





Gender and agricultural production: The case of urban and peri-urban of Addis Ababa and Oromia Special Zone surrounding Finfinne, Ethiopia

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ABSTRACT

In this study, we have attempted to assess how gender affects urban and peri-urban agriculture in Ethiopia. On the basis of a household survey, data were collected from 54 urban farmer households using a structured questionnaire, and nine case studies and focus group discussions were randomly selected from three sub-cities in Addis Ababa and one district in the Oromia Special Zone surrounding Finfinne. Data from both primary and secondary sources were employed to generate the paper. The findings revealed that the most common types of agribusiness in urban and peri-urban areas were cultivating grass and vegetable crops. It also suggests that those involved in urban and peri-urban agriculture are creating job opportunities and extra income for middle- and low-income people. The decision-makers therefore must implement sustainable livelihood systems for these very poor communities, which reside in peri-urban and urban centers in the area.

Keywords: urban, peri-urban, agriculture, income, grass, livelihood

INTRODUCTION

Rural farmers rely a lot on agriculture, and urban society often engages in its production. It also serves as the basis for the economy of the majority of developing nations and makes a major contribution to the GDP and job opportunities of these countries. Since rapid urbanization, urban agriculture has supplied staple foodstuffs to meet the rapidly growing urban population's demand. For instance, in Nigeria, 20% or more of the vegetables were produced in urban areas using irrigation ponds, engaging 16% of the town's population. Most of them grow vegetables for trade and family use, mainly in southern Nigeria, like lettuce, Swiss chard, orchards, and wine tapping (Olawepo, 2012).

The role of women in agriculture varies by region and country development level. Because of the barriers that prevent women from being as productive as they may be in agriculture and the rural economy, agriculture fails spectacularly in many countries. Women's utilization of agricultural time differs depending on the type of crop produced, the stage of production, their age, and their culture. Some crops are given more attention due to their proximity to residences or other socioeconomic reasons. Furthermore, compared to men, women have a higher overall labor burden

related to childcare, preparing food, collecting fuel and water, etc. (FAO, 2001).

In Ethiopia, agriculture accounted for 85% of all employment in 2013/14, 40% of the GDP, and 2.3% of real GDP growth (UNDP, 2015). Vegetables and root crops are commonly produced in Ethiopia on limited and commercial farms, according to the CSA (2010). Lettuce, kale, Swiss chard, cabbage, tomato, green pepper, and red pepper were just a few of the vegetable crops. The most common root crops are sweet potato, taro (godere), beet roots, carrots, onions, and garlic. The quantity of land allotted for both root and vegetable crops varied from year to year. For instance, a total of 119,091, 162,125, and 138,393 ha of land were allocated for vegetable production under irrigation and rain fed schemes over a period of three years, from 2007/08 to 2009/2010.

Also, the percentage of the total cultivated area used to produce vegetables under irrigation plummeted over the course of the years, declining to 5.57%, 5.43%, and 3.68%, respectively. The same is true for root crops; for the specified time period, 184,392, 154,742, and 212,206 ha of land were earmarked for irrigation and rain feed, respectively. While the percentages of root crops grown with irrigation were 7.4, 7.9, and 5.3%, respectively.

Statement of the Problem

Agriculture's labor divisions vary from continent to continent as well as from region to region. For instance, women make up over 40% of the agricultural labor force in the developing world, with a range of roughly 20% in the Americas to almost 50% in Africa. From just over 40% in Southern Africa to just over 50% in Eastern Africa, these are indeed the average percentages across Africa (FAO, 2001). Additionally, there were gender inequalities, with women often receiving between two-thirds and one-half of what men do for the same number of hours in the agricultural sector in Lebanon (FAO, 2021).

In highly populated countries like China, the roles of women and men are highly equivalent as compared with other countries. On the one hand, this is mainly due to urbanization, population expansion, and inland migration. On the other hand, the suitability of urban agriculture in terms of job creation, especially for women, as a means of survival and livelihood income made it more preferable than any economic activity. Thus, it is clear that urban and peri-urban agriculture are very labour-intensive and create employment for the jobless, particularly for women, youth, and people newly arrived from rural areas (ILO, 2013).

Likewise, urbanization encourages people's migration to cities, which enhances the food demand in urban areas in contrast to rural areas. According to World Population Prospects (WUP) (2011), the world's urban population is expected to increase by 72% by 2050, from 3.6 billion in 2011 to 6.3 billion in 2050. For the same period, the rural population of the less developed regions is expected to decline from 3.1 billion to 2.9 billion. It means that to feed the growing urban population, the contribution of urban and peri-urban agriculture is incontestable.

Urbanization and its consequences pose new challenges to the environment and natural resources. For instance, as a result of urbanization and population expansion, urban rivers were highly susceptible to pollution, especially in developing countries with poor infrastructure and a lack of capacity to treat waste. This, in turn, has an impact on the urban population, either directly or indirectly. Those households (HHs) that live along the nearby river and use the river water for agricultural production may be liable to different contagious and respiratory diseases. In addition, the health of those who consume agricultural products is likely to be affected as a result of the existence of heavy metals and dangerous chemicals, as well as being sensitive to diarrhea (Kassa, 2012).

