



Addis Ababa University
College of Development Studies
Centre for Food Security Studies

Urban Agriculture and Food Security: The Case of Vegetables Production in Addis Ababa, Ethiopia

By:
Habtamu Serbessa Gadissa

April, 2024
Addis Ababa, Ethiopia



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in Addis Ababa, Ethiopia**

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A Dissertation Submitted in Fulfillment of the Requirements for the Degree of Doctor of
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Approved by the Board of Examiners

This is to certify that the dissertation written by Habtamu Serbessa Gadissa entitled “**Urban Agriculture and Food Security: The Case of Vegetables Production in Addis Ababa, Ethiopia**” and submitted in fulfilment of the requirements for the Degree of Doctor of Philosophy (PhD) in Food Security and Development Studies complies with the regulations of the University and meets the accepted standards with respect of originality and quality.

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DEDICATION

I dedicate this dissertation to Aserate Wendimu (Mom) and Serbessa Gadissa (Dad), who always reminded me that words have the power to change the world.

Declaration

*I, the undersigned, declare that this dissertation entitled "**Urban Agriculture and Food Security: The Case of Vegetable Production in Addis Ababa, Ethiopia**" is my original work and has not been presented for a degree at any other university and that all sources of materials used for the study are duly acknowledged.*

Habtamu Serbessa Gadissa _____

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This dissertation has been submitted for examination with our approval as a university supervisor.

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Table of Contents

Declaration	iii
Table of Contents	iv
List of Tables.....	vii
List of Figures.....	viii
List of Acronyms and Abbreviations	ix
Acknowledgements	x
CHAPTER 1: GENERAL INTRODUCTION	1
1.1. Background.....	1
1.2. Statement of the problem.....	5
1.3. Research questions.....	7
1.4. Objectives	7
1.5. Significance of the study.....	8
1.6. Scope of the study.....	8
1.7. Literature reviews	9
1.7.1. Urban agriculture: The broad scope	9
1.7.2. Typologies of urban vegetable farming	11
1.7.3. Definition of vegetables, food security and livelihoods.....	13
1.7.4. Theory of urban farming	14
1.7.5. Impacts of urban agriculture	18
1.7.6. Types of urban vegetable practises	22
1.7.7. Urban vegetable production marketing chain	23
1.7.8. Future threats of urban farming.....	24
1.7.9. Empirical literature reviews	25
1.8. Success stories of urban farming from COVID-19	28
1.9. Urban agriculture policy framework.....	29
1.10. Conceptual framework.....	30
1.11. Research methodology	32
1.11.1. Research philosophy	32
1.11.2. Research approach	33
1.11.3. Study design	33
1.11.4. Description of the study area.....	34
1.11.5. Study subjects and duration	36
1.11.6. Sampling design and frame	36

1.11.7. Sample size determination	37
1.11.8. Sampling technique	38
1.11.9. Data sources and collection tools	39
1.11.10. Techniques of data analysis.....	40
1.12. Ethical consideration.....	43
1.13. Scope of the study	43
1.14. Limitations of the study	44
1.15. Structure of the dissertation	44
CHAPTER 2: DETERMINANTS OF URBAN VEGETABLE PRODUCTION	
AND ATTRIBUTES OF PRODUCERS IN ADDIS ABABA, ETHIOPIA	46
2.1. Introduction.....	48
2.2. Methods.....	50
2.3. Results and discussion	52
2.3.1. Demographic and socio-economic characteristics of the respondents.....	52
2.3.2. Attributes of urban vegetable production.....	57
2.3.3. Types of vegetables produced and production capacity.....	59
2.3.4. Determinants of vegetable producers	60
2.4. Conclusion and recommendations	63
CHAPTER 3: OPPORTUNITIES AND CHALLENGES OF URBAN	
FARMING IN ETHIOPIA: EVIDENCE FROM VEGETABLE	
PRODUCERS IN ADDIS ABABA	64
3.1. Introduction.....	66
3.2. Methods... ..	68
3.2.1. Description of study area	68
3.3. Results and discussions.....	72
3.3.1. Benefits from vegetable production.....	72
3.3.2. Factors affecting the practices of urban vegetable production	77
3.4. Conclusion and recommendations	79
CHAPTER 4: THE CONTRIBUTION OF URBAN AGRICULTURE TO	
HOUSEHOLD FOOD SECURITY AMONG URBAN VEGETABLE	
PRODUCERS IN ADDIS ABABA, ETHIOPIA	81
4.1. Introduction.....	83
4.2. Methods.....	85
4.3. Results and Discussions	87
4.3.1. Socio-economic profile of vegetable producers.....	87
4.3.2. Producers' food insecurity status	88

