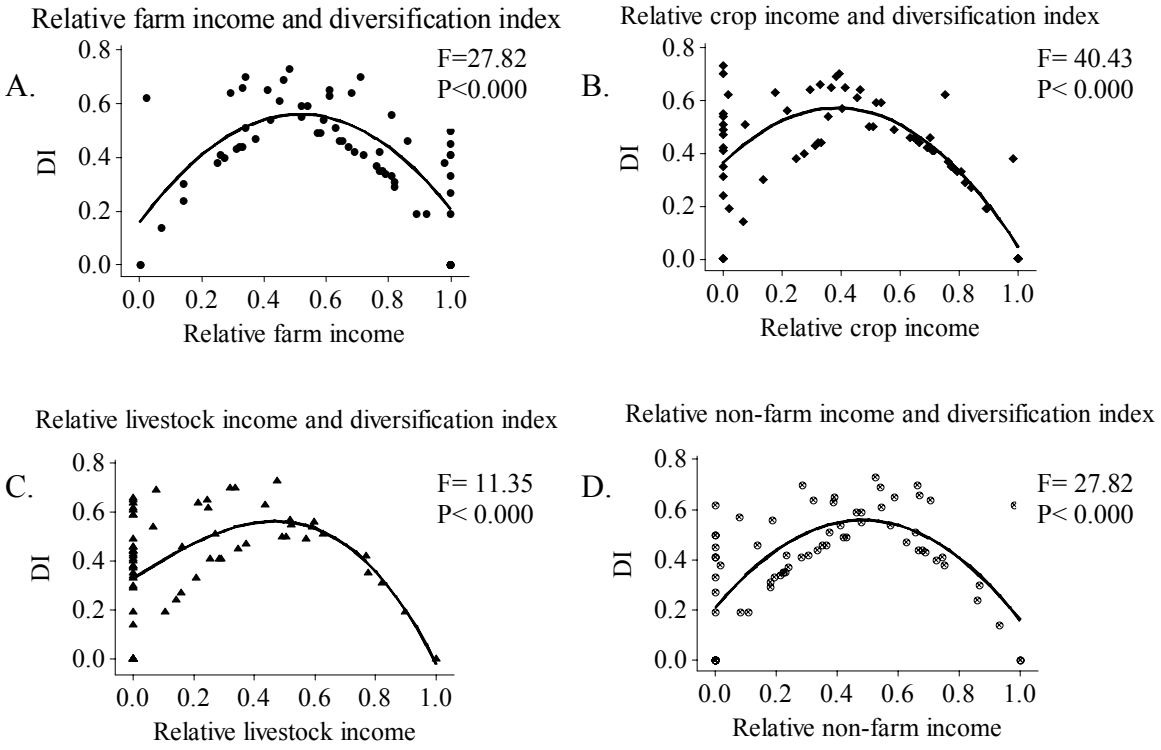


Figure 4.5. Relative incomes and livelihood diversification index (DI)

Similar results were found when diversity index against household per capita income and per capita non-farm income was regressed (see Appendix V B for SPSS outputs). Scatter plots for regression results are presented in Figure 4.6 below. However, per capita farm income yielded a weak relationship (P< 0.09) with diversity index.

Possible implications of these results are that urban farmer households with low per capita income tend to follow specified livelihood strategies, may be because of asset constraints or limited access to other livelihood options, while middle income households rather invest on diversification at the expense of higher income. And, urban farmer households with high per capita income choose specialization in stead of diversification because they can achieve high economies of scale from

one income sources, particularly from farming, since their asset constraints are relatively more relaxed. This is in line with Panagariya and Succar (1986) findings who said that specialization is a result of strong economies of scale, regardless of any institutional level.

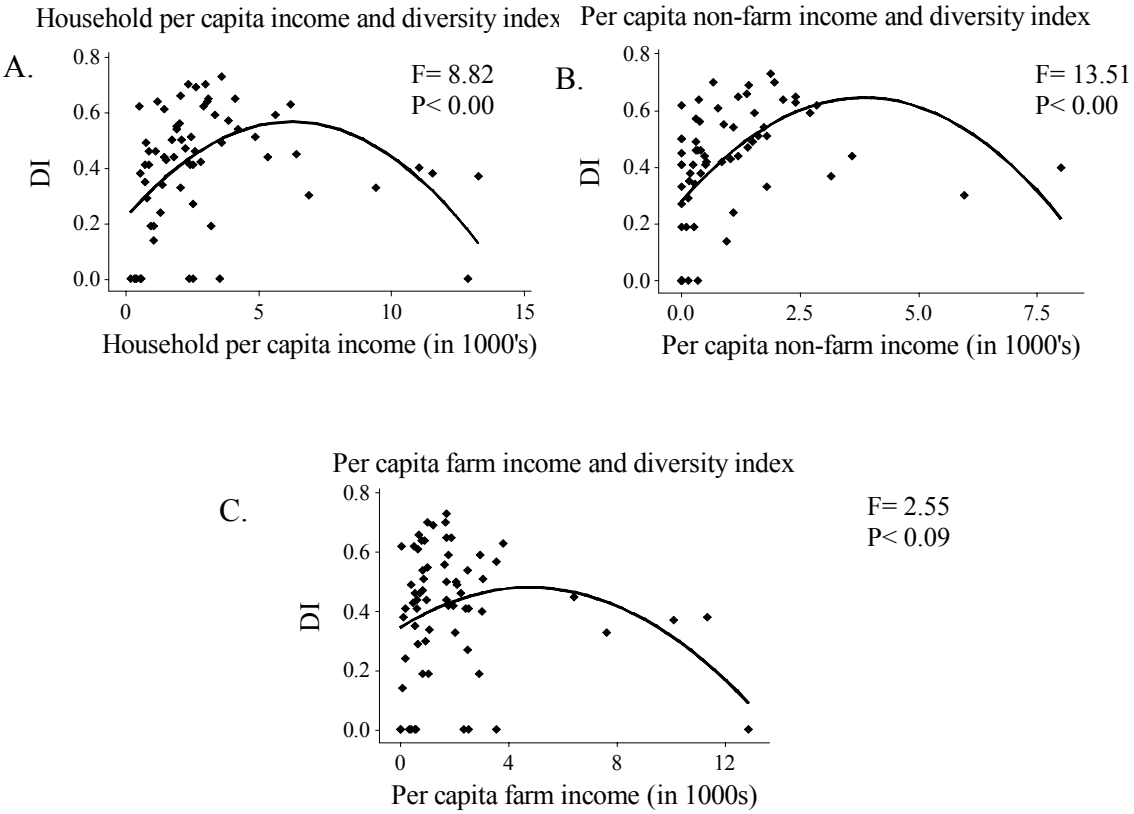


Figure 4.6. Per capita incomes and livelihood diversification index (DI).

Livelihood strategy categories

In all of the sub-cities, the urban farmer households who were engaged specifically in farming based activities were few, i.e. households who ran their livelihoods specifically by producing crops, livestock or both accounted for only 21 % of the total (see Table 4.11). And, the majority (80 %) the urban farmer households was found to involve both in farm and non-farm based activities. Similar reports were found across all sub-cities (P< 0.06).

Table 4.11. Proportion of households, by livelihood specialization and by sub-cities

Livelihood specialization category	Proportion of households	Sub-cities		
		Akaki-Qality	Bole	Lafto and Qeranio
Single specific source				
Crop only	8.6	0	15.0	10.0
Livestock only	1.4	5.0	0	0
Two specific sources				
Crop and livestock	11.4	15.0	10.0	10.0
Crop and non-farm	34.3	15.0	55.0	33.3
Livestock and non-farm	14.3	30.0	0	13.3
All sources: crop, livestock and non-farm	30.0	35.0	20.0	33.3
Total	100.0	100	100	100

Note: $\chi^2 = 17.521$, $P < 0.064$

A statistical analysis was made to find out major livelihood strategies that different urban farmer households follow by incorporating income to livelihood specialization categories. First, a summary of different livelihood strategy types was developed based on the natures of households' livelihood activities and a livelihood activity which covers 75 % of total household income share (Table 4.12). For instance, if a household generates at least 75 % of its household income from crop production, it will be grouped in 'principally crop' strategy type. The results are summarized in Table 4.13.