Urban and peri-urban agriculture in Ethiopia contributes a lot to the livelihoods of the HHs in terms of income generation and poverty reduction, besides its socio economic challenges. According to Tewodros (2007), farm households in Addis Ababa are engaged in the production of livestock and vegetable crops for home use and market. Since urban and peri-urban agricultural land is too small, vegetable crop production is a well-suited and conducive source of income for the poor. He also argued that similar to the rural farming HHs, vegetable producers in Addis Ababa use traditional tools, extensive labour, and the furrow irrigation method using traditional canals, which is liable to and affected by floods during the rainy season.

Regardless of its contribution to the livelihood of the farm and non-farm communities as suppliers of vegetable crops, urban and peri-urban agriculture is a survival strategy for the poor. Even though a lot of research has been done in urban and peri-urban agriculture, there are limitations to addressing the role of gender in urban and peri-urban agriculture. Thus, this paper tried to fill the gap observed by other researchers, focusing on case stories and a descriptive style of explanation. Hence, taking into consideration the mentioned problems and gaps, the following objectives would be addressed:

The study's overarching goal was to investigate the role of gender in urban and peri-urban agriculture in Addis Abeba and the Oromia Special Zone surrounding Finfine. The specific objectives of this study were to:

- investigate the roles of men and women in urban and peri-urban agriculture,
- assess the land ownership by gender and the type of agricultural products,
- investigate gender revenue generation in urban and peri-urban areas, and
- know what engagement means for gender in urban and peri-urban agriculture.

Conceptual Framework for the Study

The conceptual framework used in this study includes key interconnected elements that have an impact on urban and peri-urban agriculture: activity actors, livelihood strategies, eco-health, agricultural policies and laws, and supply chain management (marketing). In this framework, the access to resources by gender; gender analysis of factors influencing activities, and the irrigation activities of the area were included in the study. Furthermore, the study area assesses the implications of existing gender division of labor, livelihood strategies, the contribution of urban and peri-urban agriculture to eco-health, available policies for urban and peri-urban agriculture, and other intervention areas.

Identifying gender roles, which became mandatory in 2003, is the first step in studying gender in urban and peri-urban agriculture. Essentially, the process of determining "who does what" was examined in this research framework. And hence, the activity profile is "based on the concept of gender-based division of labor" in agricultural tasks. The data was gathered on women's and men's tasks, their shared as well as unshared tasks, and on the degree of fixity of the gender division of labor analyzed as shown in **Figure 1**. Therefore, the conceptual framework below was used as a guideline for the study of the role of gender in urban and peri-urban agriculture in Addis Ababa City.

METHODS AND MATERIALS

Description of the Study Area

The research was conducted in Addis Abeba and the Oromia Special Zone surrounding Finfine (**Figure 2**). It includes household farmers, individuals, and cooperatives engaged in the cultivation of different vegetables and grasses along the Akaki River in Kolfe Keraniyo, Akaki Kality, and Nifas

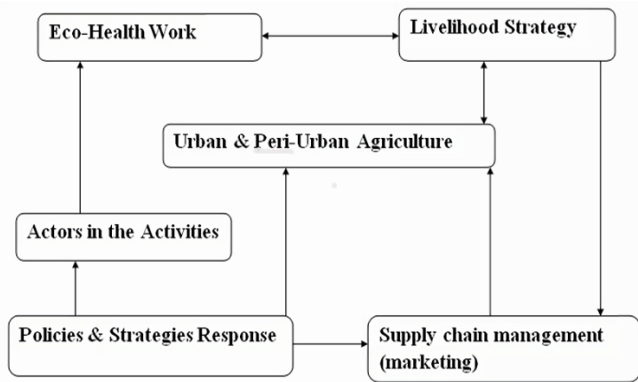


Figure 1. Conceptual framework of the study (own elaboration, 2017)

Silk Lafto sub-cities of Addis Ababa Administration, and Kaliti Woreda (Gemede, Handode, and Chefe Tuma Kebeles) of Oromia Special Zone surrounding Finfine. According to Ethiopia demographic and health survey 2005 (Central Statistical Agency [Ethiopia] and ORC Macro, 2006), Addis Ababa has a mild climate and is found at 2,408 meters above sea level. Its average daily temperature is about 16 °C, its mean annual precipitation is about 1,180 mm, and it has a unimodal rainfall regime starting from June to September. Dry seasons occur from October through February. During the dry season, many urban dwellers engage in urban farming using irrigation along the rivers found in the city.