4.3.3. Vegetable production's contribution to food security.....	90
4.4. Conclusion and recommendations	98
CHAPTER 5: THE ROLE OF URBAN VEGETABLE PRODUCTION TO THE LIVELIHOODS ENHANCEMENT OF PRODUCERS IN ADDIS ABABA: EXAMINATION OF INCOME, EMPLOYMENT AND MARKET EFFECTS	100
5.1. Introduction.....	102
5.2. Methods.....	105
5.3. Results and discussion	105
5.3.1. Socioeconomic profile of producers.....	105
5.3.2. Vegetables production contribution to household well-being.....	106
5.3.3. Urban vegetable production as an income-generating tool	106
5.3.4. Vegetable market and channels	108
5.3.5. Impact of vegetable production on employment creations	110
5.4. Conclusions and recommendations.....	112
CHAPTER 6: SYNTHESIS OF MAIN FINDINGS, CONCLUSIONS AND RECOMMENDATION	114
6.1. Main findings of the research.....	114
6.1.1. Factors influencing vegetable production systems and producer characteristics...	114
6.1.2. Benefits and barriers of urban vegetable production.....	115
6.1.3. The role of urban vegetable production in household food security	118
6.1.4. The role of urban vegetable production in urban livelihoods.....	120
6.2. On the path to future urban vegetable farming in Ethiopia	122
6.3. Policy considerations and recommendations	123
6.4. Contribution to science and society	125
6.5. Recommendation for future research.....	125
REFERENCES	127
APPENDIXES	153
Questionnaires... ..	153
Appendix: I Questionnaires for the Field work.....	154
Appendix: II Interview guide for key vegetable producers.....	166
Appendix: III Focus Group Discussions	167
ተያያዥ/ተጨማሪ ጉዳዮች	168
የአርሶ አደርና ከተማ ግብርና ልማት በማዕከል መዋቅራዊ አደረጃጀት	180
Pictures from observed area.....	183

List of Tables

Table 1.1 Summary of land resources used for typical typologies of urban farming.....	11
Table 1.2 Summary of commercialization employed for typologies of urban agriculture.....	20
Table 1.3 Summaries of practices for typical typologies of urban farming	23
Table 1.4 Nifas Silk Lafto sub city total population	35
Table 1.5 Total households engaged in vegetable production in Addis Ababa	38
Table 3. 1 A summary of major concerns raised in vegetable production (SWOT)	74
Table 3. 2 Force field analyses showing the driving and hindering forces for the.....	74
Table 3. 3 Household access to extension services	75
Table 3. 4 The correlation of factors that affect the vegetable production (Spearman)	78
Table 3. 5 Binary logistic regression estimates for determinants of vegetable production.....	79
Table 4. 1 Summary of study variables and their descriptions.....	87
Table 4. 2 The Household Food Insecurity Access Scale questions and household	88
Table 4. 3 Types and average number of foods consumed by the study households.....	89
Table 4. 4 Household food security and Household Food Consumption status summary.....	90
Table 4. 5 Cross-tabulation of employment and households' food security status	91
Table 4. 6 Ordinal logistic regression estimates for determinants of food security status	93
Table 4. 7 Sex of the respondents and household food insecurity access cross tabulation	93
Table 4. 8 Household family size and household food insecurity access scale score	96
Table 5. 1 Dependent and Independent variables descriptions	105
Table 5. 2 Farmers' perception and practices on local market syetem	109
Table 5. 3 Linear regression estimates for determinants of income from production.....	111

List of Figures

Figure1.1 A Model of agricultural land use.	15
Figure1.2 Conceptual frameworks to assess the effect of urban vegetable production	31
Figure1.3 Map of Nifas Silk Lafto sub city, Addis Ababa, Ethiopia.	34
Figure 2.1 Producers sources of land.....	58
Figure 2.2 Different varieties of vegetable production in the study area	59
Figure 3.1 Respondent vegetable production opportunities.....	76
Figure 3.2 Perceptions of respondents regarding the environmental benefits.....	76
Figure 3.3 Factors that affect the practices of vegetable production in total HHs	77
Figure 5.1 Sales income from vegetable production per household	107
Figure 5.2 Producers' farming costs during vegetable production	108
Figure 5.3 Respondents' marketplace chose to sell the product	109
Figure 5.4 Distance by car to the nearest market area for producers	110
Figure 5.5 Total Employees in vegetable production system.....	111