Diversified livelihood strategy types were found to be followed by many urban farmer households (about 60 %), out of which crop and non-farm together contributed to 30 %, livestock and non-farm 15 %, and crop and livestock together provided for 13 % of the households. There were a few households (40 %) who specialized in specific livelihood strategies. Most of them obtained larger portions of their household incomes from crop production (27 %), where principally vegetable strategy provided for the majority (22 %). There were also few urban farmer households (10 %) whose livelihoods were mainly dependent on non-farm income sources.

Table 4.12. Livelihood strategy categories, by 75 % total income share

Category shares in total income	Strategy type
Crop income ≥ 75 %	Principally crop
Vegetable income ≥ 75 %	Principally vegetable
Livestock income ≥ 75 %	Principally livestock
Large cattle income ≥ 75 %	Principally large cattle
Crop and livestock together ≥75 %: Crop income < 75 %, livestock income < 75 %	Crop and livestock
Non-farm income ≥ 75 %	Principally non-farm
Crop and non-farm together ≥ 75 %: Crop income < 75 %, non-farm income < 75 %	Crop and non-farm
Livestock and non-farm together ≥ 75 %: Crop income < 75 %, non-farm income < 75 %	Livestock and non-farm

Note: Highlighted strategy types, principally vegetable and principally large cattle, are subsets of principally crop and principally livestock strategy types, respectively.

Livelihood strategies that low income urban farmer households follow are more specific than that of middle and high income households (see Table 4.13). Almost 80 % of the low income households receive their income specifically from crop production or non-farm income sources. But, in case of middle and high income urban farmer households, there are less than 40 % households who follow specific strategies.

Around 55 % of the low income urban farmer households obtain their income specifically from crop production, and principally vegetable strategy provides for the majority (46 %). And, some low income households (23 %) are mainly dependent on incomes from non-farm based activities. Middle income urban farmer households follow more diversified livelihoods, where over 30 % of them follow mixed crop-livestock production strategy, and about 30 % follow combined farm*non-farm livelihood strategy. There are also some middle income households (31 %) whose strategies are specifically crop production, and over half of them obtain their income mainly from vegetable production. In cases of high income urban farmer households, it is a different situation. Like middle income urban farmer households, most of high income households (60 %) have diversified livelihoods, but the majority tend to follow farm*non-farm livelihood strategies (54 %) instead of mixed crop-livestock production strategy (8 %). Similarly, there are also some high income urban

farmer households (23 %) whose livelihoods are specifically dependent on crop production, i.e. vegetable production. And, only few households were found to be specifically dependent on livestock production, and they are either from middle (7 %) or high (8 %) income urban farmer households (see Table 4.13).

Table 4.13. Proportion of households by livelihood strategy types and by income quintile groups (N=67)

Strategy type	Proportion of households	Income quintile group				
		Lowest	Second	Third	Forth	Highest
Principally crop	26.9	53.8	21.4	30.8	7.1	23.1
Principally vegetable	22.4	46.2	21.4	15.4	7.1	23.1
Principally livestock	4.5	0	0	7.7	7.1	7.7
Principally large cattle	3.0	0	0	0	7.1	7.7
Crop and livestock	13.4	0	7.1	30.8	21.4	7.7
Principally non-farm	10.4	23.1	14.3	0	7.1	7.7
Crop and non-farm	29.9	7.7	50.0	15.4	42.9	30.8
Livestock and non-farm	14.9	15.4	7.1	15.4	14.3	23.1
Total	100	100	100	100	100	100

Note: $\chi^2 = 24.617$, $P < 0.216$

So far, we have seen interesting relationships between incomes, livelihood strategies and different groups of urban farmers. We found out that urban farmer households at all income levels generate larger portions of their income from agriculture, which is over 60 % of total household income. We have realized that those urban farmer households who enjoy relatively larger income from farming-based activities are mostly food secured. Urban farmers who posses livestock, particularly milk cattle, obtain relatively larger income from farming than other farmers do. And, the relationship between relative farm income and non-farm income was that relative farm income is larger for heads of urban farmer households who are not normally involved in non-farm employment (e.g. civil servant) and/or casual jobs.

Regarding livelihood strategies, we found out that the poor households follow less diversified livelihoods, which are either principally crop production or non-farm based activities, as compared to households in better income groups. Thus, larger share of their household income is generated

specifically from either crop produces, or non-farm income options (like casual work and non-farm employment). We also observed that there are no poor urban farmer households who obtain any significant income from livestock production, implying that the majority does not possess livestock (see Figure 4.7).

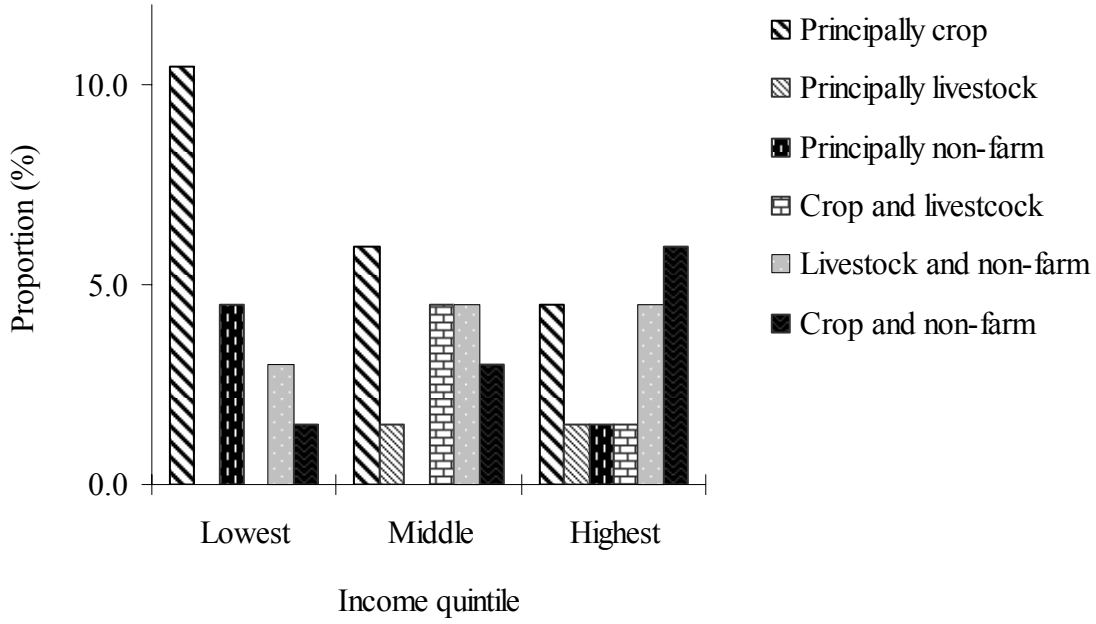


Figure 4.7. Contributions of livelihood strategy types over income groups

The general tendency is that the number of urban farmers whose livelihoods are exclusively dependent on crop production or non-farm options reduces with an increase in household income. And, participating in crop cultivation and non-farm options together as livelihood activity tends to increase across the income groups. Combination of crop and livestock production as livelihood strategy was found to be common among middle income urban farmers, and livestock*non-farm strategy was found to be commonly carried out in both middle and high income urban farmer households (see Figure 4.7 again). These strategies are, however, less observed in the low income households.