The population of Addis Ababa is about 2,739,551 with a growth rate of 3.7%, according to Ethiopian Central Statistical Authority (CSA) (2007). Some of the city's residents are indigenous to the area, while the rest of the population consists of migrants from other regions of Ethiopia. The city is composed of urban and peri-urban areas and is divided into ten sub-cities, which are Addis Ketema, Akaki Kaliti, Arada, Bole, Gulele, Kirkos, Kolfe-Keraniyo, Lideta, Nifas Silk-Lafto, and Yeka sub-cities. The Addis Ababa City Council is responsible for the administration of the city. Seven of the sub-cities have urban agriculture offices under their sub-city capacity building program offices, except for Arada, Addis Ketema, and Kirkos. Based on the Addis Ababa urban land use plan report, the total land area of Addis Ababa is 530.14 square kilometers.

Data Sources and Method of Analysis

In the research course of action, both primary and secondary data were collected from different relevant sources in order to clearly address the distinctively set objectives. The primary data were collected from household heads and other farm communities that are either individually or cooperatively participating in the production of different crops and vegetables using the Akaki River and its tributaries. Secondary data were also collected to identify the demography of the residents and the respective ratios of gender participating in agricultural activities in the city and its surroundings.

The research followed both qualitative and quantitative data collection approaches, using structured and semi-structured questionnaires through face-to-face interviews. The qualitative data were collected in the form of a case study from households and individuals who lived in the area and had been participating in agricultural activities for several years. In

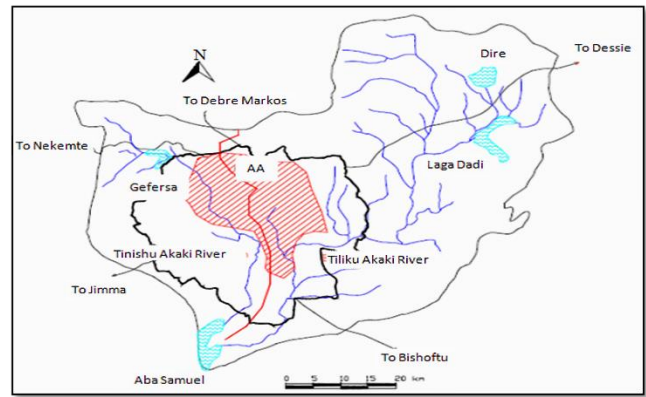


Figure 2. Urban & peri-urban agriculture following Akaki River (Guchi & Ashenafi, 2010)

addition to the case study, other qualitative and quantitative data were gathered by interviewing farmers who were participating in the farm, whether they were owners of the farm or daily laborers.

The research has applied the purposive sampling techniques to collect the primary data. According to this research approach, households, individuals, and cooperatives participating in agriculture from Akaki Woreda, Akaki Kaliti, Nifas Silk Lafto and Kolfe Keraniyo subcity were randomly selected and interviewed by the research team members. Out of these respondents, 22.2% were from Akaki Woreda, 33.33% were from Akaki Kaliti sub-city, 14.3% were from Nifas Silk Lafto sub-city and 33.33% were from Kolfe Keraniyo sub-city areas respectively. Based on this technique, 63 respondents were interviewed. The well-informed key informants (nine, or 14.3%) of these respondents were interviewed in depth for case studies, and 54 (85.7%) were deployed for face-to-face questionnaire-based data collection. Furthermore, the total number and proportion of female and male respondents were 21 (39%) and 33 (61%), respectively. This is due to male dominance in farm activities, and as a result, much less female participation was observed in the activities while the research was conducted in the farm areas.

The study employed a mixed method that comprises both qualitative and quantitative methods of data analysis. The qualitative and quantitative data were analyzed using descriptive and explanatory analysis. In the quantitative analysis progression, STATA version 14 and SPSS version 21 were used to code, tabulate, analyze, and interpret the data. Thus, descriptive statistical techniques such as mean, frequency, standard deviation, and percentages were used to analyze the quantitative data.

RESULTS AND DISCUSSION

Division of Labor

Most of the time, the farm participation of women and men is not comparable in rural, peri-urban, and urban areas. The primary reason is division of labor among family members such as women, men, and children. As summarized in **Table 1**, respondents in the study area clearly identified their role in agricultural activities. Accordingly, 55.6% of males alone

Table 1. Proportion of gender by division of labor

Farming activities	Only female	Only male	More female	More male	Both equally	Total
Land preparation	0 (0)	2 (3.7)	2 (3.7)	1 (1.9)	2 (3.7)	7 (13)
Tillage or hoeing	0 (0)	2 (3.7)	0 (0)	0 (0)	0 (0)	3 (5.6)
Plantation or sowing	0 (0)	2 (3.7)	0 (0)	0 (0)	0 (0)	2 (3.7)
Weeding	4 (7.4)	2 (3.7)	1 (1.9)	0 (0)	3 (5.6)	10 (18.5)
Fertilizing	0 (0)	2 (3.7)	0 (0)	0 (0)	0 (0)	2 (3.7)
Chemical spray	0 (0)	1 (1.9)	0 (0)	0 (0)	0 (0)	1 (1.9)
Watering	0 (0)	1 (1.9)	0 (0)	0 (0)	0 (0)	1 (1.9)
Harvesting	6 (11.1)	2 (3.7)	0 (0)	0 (0)	2 (3.7)	10 (18.5)
Marketing	0 (0)	2 (3.7)	0 (0)	0 (0)	0 (0)	2 (3.7)
In all farming activities	0 (0)	13 (24.1)	0 (0)	3 (5.6)	0 (0)	16 (29.6)
Total	10 (18.5)	30 (55.6)	3 (5.6)	4 (7.4)	7 (13)	54 (100)