List of Acronyms and Abbreviations

AA:	Addis Ababa
AAUAFDC:	Addis Ababa Urban Agriculture and Farmers' Development Commission
CSA:	Central Statistical Agency
CSA:	Community-Supported Agriculture
CG:	Community Gardening
FAO:	Food and Agriculture Organization
FS:	Food Security
HFIAS:	Household Food Insecurity Access Scale
HG:	Home Gardening
LG:	Local Governments
SPT:	Social Practice Theory
TL:	Transformative Learning
UA:	Urban Agriculture
UF:	Urban Farming
UNDP:	United Nations Development Programme
UPA:	Urban and Peri-urban Agriculture
USA:	United States of America
UVP:	Urban Vegetable Production
VC:	Vegetable Cultivation
VP:	Vegetable Producers

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Abstract

The world, including Ethiopia, is experiencing an unprecedented era of urbanization. By 2050, the global population is projected to reach 9.7 billion, with 70% residing in cities, mainly in low- and middle-income nations. The recent COVID-19 pandemic and the escalating climate crisis urge us to reconsider our food production and distribution methods. In response, urban agriculture has gained prominence as a means to transform the global food system. This shift seeks to improve access to and the availability of nutritious food, create income opportunities, and contribute to community rebuilding as part of resilience efforts. This study aimed to comprehensively investigate the status, challenges, and potential opportunities of urban agriculture and food security in Addis Ababa, Ethiopia, with a specific focus on vegetable production. This study investigated several research questions by describing what farmers do (descriptive methods) and analyzing why they do so (analytical methods). To achieve this goal, the study used a variety of tools, such as SWOT analysis (identifying strengths, weaknesses, opportunities, and threats), force field analysis (analyzing driving and restraining forces), and scales to measure food insecurity (Household Food Insecurity Access Scale) and dietary intake (Food Consumption Score). Finally, a statistical method (regression model) was used to pinpoint the factors affecting food security and how much of an impact these factors have on the likelihood of household experiencing food insecurity. The findings showed that most farmers grow vegetables through rivers, not only for easy watering but also to protect the river's health. These vegetable gardens are close to their homes and focus on leafy greens such as kale and lettuce. Most farmers grow vegetables for both their own families and for sale. Interestingly, more than 70% of the people involved in urban farming were fairly new to it, having less than five years of experience. This suggests a large increase in the ability to grow vegetables in cities within this area. Most of them saw this growth as positive because they not only provided households with fresh, healthy food but also lowered their grocery bills and offered income-generating opportunities. These improvements ultimately led to better food security and dietary intake. However, a study revealed a concerning reality within the study area. A significant portion of the population struggles with food insecurity and may not be consuming a balanced diet. While the majorities achieve an acceptable level of food consumption, there is a need to address the challenges faced by those experiencing borderline or poor dietary intake. Safe housing, job opportunities, and stable family structures (such as marriage) were linked to better food security in the study.

While a skilled workforce, good conditions, motivated farmers, and government support could boost urban farming, the sector faces challenges. These include limited land, unclear rules, poor soil, trouble obtaining supplies, hot markets, lack of training, and weak support. Transportation issues and a public unaware of the benefits add to the struggles. To address these challenges and improve sector productivity and profitability, this study recommends the need for a socially and economically oriented dualistic urban agriculture framework. This plan would focus on helping farmers use resources better, reach markets more easily, and create a supportive environment. The study also recommends connecting farmers with research and extension services to introduce and use new technologies effectively. This could significantly improve urban agriculture in the region.

Keywords: *Urban Agriculture; Urban Vegetable Production; Household Food Security; Urban Livelihood; Ethiopia; Addis Ababa*

CHAPTER 1: GENERAL INTRODUCTION

1.1. Background

Food production has been a longstanding practice in and around cities throughout recorded history. However, the concept of Urban Agriculture (UA) gained prominence relatively recently, reaching its peak in the 1990s (FAO *et al.*, 2022). Various sectors contribute to UA, including horticulture, livestock, fodder and milk production, aquaculture, and forestry. The definition of UA has evolved over the past two decades. The widely accepted definition, proposed by Smit *et al.* (1996) and endorsed by the United Nations Development Programme (UNDP), characterizes UA as a business involved in producing, processing, and marketing food across urban and peri-urban areas. This activity is typically responsive to the daily demands of consumers in a metropolis (Smit *et al.*, 1996).