Therefore, the implications are that the poor are trapped in asset poverty limiting their livelihood strategies, and are among the majority of food insecure urban farmer households. This may be because they do not possess critical assets (e.g. milk cattle) which are found to raise the income from farming. Positive correlations between absolute per capita farm income, and number of milk

cattle and availability of formal credit further support this finding (see Appendix III B). And/or, if the poor are employed in non-farm sectors, their works do not pay off enough for their daily household needs; hence, they follow urban farming as their survival strategies. Middle income households, on the other hand, were found to better exploit the crop*livestock synergy that is to use crop wastes for livestock feed and animal refuses as manure. Thus, they better tend to practice mixed farming, enjoy the increased benefit and better tend to reduce the household food insecurity.

4.4. Household assets of urban farmers

Asset holdings of the urban farmers were also recorded and analyzed. The results are shown in Table 4.14 and Figure 4.6. Identifying the assets utilized by the farmers, especially for farming based activities, are important to understand which of the assets contributed to increase in resilience and security of the farmers' livelihoods (Ellis 2000).

The result shows some variations in asset holdings among urban farmer households in different income groups. Particularly, land, livestock, education, family size and credit availabilities were found to be critical assets that distinguish the poor farmers from the well-to-do urban farmer households (see Table 4.14). Low income households have significantly fewer numbers of milk cattle and limited access to credits as compared to other households (see also Appendix III B). Majority of heads of urban farmer households who did not have any formal education were from low income groups, and it was also found that no spouses attended secondary education in low income households. The number of children who went for secondary schools in the low income households is also significantly less than that for other groups (see Table 4.14). Although this groups was found to have better adult work forces, lack of education and capital seem to held their productivity as compared to those in the better-off households

Besides the variation within group, there was also variability in land possession among the low income urban farmer households and better-doing households. Low income households have relatively smaller land sizes as compared to households in better income groups (see Figure 4.8). In general, low productivities as a result of land constraints are emphasized by almost all of the farmers, and it is not surprising because land for farming is not normally available in the city because of high opportunity costs. Many authors also confirmed that land is one of the major constraints in urban agriculture (Bryld 2003, Deelstra and Girardet 1999, UNDP 1996).

Table 4.14. Household assets, by income groups

Household asset	Income quintile groups				
	Lowest	Second	Third	Forth	Highest
Natural capital					
Private land owned (mean area in hectare)	0.80	0.83	1.15	1.37	1.16
Milk cattle owned (mean no.)	0.54	0.79	1.62	1.86	1.54
Ox owned as draft animal (mean no.)	0.08	0.07	0.85	0.14	0
Physical capital					
Tractor (% with total no. of hhs)	-	-	-	-	-
Agricultural tools (% with total no. of hhs)	84.6	85.7	92.3	71.4	76.9
Renting house (% with total no. of hhs)	23.1	35.7	15.4	32.7	38.5
Human capital					
Household size (AEU)	5.42	4.86	5.87	6.15	4.19
Education level of household head (%)					
No formal education	53.8	42.9	23.1	35.7	38.5
Primary and Junior secondary	23.1	21.4	61.6	42.9	30.8
Secondary	15.4	35.7	15.4	14.3	23.1
College/University	7.7	0	0	7.1	7.7
Education level of spouse (% ≥ Sec. sch.)	0	14.3	15.4	0	15.4
Education level of children (% ≥ Sec. sch.)	53.9	64.3	76.9	71.5	69.3
Financial capital					
Savings (% with total no. of hhs)	69.2	71.4	61.5	85.7	100
Access to credit (% with total no. of hhs)	15.4	14.3	23.1	50.0	46.2
Cattle for fattening (Mean no.)	0.08	0	0.62	0	0.23
Social capital					
Shared land (% with total no. of hhs)	38.5	50.0	15.4	14.3	0
Members in farmer association (% with total no. of hhs)	84.6	85.7	84.6	78.6	92.3

Note: no., hhs, sec and sch. represent number, households, secondary and school, respectively. AEU is adult equivalent unit.

In UNDP (1996) report, a 160 square meters of land in cities was also estimated to fulfill minimum demands for a household such as food and other essentials if it is intensively cultivated with high value crops. In our case, the farmers have on average 0.80 to 1.4 hectares of land, which is equivalent to 8000 to 14000 square meters. Thus, input and technology constraints, especially for

low income crop producers, are better to explain low productivities of urban farming than the plot sizes in Addis Ababa.

It was also found that many low income (lowest and second quintile) urban farmer households (40-50 %) jointly cultivate crops with other farmers and proportionally share the produce, i.e. they were found to posses communal lands which belong to farmer associations (see Table 4.14). The farmers confirmed that such strategy is particularly important for tenure security. Besides, they were found to adapt this strategy to achieve asset smoothing because the association provides inputs and land, and pays taxes, where as the farmers contribute labour and small annual fees. This situation was, however, less observed in better income household groups.

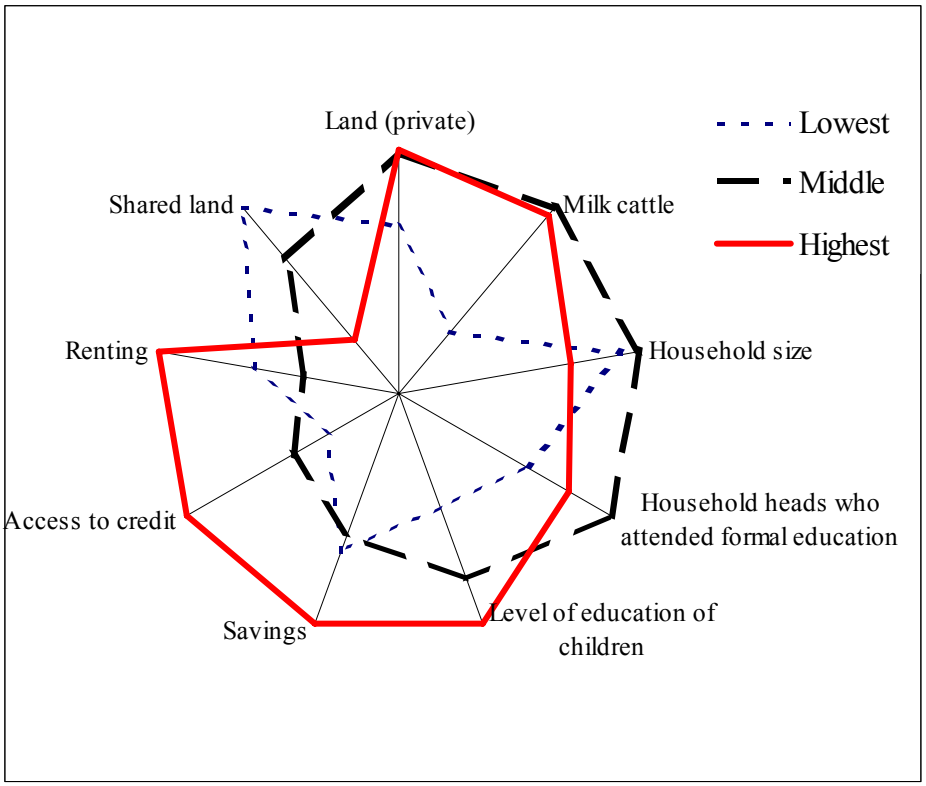


Figure 4.8. Selected household assets, by income groups

Besides this, the poor urban farmer households lack access to credits as compared to better income households. However, it was found that urban farmers who utilized formal credits tend to generate relatively larger income from farming than other farmers do. Mougeot (2000) argued that many urban farmers do not get formal loans as long as they carry out farming on plots of land for which

they don't have ownership rights. Another argument by Bryld (2003) was that vulnerable groups such as women headed households and new migrants lack and/or are excluded from such kind of social and political information. Most of the urban farmers in our case (75 %) reported that they have ownership rights to the land they cultivates, but they also emphasized that their lands are not enough to be a guarantee for getting formal loans. However, those households who are permanent government employees, livestock owners, and/or have housing tend to have relatively better access to credit services (see Appendix III B), and they are usually not from the lowest income household groups. And, some urban farmer households (10%) also claimed that they do not know/have any organization which provides credit services, especially for interest of their own livelihood activities. Thus, this factor together with other constraints discussed earlier limited livelihood outcomes of the poor urban farmer households. Lack of assets such as livestock, education, land and savings further support our findings in the previous sections, and showed a difference in income status between the poor and better-off urban farmer households.