Table 2. Proportion of mode of business of the HHs

Mode of business	Frequency	Percentage (%)
Sole proprietorship	27	50.00
Cooperative	21	38.89
Partner	6	11.11
Total	54	100.00

Note. Source: Own survey results, 2017

participate in all agricultural activities, whereas 18.5% of females engage in the production without any assistance from males. It does not mean that females' participation in agricultural activities is lower than males', but it indicates their effort and support for male farming activities in preparing food, cleaning, childcare, etc. Moreover, the role of females in agricultural activity dominates over that of males, especially in weeding (7.4%) and harvesting (11.1%) (Table 1).

Agro Business

It has been argued that gender analysis enhances the understanding of not only the practical needs but also the strategic needs of women farmers. It shows that it is not only a question of whether women farmers have access to key inputs but also whether they have control over resources and benefits. Essentially, these issues are related to decision making. It is a plain fact that everyone's life is full of decisions. According to study results, they participate in different types of businesses in urban and peri-urban areas of Addis Ababa (Table 2). The main modes of business for farm owners are sole proprietorships, cooperatives, and partnerships. In this study, it was discovered that there is a share of crops or farmland rents between firms in a joint venture or as partners. However, the majority of respondents report that farm activities were carried out by sole proprietorships, followed by cooperatives.

Land Ownership and Experience

According to Figure 3, the majority of respondents in the study areas were landowners (68%) with the remainder being daily laborers (30%) and piece rate employees (2%). 89% of land tenure status was owned farmland, while 6% and 5% were rented out and rented in, respectively. Most of the owned farmlands were inherited from their parents, and they continued their family's engagement in agriculture, especially in urban agriculture rather than peri-urban agriculture (case study 1). The research team also tried to see the experience of respondents' engagement in agricultural activities. As a result, it was found that 77.8% of the respondents fall in the range of

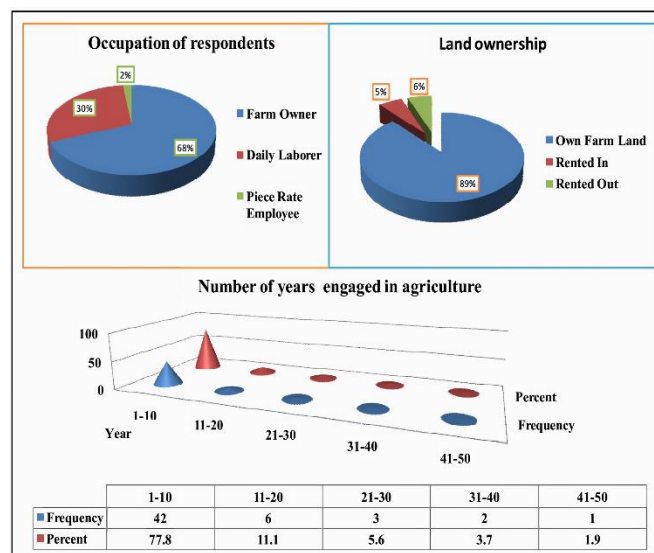


Figure 3. Land tenure, occupation, & experience of respondents (own constructed)

one to ten years of experience, followed by 11 to 20 years of experience by 11.2%.

Area of Land Under Cultivation

As all of the respondents were from urban and peri-urban areas, the size of the land they use for cultivation is very small, except for a few of them who are living in Akaki Woreda near the Aba Samuel area. Such land holdings limited the types and quantities of production that could be produced at any given time. Since the land configuration is very suitable for irrigation, the farmers undertake intensive agriculture and provide their produce to Addis Ababa residents and retailers. The land is mainly owned privately and cooperatively.

The land owned by private individuals ranges from 0.25 ha to more than two ha according to the family size and land pre-occupied by their parents or relatives, from whom they inherited or shared the land resources. Compared to private land occupation, the size of cooperatively held land is very small. It ranges from 0.036 ha to 0.25 ha. Because of their smaller land holdings, farmers were forced to cultivate only high-value crops with short harvesting periods. Indeed, the smaller the farmers' land area, the more high-yield crops they produce each year and the higher their income (Figure 4).