Similarly, Mougeot (2000) defines UA as an industry situated within or on the outskirts of a town, city, or metropolis. This industry engages in growing, raising, processing, and distributing a variety of food and non-food products. It relies heavily on human and material resources within and around the urban area, providing resources, products, and services back to the same urban area. Despite these existing definitions, they have limitations, notably excluding urban farming systems on and in buildings (Specht *et al.*, 2014).

Initially, the recognition of UA's importance was more pronounced in the global South, where substantial urban populations actively engaged in food production in and around East African cities (Cole *et al.*, 2008; Prain, Karanja, and Lee-Smith, 2010). The global community has acknowledged the significance of UA and advocates for its integration into urban planning. Innovative initiatives are underway to foster UA development globally, recognizing it as a crucial element in the resilience of city-region food systems (FAO, 2019b; FAO *et al.*, 2022). UA is increasingly viewed as a key contributor to the resilience of city-region food systems, diversifying food supply chains, enhancing the livelihoods of urban residents, and offering various benefits to sustainable urban development through localized food production and short supply chains.

Urban Agriculture has gained global recognition for its potential to enhance urban food security. Smit *et al.* (1996) estimated that Urban and Periurban Agriculture (UPA) engaged around 800 million urban residents worldwide in income-generating and/or food-producing

activities. Zezza and Tasciotti (2010) reported that 40 percent of African urban dwellers are involved in some form of agricultural activity, and this percentage increases to 50 percent in Latin American countries. A global UPA assessment in 2014 revealed that 266 million urban households in developing nations are actively engaged in crop production, cultivating 68 million hectares of land within 20 kilometers of urban centers worldwide (Thebo *et al.*, 2014).

In September 2020, the Food and Agriculture Organization (FAO) launched the Green Cities Initiative during the seventy-fifth session of the United Nations General Assembly (FAO, 2020a). This initiative targets small, intermediate, and metropolitan city, aiming to enhance people's well-being by improving the urban environment, strengthening urban-rural linkages, and increasing the resilience of urban systems, services, and populations to external shocks. In addition to ensuring access to a healthy environment and sustainable food systems, the Green Cities Initiative also contributes to climate change mitigation and adaptation.

FAO has actively supported several countries in Africa, Asia, and Latin America over the last two decades. These countries have sought and received FAO assistance in overcoming barriers, providing incentives, inputs, and training to low-income urban farmers in both large cities and small towns. FAO's multidisciplinary projects assist governments and local authorities in optimizing policies, institutional frameworks, and technical support services for UA, as well as improving production systems. The advocated practices and approaches include irrigated commercial market gardening in urban outskirts, simple hydroponic micro-gardens in slum areas, green rooftops in densely populated city centers, and urban agroforestry practices.

In the context of Melbourne, Australia, community gardens and street gardens are becoming increasingly common. Community composting operations are providing nutrients to growing greens without relying on chemical fertilizers. Public housing developments also feature communal gardens that are accessible to residents (Zainuddin and Mercer, 2014). These examples highlight the diverse and evolving nature of UA practices across different regions. Shanghai, China, confronted with the challenges of high population density, pollution, and congestion, has turned to urban farming as a solution. The city actively composts more than 80 percent of its organic waste, transforming it into highly effective fertilizer. This fertilizer is utilized in the city's agricultural zone, where the municipal government produces approximately 55 percent of the vegetables consumed and

an impressive 90 percent of green-leaf vegetables (Ding *et al.*, 2018). Colleen and Saenz-Montoya (2020) highlight the integral role of urban kitchen gardens in Colombia, emphasizing a program called "Urban and Rural Kitchen Gardens with You," led by the Mayor's Office. This initiative aims to foster the growth, vitality, and proliferation of family gardens, contributing to food security and improved nutrition for the city's residents.

In Ghana, Africa, urban agriculture has become a regional model, particularly in Accra, where farms are established wherever space can be found. These unconventional locations include areas under power lines, between walls and gutters, or any available space for cultivation (Puppim de Oliveira and Ahmed, 2020). India's government is actively promoting large-scale urban gardening, with plans to establish 230 rooftop gardens in Bihar. Residents will receive training and supplies, enabling them to cultivate their own healthy food while contributing to the city's greenery (Bannor *et al.*, 2021).