5. Conclusion

The purpose of this study was to provide empirical evidences on the role that urban agriculture plays in the livelihoods of urban farmer households in Addis Ababa city. The major urban agricultural production systems in the city were identified. The role of urban agriculture in household income and urban poverty alleviation, and socio-economic challenges in relation to urban farming were investigated. 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.

Not different from the rural Ethiopia, the urban farmers in Addis Ababa use traditional tools, extensive labour and furrow irrigation to cultivate their fields. Fertilizer, manure and wage labour use is common in crop production and generally, family labour is the most common input for all urban farming activities. Building irrigation dam is found to consume much effort and time of the farmers as it is frequently washed away by heavy rains and should be rebuilt every year. The study has also revealed that the farmers used different strategies to access land, which is one of the critical assets for urban farming. Many crop producers own some land for farming, and they have mostly title deeds to the land they cultivate; some jointly possess land (communal lands) where they cultivate together and proportionally share the produce. Renting land is relatively less common except for the landless urban farmers (which were 10 %).

The urban farmers in Addis Ababa differ in their social backgrounds such as region of origin, age, occupation, and levels of education, which might have also implications on their livelihood strategies. The majorities of the farmers have low formal education and consider farming as their

major occupations. Participation of the youth is relatively low in the sector, leaving it for adults over 40 years old and women who also support large families. Insufficient earnings from non-farm sectors and food insecurity were major reasons for adapting urban agriculture as survival strategy in the city, that is, to fulfill daily food and other essentials.

The urban farmer households vary also in their income status and livelihood strategies. Although the households highly and similarly (65-75 %) depend on urban farming, there are high income inequalities among the farmers with many households living below the poverty line. Differences in critical asset holdings, namely land, livestock, education, family size and credit attributed to the income gap and variations in livelihood strategies between the poor and better-off urban farmer households. The poor households have fewer milk cattle, smaller plots of land, limited credit access and less formal education, and these constraints seem to limit efficiencies of their relatively better assets, i.e. higher adult work forces. Regarding land use, however, low productivities due to input and technology constraints, especially in the low income crop producers, are observed rather than due to land size. As a result of the asset poverty, the livelihoods of many poor urban farmer households are found to be limited (less diversified) either to producing crops (usually vegetables) or low non-farm income generating activities. Many middle and high income urban farmer households, on the other hand, follow diversified livelihoods although they differ in their principal strategies.

Finally, urban agriculture in Addis Ababa city is left with a range of policy implications. Despite its dominant contribution to livelihoods of the urban farmers, urban agriculture is strikingly found to remain as a survival strategy for the urban poor and a source of income for the better-off households. The asset constraints for farming typically limited the livelihood outcomes of the poor urban farmer households, and showed a significant difference in income status between the poor and better-off urban farmer households. Generally, lack of assets such as livestock and credit, and inputs and technology constraints were found to significantly hold investments on farming in the city, and particularly for low income urban farmer households.

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Appendix I. Assets-access-activities framework for livelihood analysis.

Livelihood platform	**Access modified by (endogenous)**	**In context of (exogenous)**	**Resulting in**	**Composed of**	**With effects on**
	Social relations	*Trends*		*NR-based activities*	*Livelihood security*
	Gender	Population		Cultivation (food)	Income level
	Class	Urbanization		Cultivation (non-food)	Income stability
	Age	Relative prices		Livestock	Seasonality
Assets	Ethnicity	Macro policy		Non-farm NR (Brick	Degrees of risk
Natural capital		National econ trends		making, thatching,	
Physical capital				marketing farm in/outputs,	
Human capital				etc)	
Financial capital	*Institutions*		*Livelihood strategies*		*Env. Sustainability*
Social capital	Rules and customs				Change in Resilience and stability of:
	Land tenure (property rights)	*Shocks*			-Soils and land quality
	Markets in practice	Drought			-Water
		Floods		*Non-NR based*	-Biodiversity
	Organizations	Pests		Trade	
	Associations	Diseases		Other services	
	NGOs			Manufacture	
	Local admin			Remittances	
	State agencies			Other transfers	

Source: Ellis 2000

Appendix II. Types and proportion of urban farmers interviewed, by sub-city.

Type of Urban farmers	Akaki-qality	Bole	Lafto-qeranio	Total (%)
Field crop producers	**10.1**	**-**	**-**	**2.9**
Vegetable producers	**4.9**	**69.9**	**43.4**	**40.0**
Large cattle keepers	**35.0**		**13.3**	**15.7**
Mixed farmers	**50.0**	**30.1**	**43.4**	**41.5**
Others	**-**	**-**	**-**	**-**
Total (%)	**100**	**100**	**100**	**100**

Note: Non-farm activities are not included.

Appendix III. Correlations between incomes and assets, and ANOVA for farm income

A. Correlations between different farm income sources among sampled households, 2005/2006.

		Crop income	Field crop income	Vegetable crop income	Other crop income	Other livestock income	Large cattle income	Livestock income
Crop income	Pearson's r	1.000						
	Sig. (2-tailed)	.						
Field crop income	Pearson's r	.075	1.000					
	Sig. (2-tailed)	.539	.					
Vegetable crop income	Pearson's r	.959	-.178	1.000				
	Sig. (2-tailed)	.000	.144	.				
Other crop income	Pearson's r	.836	-.037	.754	1.000			
	Sig. (2-tailed)	.000	.761	.000	.			
Other livestock income	Pearson's r	-.101	-.044	-.102	-.020	1.000		
	Sig. (2-tailed)	.411	.721	.403	.869	.		
Large cattle income	Pearson's r	-.142	-.069	-.141	-.035	-.023	1.000	
	Sig. (2-tailed)	.243	.575	.247	.773	.849	.	
Livestock income	Pearson's r	-.145	-.068	-.145	-.036	.006	1.000	1.000
	Sig. (2-tailed)	.233	.576	.235	.769	.958	.000	.

B. Correlation between different farm income sources and asset holdings 2005/2006.

		Household per capita income	Per capita non-farm income	Per capita farm income	Per capita crop income (general)	Per capita livestock income (general)	Per capita vegetable income	Per capita income from large cattle
Education level of household head	Pearson's r	.299	.185	-.118	-.023	-.144	-.022	-.136
	Sig. (2-tailed)	.012	.134	.343	.856	.244	.862	.271
Land size (private)	Pearson's r	-.078	.073	-.053	.012	-.092	.012	-.083
	Sig. (2-tailed)	.526	.559	.673	.920	.460	.921	.503
Number of milk cattle	Pearson's r	.681	-.153	.353	-.225	.788	-.220	.791
	Sig. (2-tailed)	.000	.218	.003	.067	.000	.074	.000
Adult equivalent unit	Pearson's r	.014	-.085	-.080	-.247	.184	-.268	.184
	Sig. (2-tailed)	.910	.494	.519	.043	.137	.028	.137
Formal credit amount	Pearson's r	.032	.062	.253	.231	.087	.203	.092
	Sig. (2-tailed)	.796	.619	.039	.060	.482	.099	.457
Informal credit amount	Pearson's r	-.021	.038	.017	-.104	.150	-.094	.154
	Sig. (2-tailed)	.866	.762	.893	.404	.224	.451	.213
Access to credit	Pearson's r	.136	.249	.095	.162	-.022	.165	-.023
	Sig. (2-tailed)	.267	.039	.437	.190	.861	.182	.856