Approximately nine vegetables and crop productions were primarily available during this assessment period in the Akaki

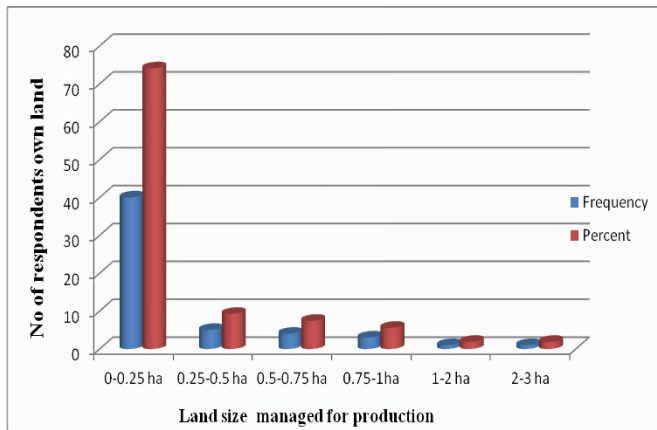


Figure 4. Number of respondents owned farmland & their respective land holding size (own research result, 2017)

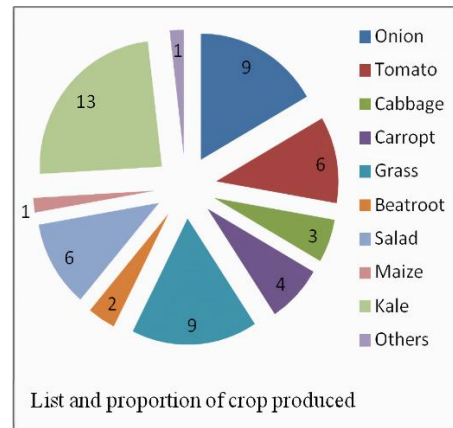


Figure 6. Lists & proportion of crops produced (own computation)

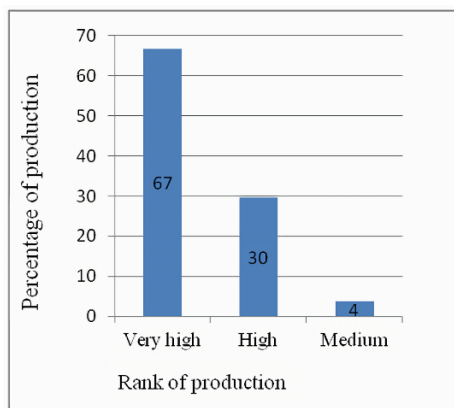


Figure 5. Rank of crops produced (own computation)

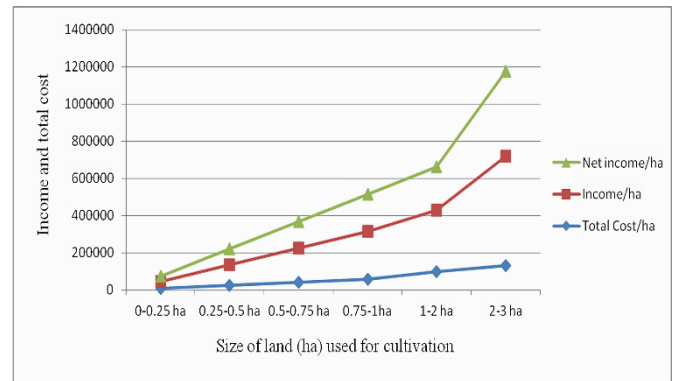


Figure 7. HHs total input cost of production, gross income, & net income per ha of land (own computation)

Woreda, Akaki Kality, Nifas Silk Lafto, and Kolfe Keraniyo areas (Figure 5).

The respondents were requested to rank the productivity of the vegetables and crops they produce based on their preference for cultivation. As a result, over 66.6% of respondents rated the products as very high, while 29.6% and 3.7% rated their production as high and medium, respectively.

Major Crops Grown and Their Rank

The main types of vegetables and crops grown in the study area are onion, tomato, cabbage, carrot, maize, beetroot, green pepper, kale, and crop production. Kale was grown by 13 (24%) of the households in the study area, followed by onions (17%). All selected households in urban and peri-urban areas are engaged in the production of vegetables, grass, and crops (Figure 6).

Cost of Production and Revenue Generated

In general, the aforementioned selected research areas are food crop growing areas, and the dominant ones are mentioned (Figure 7). It is important to recognize that in traditional agriculture, family labor is not seen as a cost of production. It is not a paid wage; its subsistence share remains the same whether it works or not. In contrast, hired labor is a cost of production, requiring a payment in cash or in kind. Many studies indicate that relatively well-off households tend to hire labor for both farm activities and domestic chores. This

is because they can afford to pay for the labor. According to this study, farmers produce crops by both hiring labor and working all of the activities during the growing season alongside the labor. Actually, the level of farm owner participation in the work is reducing as most of their children go to school. As a result, in most cases, the parents hire laborers, control the activities, and supply all the necessities.

In the production process, there was identification of the total cost incurred for production purposes and the total income earned from a hectare of land, along with the net income obtained from a round of harvest for the particular unit of land. In this computation, there is an increase in gross income and net income as cultivated land sizes increase. Likewise, the cost of production increases with the increase in land size as it requires more inputs such as labor, seed, seedlings, fertilizer, chemicals, and transportation (Figure 7).

Qualitative Analysis

Focus group discussions, key informant interviews, personal observations, a plate-taken survey, and a case study were used in this study. Details of them are, as follows.

Case study 1

According to information acquired from local residents of Akaki Kaliti, most of the vegetable, maize, beetroot, carrot, cabbage, green pepper, and grass farming was practiced on the Tinishu Akaki and Tiliku Akaki rivers in Akaki Kaliti sub-city and the peri-urban areas of Gemedo, Handode, and Chafe

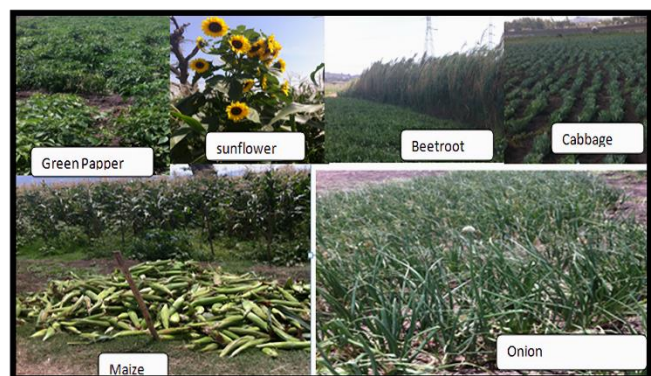


Figure 8. Vegetable & crop farm in Akaki sub-City & Akaki Woreda of Oromia Region (Source: Own plate taken, 2017)

Tuma areas of Akaki Woreda of Oromia Special Zone surrounding Finfine (**Figure 8**).

They stated that the majority of the people in Akaki Woreda were farmers who rented their land to Addis Abeba residents for 3,000 to 50,000 birr ("Qarxii," or 14 to five acres). The majority of the women are hired as day laborers on the farm, and the pay for male and female workers is not equal. They stated that, for instance, in Gemedo Kebele, the salary paid for female and male employees per day was 60 and 100 birr, respectively. On the other hand, division of labor was practiced as females were preferred for weeding and collecting output, while males were selected for tilling land, hoeing using oxen, seed sewing, and land leveling for cultivation. Gender roles differ in terms of labor division in urban and peri-urban farming activities, as well as salary payment based on masculine and feminine values. On the other hand, the study made by Tesfa (2002), Rahmato (1991), and Tadesse (2000) revealed that the ox-plow farming system and cultural taboos on women plowing, and sowing had affected women's rights on land, particularly those of female householders in Ethiopia. Another study by Boserup (1970) stated that women prepare the soil by sowing, weeding, harvesting, threshing, and transporting farm products. Therefore, bad traditional practice in our country has resulted in the division of labor by gender in Ethiopia.

According to Cornish et al. (2001), most land preparation is commonly executed by men, and irrigation and land preparation, which are done manually and are very laborious, are also mainly made by men. But, as also observed in neighboring countries, women dominate the vegetable marketing sector, in particular retail. Thus, this study has supported our finding that laborious land preparation, irrigation activities, tilling, raising beds, and nurturing crops are mainly done by men, while women are dominant in the retail sale of vegetable products in the study area.

Case study 2

Mr. Abirham was 25 years old, and now he lives in Akaki Woreda in Gemmedo Kebele, near the Handode area (**Figure 9**). He had previously worked as a cobblestone employee in Addis Ababa City's Akaki-Kality sub-city with a monthly salary of 700 birr. Other than his salary, he did not get a free residential house or other accommodations. He described cobblestone work as a time-consuming, laborious, and low-



Figure 9. Tomato farm in Gemedo & Handode Kebele (own plate taken, 2017)

income activity. Then, as a permanent employee, he switched to peri-urban green pepper farming for a monthly salary of 1,500 birr, with the added benefit of receiving a free residential house and accommodation provided by the farm owner. He also stated that agriculture work is preferable to cobblestone work in terms of income generation, safety, and comfort while working. He also works as a gardener and a night watchman. He has been engaged in green pepper work for two years in the Gemedo area as a permanent worker. From this, we can deduce that the urban employment situation has become even more acute and the practice of multiple livelihood strategies more intense. For almost all farming households in the cities and peri-urban areas, agricultural produce is for consumption as well as market supply.

Case study 3

Mr. Dadhi Tesfaye has more than two hectares of farmland in Gemedo Kebele of Akaki Kality for a vegetable and crop farm. He asked if the weather was the same as in the past or if it had changed since the rains had become more unpredictable or intermittent during crop harvesting (December to January), which had increased post-harvest losses and made the cost of labor involved in harvesting quickly following rains high. He further stated that rust diseases and insect pests have increased, especially in May and June, and vegetable pests have also become more common, mainly during rainy periods. Furthermore, the vegetable farm has now experienced unpredictable rains that trigger flooding, particularly during the autumn rains, increasing crop losses. This was the lack of proactive weather information (early warning) that would allow them to harvest crops early or remove those, such as tomatoes and cabbage, that have been harvested but left to cure. Consequently, at the beginning of June 2017, heavy rainfall accompanied by flooding destroyed our tomato, cabbage, onion, and other crops. Many farm owners in this area lost large amounts of vegetables due to the Belgian season and erratic rains.