C. Analysis of variance (ANOVA) table for mean farm income among sub-cities

	Sum of Squares	df	Mean Square	F	Sig.
Between sub-cities	1,205,361,800.153	2	602,680,900.076	.545	.582
Within sub-city	72,980,839,504.456	66	1,105,770,295.522		
Total	74,186,201,304.609	68			

Appendix IV. SPSS output of income quintile*sub-city cross tabulation

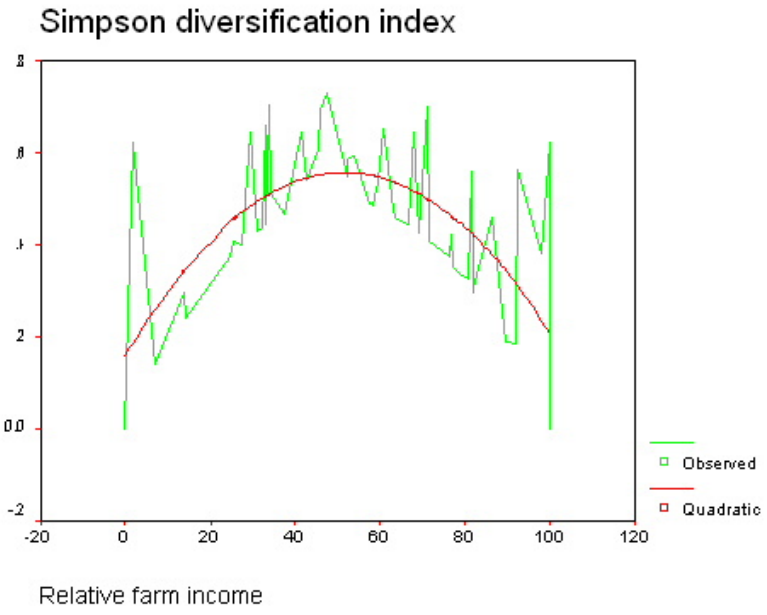
INCOME QUINTLE		Sub-city			Total
		Akaki-Qality	Bole	Lafto and Qeranio	
QUINTILE	1.00	16.7%	15.0%	24.1%	19.4%
	2.00	22.2%	25.0%	17.2%	20.9%
	3.00	27.8%	25.0%	10.3%	19.4%
	4.00	16.7%	25.0%	20.7%	20.9%
	5.00	16.7%	10.0%	27.6%	19.4%
Total		100.0%	100.0%	100.0%	100.0%

Note: $\chi 2 = 5.46$, $P < 0.71$.

Appendix V: SPSS regression outputs for incomes and diversity index

A. SPSS outputs for relative incomes versus livelihood diversity index curve fits.

```
MODEL:  MOD_1: Relative farm income (PERCCL)* Diversification index(DI)

Dependent variable.. DI                Method.. QUADRATI

Listwise Deletion of Missing Data

Multiple R           .67630
R Square             .45738
Adjusted R Square    .44093
Standard Error       .15851

            Analysis of Variance:

               DF   Sum of Squares      Mean Square

Regression      2        1.3976829        .69884147
Residuals      66        1.6581923        .02512413

F =      27.81555       Signif F =  .0000

-------------------- Variables in the Equation --------------------

Variable                    B        SE B       Beta         T  Sig T

PERCCL               .015433     .002620   2.215908     5.891  .0000
PERCCL**2           -.000150  2.1928E-05  -2.565419    -6.820  .0000
(Constant)           .160602     .069356                2.316  .0237
```



MODEL: MOD_2: Relative crop income (PERCP)* Diversification index(DI).

Dependent variable.. DI Method.. QUADRATI

Listwise Deletion of Missing Data

Multiple R	.74202
R Square	.55059
Adjusted R Square	.53697
Standard Error	.14425

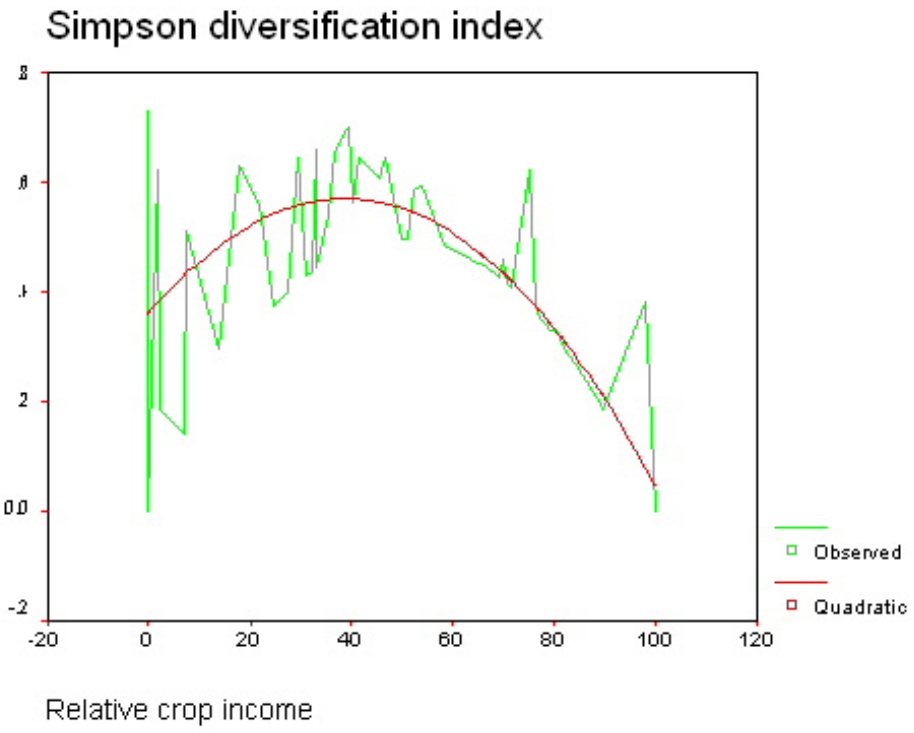
Analysis of Variance:

	DF	Sum of Squares	Mean Square
Regression	2	1.6825253	.84126267
Residuals	66	1.3733499	.02080833

F = 40.42913 Signif F = .0000

---------- Variables in the Equation ----------

Variable	B	SE B	Beta	T	Sig T
PERCCP	.010828	.001711	1.792808	6.329	.0000
PERCCP**2	-.000140	1.7658E-05	-2.242126	-7.915	.0000
(Constant)	.361700	.032745		11.046	.0000



MODEL: MOD_3. Relative livestock income (PERCLVK)* Diversification index (DI)