Case study 4

Toleshe Bayisa, 38, is a mother of two who lives in a small village in Oromia's Akaki district's Gemedo Kebele. Toleshe and her family have a land size of 2 "Qarxii" (i.e., 5,000 m²) and live in a small, thatched house, renting their land to Addis Ababa city residents for 3,000 birr per term of work. She has been employed as a worker on the farm as a daily laborer, and



Figure 10. Grass farm in Gemedo, Handode, & Chafe Tuma Kebele of Akaki Woreda of Oromia (own plate taken, 2017)



Figure 11. Akaki River overflow damaged tomato farm in Gemedo Kebele (own plate taken, 2017)

her husband has been employed as a night watchman in another farm area. In her leisure time, she sells vegetables as petty trade, particularly on Saturday and Sunday. Her other source of income was limited to the sale of an assortment of small items in the petty trade. But her main source of income was her recruitment as a daily laborer with a payment of 60 birr per day, and she spent her income to cover her family's household expenses. From these activities, if she works for 22 days per month, she is expecting to earn 1,320 birr per month. She had not been involved in vegetable farming on her own land, and she had not earned as much money to help improve their food security. She has not changed her plans to cultivate her land in order to earn a good living rather than rent it to others who take a contract on her family's land. Therefore, the intervention of the government will be mandatory in order to be effectively and efficiently utilized rather than getting hand to month.

Case study 5

Tigist Tesfaye is 28 years old and lives in the Addis Ababa town administration's Akaki Kaliti sub-city. She has finished grade nine and lives with his mother. Tigest's father died when she was 12 years old, and she has since taken on the responsibility of generating money for food and other essential needs for her mother, nephew, niece, and herself by working after school hours. The family has just a 500 m² plot of land along the riverbank of the Akaki River, and this makes it very difficult to produce adequate food, even for subsistence. As a result, she was forced to look for other income generating activities. She started generating money by selling different flower plants and other exotic trees for garden beautification. She sells different flowers and garden trees and earned 3,250 birr. She invested this money to expand her vegetable business and to start trading vegetables. Moreover, she is currently diversifying her nursery activities. Her full engagement in the flower and vegetable farm makes her work an environment-friendly activity.

FGD 1: The Environmental and Social Impact of Polluted Rivers of UPA

The FGD was conducted with farmers along the Akaki riverbank in Akaki Sub-city, near Tirunesh Beijing Hospital in Woreda 9, to assess the impact on the residents' health. The majority of respondents have lived along the banks of the

Akaki River for 10-30 years, growing vegetables and grass to supplement their income (Figure 10). According to our informants, flooding has intensified due to siltation caused by erosion from farmland and solid waste dumping upstream of Entoto areas, the Kebena River, and other small streams in urban areas from different directions. In seasons or years where floods are not a problem, it is possible to harvest three to four times in a year, boosting productivity and earnings, through appropriate management. The vegetable farm, on the other hand, was suspected by the government of being the source of "Atet" in 2015/16, and thus the government prohibited the vegetable farm from cultivating vegetables along the Akaki Riverbank. The informants said that they did not have any option but to acquire livelihood means, and thus they continued to cultivate vegetables and sell them to market to sustain their family. Additionally, vegetable products are affected by increased damage from insect pests due to changes in climate conditions. This may be the result of environmental pollution that increases pests that affect their vegetable products.

When asked how they could prepare themselves for the prospect of increased flooding risks, vegetable farmers on the Akaki riverbank stated that the need for fast-growing grasses for coffee ceremonies, holiday festivity, bride and groom ceremonies, and religious ceremonies reduced their exposure to damage from the late rainy season (Figure 11). Since, flooding is a major concern for vegetable cultivation, the farmers have tried to reduce the risk of production loss by maintaining vegetable seedlings to transplant immediately after the land has drained following the long rains so that they can plant a subsequent crop for additional income generation. Also, when unpredictable rains occur during the second round of production, they favor the cultivation of root crops such as carrots and beets that are relatively less prone to flood damage. When asked how they could better manage climate risks, vegetable and tomato farmers emphasized the need for access to weather forecasts so they could be better informed of the potential for unexpected flooding during the March to May period. The farmers also mentioned the need for greater availability of fertilizers so that they could produce vegetables and grass more quickly. When floods are forecast, they cannot get their perishable produce to market quickly enough because of the lack of timely transportation of vegetables to markets. They stated that there are different vegetable producers'



Figure 12. Vegetable farm in Akaki sub-city & Akaki Woreda of Oromia Region (own plate taken, 2017)

cooperatives in Addis Ababa city along the main rivers of Gefersa, Tinishu Akaki, Tiliku Akaki, Kebena, Bulbula, and other small streams in the city.

The findings of these FGDs show that unpredictable flooding and pests affect vegetable production. Late-season rain caused crop lodging near maturity and was a major cause of vegetable losses. Improved liquid and solid waste management for pollution abatement is critical to ensuring food safety and environmental sustainability. Therefore, the consumption of vegetables that are cultivated on polluted soil and irrigated with polluted river water has an impact on human health.