Dependent variable.. DI Method.. QUADRATI

Listwise Deletion of Missing Data

Multiple R	.50593
R Square	.25597
Adjusted R Square	.23342
Standard Error	.18561

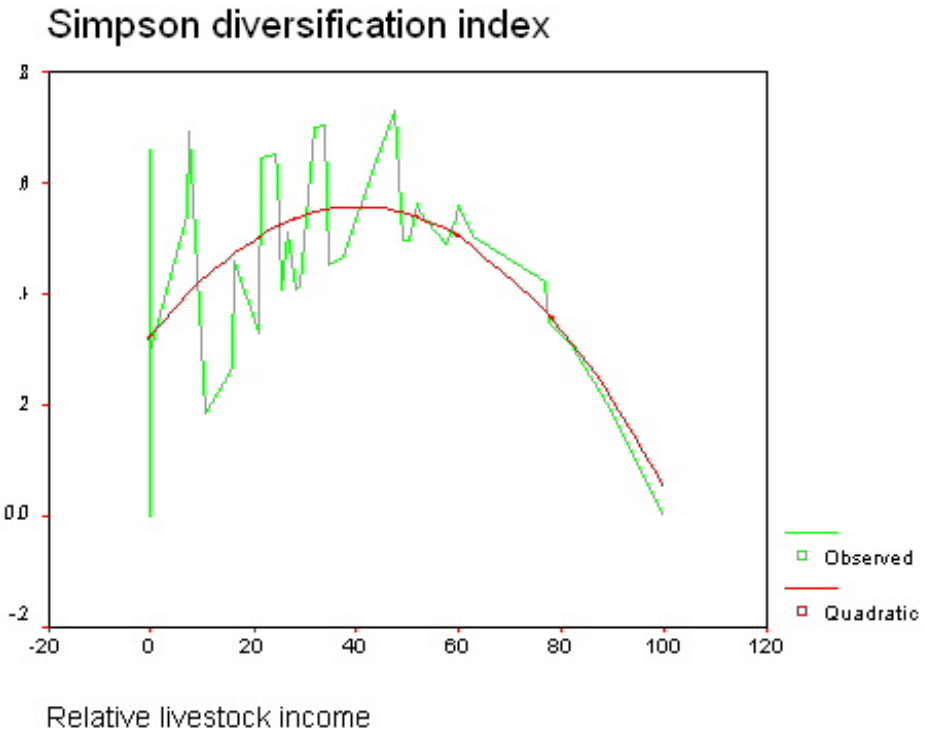
Analysis of Variance:

	DF	Sum of Squares	Mean Square
Regression	2	.7821995	.39109977
Residuals	66	2.2736757	.03444963

F = 11.35280 Signif F = .0001

---------- Variables in the Equation ----------

Variable	B	SE B	Beta	T	Sig T
PERCLVK	.011593	.002436	1.470245	4.759	.0000
PERCLVK**2	-.000143	3.1518E-05	-1.406337	-4.552	.0000
(Constant)	.325075	.029771		10.919	.0000



MODEL: MOD_4. Relative non-farm income (PERCNON)* Diversification index (DI)

Dependent variable.. DI Method.. QUADRATI

Listwise Deletion of Missing Data

Multiple R	.67630
R Square	.45738
Adjusted R Square	.44093
Standard Error	.15851

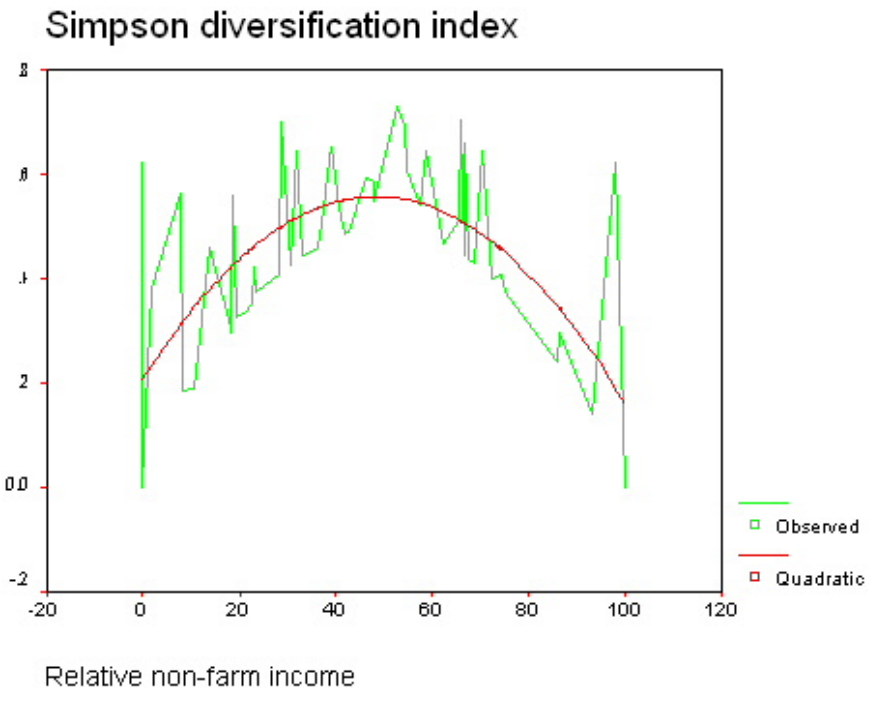
Analysis of Variance:

	DF	Sum of Squares	Mean Square
Regression	2	1.3976829	.69884147
Residuals	66	1.6581923	.02512413

F = 27.81555 Signif F = .0000

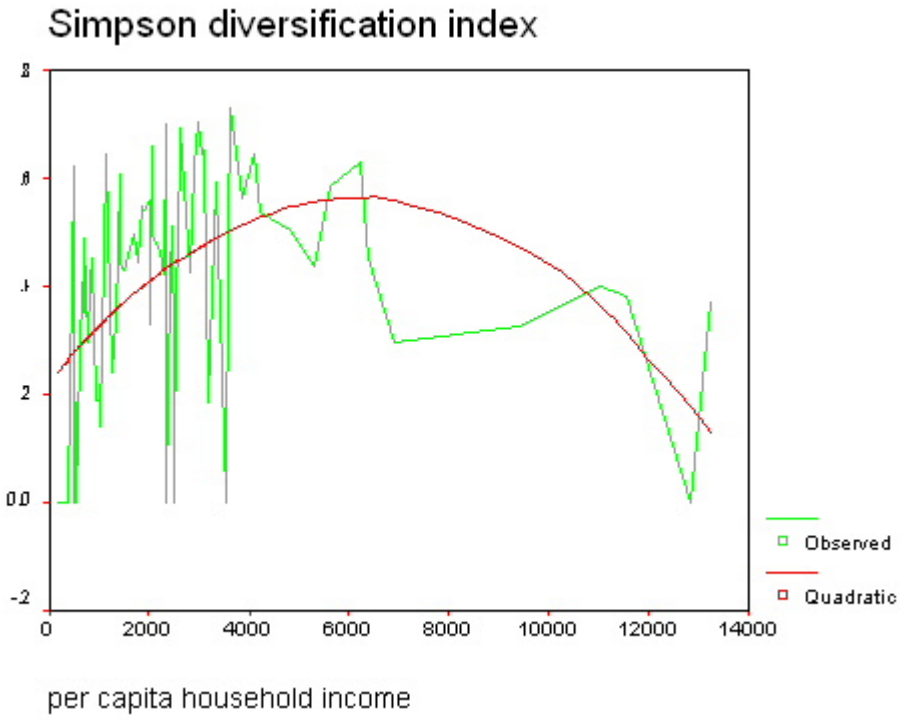
---------- Variables in the Equation ----------

Variable	B	SE B	Beta	T	Sig T
PERCNON	.014476	.001948	2.078597	7.431	.0000
PERCNON**2	-.000150	2.1928E-05	-1.907722	-6.820	.0000
(Constant)	.208416	.034261		6.083	.0000



B. SPSS outputs for per capita incomes versus livelihood diversity index curve fits.

```
MODEL:  MOD_5. Household per capita income (PERHI)* Diversity index (DI).

Dependent variable.. DI                Method.. QUADRATI

Listwise Deletion of Missing Data

Multiple R           .46487
R Square             .21610
Adjusted R Square    .19161
Standard Error       .19312

            Analysis of Variance:

               DF   Sum of Squares      Mean Square

Regression      2         .6580124        .32900622
Residuals      64        2.3868718        .03729487

F =       8.82176       Signif F =  .0004

-------------------- Variables in the Equation --------------------

Variable                   B        SE B       Beta         T  Sig T

PERHI                .000109  2.6459E-05   1.493326     4.137  .0001
PERHI**2    -8.80117929E-09  2.1155E-09  -1.501603      .     .
(Constant)           .224725     .051165                4.392  .0000
```



MODEL: MOD_6. Per capita farm income (PERFI)* Diversity index (DI)

Dependent variable.. DI Method.. QUADRATI

Listwise Deletion of Missing Data

Multiple R .27160
R Square .07377
Adjusted R Square .04482
Standard Error .20992

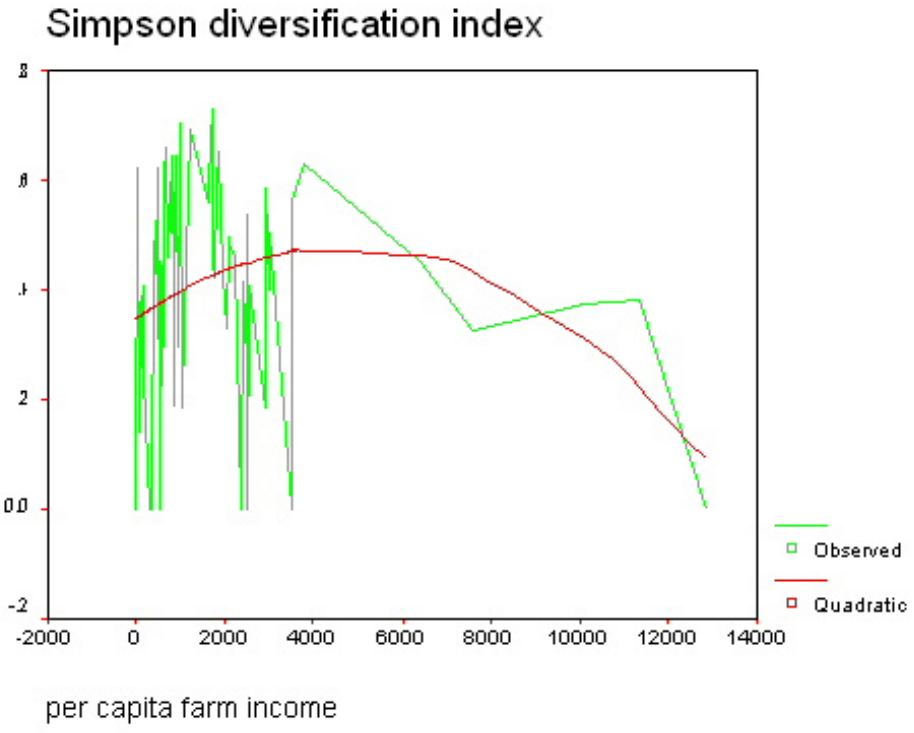
Analysis of Variance:

	DF	Sum of Squares	Mean Square
Regression	2	.2246185	.11230927
Residuals	64	2.8202657	.04406665

F = 2.54862 Signif F = .0861

---------- Variables in the Equation ----------

Variable	B	SE B	Beta	T	Sig T
PERFI	5.60352166E-05	3.1984E-05	.648855	1.752	.0846
PERFI**2	-5.90134206E-09	2.7843E-09	-.784981	.	.
(Constant)	.346676	.045893		7.554	.0000



MODEL: MOD_7. Per capita non-farm income (PERNF)*Diversity index (DI).

Dependent variable.. DI Method.. QUADRATI

Listwise Deletion of Missing Data

Multiple R .54487
R Square .29688
Adjusted R Square .27491
Standard Error .18290

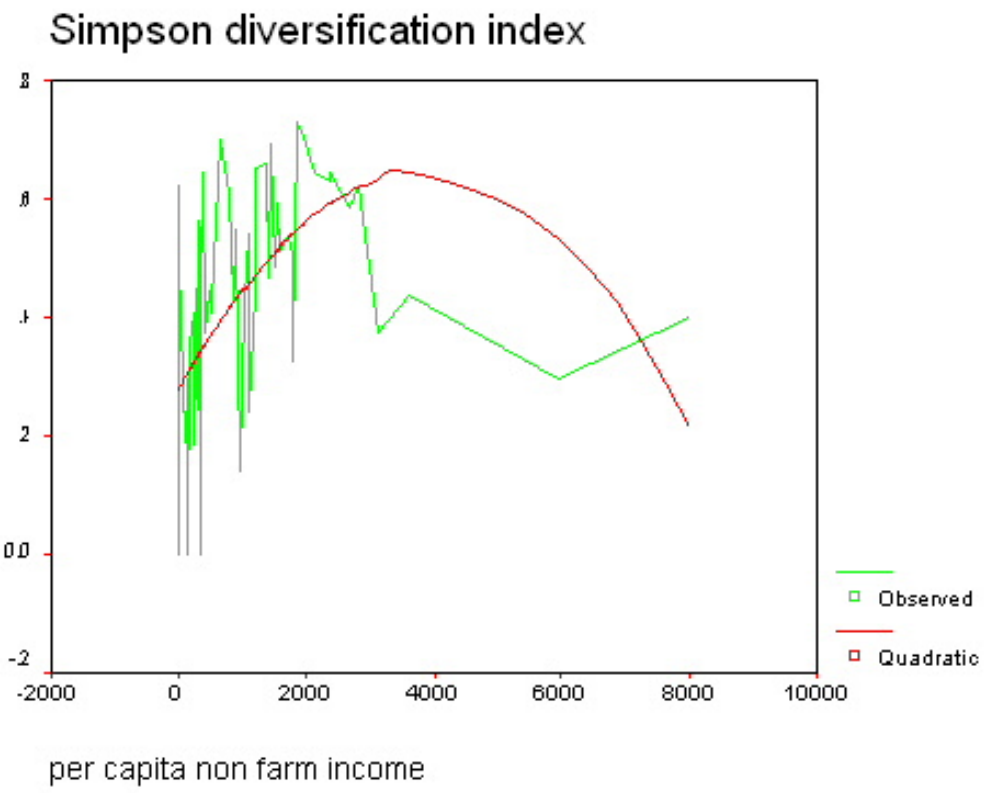
Analysis of Variance:

	DF	Sum of Squares	Mean Square
Regression	2	.9039626	.45198132
Residuals	64	2.1409216	.03345190

F = 13.51138 Signif F = .0000

---------- Variables in the Equation ----------

Variable	B	SE B	Beta	T	Sig T
PERNFI	.000191	3.7067E-05	1.239990	5.151	.0000
PERNFI**2	-2.48728211E-08	5.7430E-09	-1.042658	.	.
(Constant)	.279779	.032239		8.678	.0000



Appendix VI. Questionnaire and checklist

A. QUESTIONNAIRE

a. HOUSEHOLD DEMOGRAPHIC DATA

We would like to ask some questions about the people who are living/ staying in this household at the moment.

Q1. Number of people living in household: _____

Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
Name of people living in the household, starting with household head	Relation to Household	Sex (M/F)	Age	Region of origin	Occupation/ economic activity	Marital status	Highest level of education attained	Role /responsibility
1. Household head								
2.								
3.								
4.								

Codes for Q3:
1. Father
2. Mother
3. Son
4. Daughter
5. Grand children
6. other (specify)

Codes for Q8:
1. Single,
2. Married,
3. Divorced,
4. Widowed,
5. Separated.

Codes for Q10
1. On-farm (cultivation of crops, livestock rearing, etc…)
2. Off-farm (wage on other farm within agric., income from firewood, charcoal, and other environmental sources…)
3. Non-farm (non-agricultural income sources)
4. Student
5. No work

b. HOUSEHOLD INCOME FROM FARMING ACTIVITIES

1. Crop production:

Q11. Do you grow crops?