FGD 2: Vegetable and Grass Producers

Focus Group Discussion (FGD) was carried out in the Kaliti area on June 17, 2017, with five urban farmers who are vegetable and grass producers. They stated that due to the proximity of urban and peri-urban areas to Addis Abeba, urban agriculture is widely practiced as a means of obtaining food security and income generation for poor households and some middle-income people. The informants stated that vegetable farmers in the cities organized as cooperatives around the 1970s, like Keraniyo Medhane Alem, Kolfe-Lideta, Kebena Bulbula, Mekanisa Furi Saris, and Shankla cooperatives. Each of the cooperatives was also paying land taxes to the government. The farm activities as cooperatives and other individual farmers produce different types of vegetables and grasses using irrigation systems from the rivers Kebena, Tinishu Akaki, Gefersa, Tiliku Akaki, Bulbula, and other small streams in the city. The vegetable farm was carried out on these polluted rivers, and it may affect the health of people. We do not know the impact of these products on human health (Figure 12).

According to Mekonnen (2007), the Little Akaki River basin begins in the Gullele area (the northern part of the city) and its catchment includes Merkato, Ledeta, Mekanissa, Lafto, and a portion of the Kaliti areas, whereas the Great Akaki River basin begins in the Entoto Kidane Miheret area (the north-eastern part of Addis Ababa) and its catchment includes sidest kill the lower stream of the Little Akaki River flows through the south-western side of the city and continues to flow to the peri-urban area of Akaki Woreda in the Oromia Special Zone Surrounding Finfine in Oromia Regional State, where most vegetable farm activities are practiced, and then continues to flow into the Aba Samuel reservoir and then to the Awash river. The Little Akaki River is also the dumping site for many industrial, commercial, and domestic wastes, so the pervasiveness of heavy metals and other chemical pollutants in the irrigation

water of this river is expected. The most important concentration of industries is around Gofa Sefer on the Little Akaki River, and the other is outside of Addis Abeba, southwest of the Ethiopian Electric Power Corporation power station at Kaliti, where the Little Akaki River is diverted to irrigate vegetables (Mekonnen, 2007). He made a laboratory test on vegetables like lettuce, red beet, Swiss chard, and carrot to analyze their total metal content. Then, the result reveals that the order of toxic heavy metal contamination, especially zinc contamination, in vegetables is lettuce > red beet > Swiss chard > carrot. He reported that the accumulation of these heavy metals in and on the vegetables might be due to the use of sewage-fed river water for their cultivation, and he also revealed that metals in water had more impact on vegetation than the soil itself. In general, he concludes that a detailed investigation of the extent of biosorption of heavy metals into the vegetables is required to determine whether the bioaccumulation in the vegetables is beyond the limit or not.

CONCLUSIONS AND RECOMMENDATIONS

The findings of this study, which was conducted in the Addis Abeba sub-cities of Akaki Kaliti, Nifas Silk Lafto, and Kolfe Keraniyo, as well as the Oromia Special Zone Surrounding Finfine, revealed that the land size that farmers cultivate is very small and intensively used for production purposes. In this research, as it is displayed in different figures and tables, the farm community varies in education level, means of managing land resources, proportions of male and female participating in agricultural activities, and cultivation preferences. The primary causes of these disparities were work division culture, a lack of awareness, and how both males and females perceived the role of females. As a result, the proportion of females participating in urban and peri-urban agriculture is 39%, while the proportion of males participating is 61%, respectively.

The other factor that lessens the participation of women is a cultural problem. For instance, some of the male respondents expressed their belief as when women get involved in farm activities; the productivity of the land reduces. Such atypical beliefs also reduce the direct engagement of females in agricultural activities. In fact, even though there is minimal direct participation of women in farm duties, they play a significant role in supporting male farmers by covering all domestic work like cooking food, childcare, firewood collection, fetching water, and doing other non-farm activities. The overall agricultural activity that is carried out on

such a small scale is not possible with either direct or indirect female participation.

The central aim of this study was to assess the participation of women and men in urban and peri-urban agriculture in the selected area. As a result, issues such as environmental management problems following the Akaki River, which is used for multiple socioeconomic purposes, have been identified during the research course of action. The quality of the river has been severely degraded as a result of this problem, affecting the health of river dwellers and severely affecting agricultural products, reducing the biodiversity of the river ecosystem, and affecting agricultural land through sedimentation as an off-site impact during the rainy season by over flooding.

Therefore, the research team recommends the following points:

1. The government and any other stakeholders should take into consideration the environmental value of the Akaki River and its tributaries in order to recover the river and maximize the benefit obtained from the river ecosystem.
2. Training is needed for the farm community on how to use the river and what to produce to capacitate the farmers.
3. Through meetings and forums, the community should be made aware of the importance of women's participation in urban agriculture and how they can participate in activities such as integrating agro-processing and adding value to their agricultural products.

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