Q12. Where do you grow the crops? In backyards/In open space/In urban fringe areas/ Roadsides/Other_____

Please consider the following crops, vegetables, fruits and ornamental plants when interviewing about the list of crops produced by the farmer

Crops	Vegetables	fruits	Ornamental plants
Tef Wheat Chick pea Grass pea Beans Lentil Barley Millet and others	Carrot Potato tomato Cabbage Other cabbages Beet root	Fruits Orange Mango Papaya Banana Coffee Avocado Other fruits	Flowers Trees and others

Q13	Q14				Q15	Q16		Q17	Q18
List of crops grown last year	Uses of crop				Amount of crop produced last year	Annual income from each crop sale in birr	Where did you sell the crop produce	Challenges linked to production of crop	Possible solutions to challenges in (Q17)
	Home cons.	Sale	Gift and reciprocity	Other				a. Accessing seeds b. Fertilizer access c. Extension services d. Watering of crops e. Droughts f. Lack of markets g. Storage h. Transportation i. Pests j. Late delivery of inputs by govt/ suppliers k. Labour l. Conflicts m. Other (specify)	

Q19. Do you have enough seed? If not, how do you fill the shortage of seed?_____

Q20. Where do you get the seed from? Extension agents:____ Relatives:_____ Other:_____

Q21. Do you apply chemical fertilizers in your garden/plot? (If no, go to Q23)

Q22. How do you get fertilizers?

Q23. How do you water your crops? Use irrigation water/ Rain fed/ Other _____

Q24. Is there adequate water resource for cultivation? If no, how do you fill the shortage?

Q25. Do you apply manure in your plots? (If no, go to Q27)

Q26. How do you get manure?

Q27. What are your means of controlling diseases and pests?

Q28. How do you dispose of crop wastes?

Q29. Household composition and individual involvement in crop production activities

Status	sex	Involvement in activities (Yes/No)							
		Land prep.	planting	weed	Irrig.	Fert. Appl.	Disease control	Harvest	Sale of produce

Q30		Q31
Agriculture related assets owned and quantities		Do you rent any assets that you don't own as a household during your agricultural activities? Yes□ No□
Assets	Quantities	If yes, what is rented?
1 Ox drawn 2 plough 3 Tractor 4 Tractor trailer 5 Hoes 6 Ridge/cultivator 7 Harrow 8 Tractor plough 9 Oxen 10 Machetes		1 Ox drawn 2 plough 3 Tractor 4 Tractor trailer 5 Hoes 6 Ridge/cultivator 7 Harrow 8 Tractor plough 9 Oxen 10 Machetes

2. Livestock rearing

Q32. Do you rear livestock?

Q33. Where do you keep your livestock? In backyard barn/ In peri-urban area/ Other_____

Q34				Q35					Q36		Q37	Q38
List of Livestock Reared and Quantities				Uses of livestock					Annual income from each livestock sale	Where do you sell livestock?	Challenges of livestock rearing	Possible solutions to challenges in (Q37)
		Qty	Product type	Home consumption	Sale	transport	manure	Other(specify)				
Cattle	Cows										1. Lack of veterinary services 2. Shortages of grazing areas 3. Diseases 4. Shortages of feeds 5. Lack of markets 6. Conflicts with wild animals 7. labour 8. Transportation 9. Storage 10. Conflicts 11. Other (specify)	
	Oxen for fattening											
Goats												
Sheep												
Chickens			Eggs									
			Meat									
Donkeys												
Pigs												
Bees												
Silk worm												
Other (specify)__												

Q40. How do you feed your animals? Grazing in open areas/ Stall-feeding / Other _____

Q41. Do you get adequate feed for your animals? If no, how do you fill the shortage? _____

Q42. Is there adequate water resource for the animals in your area? Yes□ No□

If no, how do you fill the shortage?

Q43. Do you use processed feeds? If no, why?_____

Q44. Do you have veterinary services nearby?

Q45. How do you dispose of animal wastes?

Q46. Household composition and individual involvement in animal husbandry

Status	Sex	Involvement in activities (yes/no)						
		Feeding	Milking	Cleaning of barn	Treatment	Sale of product	Other activities	

c. OTHER INCOME SOURCES

Q47. Do you/member of your family involve in different non-farm/off-farm activities?
If yes, how much do they earn from the activities on average per month?

Activity		Participant	Sex	age	Income per month	Why others not participating	
1. Own trading							
2. Casual work							
3. Remittance	Cash						
	Kind						
4. Income from natural resources • Firewood • charcoal • Woods for buildings • Other (specify) • Other (specify)							
5. Employed (specify)_____							
6.							

Q48. Do you own a house?

Q49. Who in the household decides on how to use the income from farming?

d. LAND CHARACTERISTICS

Land Possession		Yes						
		Size of land	Distance from dwelling (in time)	Location of land	Quality of land	Source of land	Title deed	Use of land
Q50	Do you own land? Yes□ No□				Fertile□ Medium□ Poor□	Inherited from parents□ First possession □ From spouse□ Bought □ From Government□ Other_____	Yes__ No__	
Q51	. Do you rent land? Yes□ No□							
Q52	Other form of ownership ? (specify)							

Q53**.** Have improvements made in your land characteristics since you received it? If yes, fill out the following table.

Type of improvement	Date of improvement	Cost of improvement
Change in size (increased/decreased) Fencing Tree panting Other (specify)		

Q54. Do you face problems with the following to expand your farming: Buying of land? Selling of land? Renting of land? Renting out land? If yes, how? _____

Q55. Is the produce from your own farm enough for year round consumption? If yes, go to Q56. & if no, go to Q58.

Q56. How many months of consumption does it provide for? ……..

Q57. How do you fill the consumption gap?

1- Buying using money earned from household's other income sources
2- Buying using money sent by kin living in another area
3- Get foodstuffs from relatives and friends within community
4- Others (specify)……

Q58. Which of the following environmental shocks have been experienced in the past 2 years (i.e. between August 2004 and today)? Droughts, Floods, Mudslides, Pests, Diseases, Others (please specify)?

Q59. How have the shock(s) mentioned in Q58 above been addressed?

1- By growing drought resistant crops
2- By using pesticides
3- By having more than 1 garden in different places
4- By involving in non farm activities (trading, carpentry, tailoring, etc)
5- Getting remittances from family members living outside area
6- By involving in off farm activities (working on other people's farms)
7- Reducing household size by sending household members to live with kin elsewhere
8- Others(please specify)…….
9- Others (please specify)……

e. SOCIAL NETWORK

Q60**.** Are you a member in the social groups of the community? If yes,

Name of the social group	The role of the respondent/member of the group in the household	Advantages as being a member	Disadvantages as being a member

f. FINANCIAL MATTERS

Q61. What kind of agencies do you have access to get credit and saving services?

Formal (banks, micro credit institutions, etc..) institutions				Informal institution			
Name of institution	Size of loan	Purpose	Reliability	Name of institution	Size of loan	Purpose	Reliability

Q62. Do you face problems with any kind of credit services? If yes, how?

Q63. Do you practice saving? If yes, in what form do you keep it? Money in bank/Money in 'Equb'/ seed in store/ livestock/other animals/Other_____

Q64. Do you borrow or lend money to your family (including extended family) and friends?

Q65. What problems do you face as an urban farmer?

B. CHECKLIST for key informants

1. How is the extent of urban farming in this sub-city?
2. Which kebeles is urban farming most common?
3. Do you have list of names of urban farmers with kebele number? If yes, can I have them?
4. Which crops and livestock are commonly produced in this sub-city? Start with the most important.
5. What are the main uses of the crops and livestock? Start with the most important.
6. What problems do the urban farmers face in crop and livestock production?
7. What proportions of the people in the sub-city are engaged in urban farming?
8. How do you rank the living conditions of the urban farmers in the sub-city? What things they don't have?
9. How do urban farmers maintain their level of income throughout a year? If they have other income means?
10. How do you valuate the significance of urban farming as compared to alternative income generating opportunities?