The Netherlands, recognized for its extensive waterways and proficiency in water management, has innovatively addressed agricultural challenges in Rotterdam's industrial district. A distinctive solution involves a two-story floating platform that accommodates around 35 cows. These cows are sustainably fed with city food waste, and their waste is cleverly repurposed into fertilizer for nearby farmland, showcasing an environmentally conscious and resource-efficient agricultural practice (EGT, 2022). Seoul, South Korea, is encouraging urban farming through financial and professional assistance from local government agencies. Particularly, the city has seen innovative advancements in vertical farming, exemplified by Metro Farm, a hydroponic farm located in a subway station (Oh and Kim, 2017).

Micro-gardening practices, particularly in smaller areas, have long contributed to food security and nutrition in impoverished countries. In Kampala, Uganda, locals have ingeniously constructed a drip irrigation system for growing kale by stacking wooden crates around a central compost chamber (Leregger *et al.*, 2014). These diverse approaches underscore the global trend of embracing urban farming for environmental, nutritional, and sustainable reasons.

The research community in Ethiopia has given limited attention to UA, which is considered both under-researched and relatively new in the country (Ashebir *et al.*, 2007). Existing literature is dominated by grey literature and micro-level studies, often focusing on a sample of households within specific metropolitan centers. Unfortunately, this has

resulted in a scarcity of information regarding the macroeconomic role of UA at both regional and national levels (Amsalu, 2020).

Despite small-scale farming contributing to approximately 95 percent of overall crop production in Ethiopia, with categorizations into rural (traditional) and urban based on the location of farming activities (MoARD, 2010; AgSS, 2016), UA is frequently underreported due to its size and the lack of specific institutions with dedicated responsibilities in the sector (Messay, 2013). As Amsalu (2020) notes, UA is only covered and recorded in the Ethiopian Agricultural Enumeration Survey 2001–2002.

Teferi and Sundara (2013) emphasize the essential role of UA in the lives of many Ethiopians, supporting hundreds of thousands of families across the country. However, the assessment of its viability as a livelihood strategy yields conflicting results. According to FAO (2015), each farming household earns an annual profit significantly greater than the annual salary of a public servant, contributing to both household income and urban food supply. It plays a crucial role in providing fresh and nutritious products to cities, generating income for households, and creating job opportunities for the community (FAO, 2017). Additionally, Sophia (2015) suggests that poor urban households engaged in UA consume more meals per day than those not involved. Alemayehu *et al.* (2017) discuss the implications of urban farming in Bedelle, noting that challenges often pertain to administrative rather than physical barriers. Dejen (2020) reinforces the positive aspects of UA, highlighting its potential to increase the proportion of food consumed in the city. UA, by utilizing organic solid and liquid wastes, not only improves the urban environment but also enhances the quantity and quality of available food, providing nutrition and income (Steenkamp *et al.*, 2021).

Messay (2010) underscores the multifaceted importance of UA in the town of Adama, highlighting its crucial role in achieving food security. Producers in Adama supply their products to local consumers and vendors, contributing significantly to environmental greening, job creation, and urban waste management. Yared (2019) emphasizes that even basic knowledge of vertical farming can substantially improve food security and viability. Mahteme and Akalewold, in their work from 2020, emphasize the significant role of UA in enhancing the quality of life for the urban poor in Hawassa city. The study found that 76 percent of respondents earned more money, with 51.4 percent covering household food consumption and 29 percent gaining employment opportunities. Challenges in Hawassa's

UA include a lack of credit services, technology support, feed, treatment, and input, as well as difficulties related to market access and storage facilities.

Vegetable cultivation in Ethiopia, including horticultural crops, fruits, and root and tuber crops, has a longstanding history in urban and peri-urban agriculture (Ashebir *et al.*, 2007; Fufa, 2017). Agriculture has been practiced in Addis Ababa for decades and continues to evolve alongside the city, playing critical roles in providing food, raw materials, and employment for the urban poor (Temesgen, 2017; Mekuria and Messay, 2018). However, challenges persist, with limited technical capacity at the local government level hindering accessibility for producers in Addis Ababa. The establishment of the Addis Ababa Urban Agriculture Commission in 2019, as noted by Ashenafi (2020), aims to address these challenges. The commission envisions the creation of UA parks in Addis Ababa to generate more than 50,000 new jobs annually. Their ambitious plan includes cultivating vegetables and fruits in various urban spaces, such as green areas, rooftops, restaurants, schools, and more.

Fruit and vegetable consumption has seen a gradual increase, especially among urban groups, according to Yeshiwas and Tadele (2017). Urban farmers in Addis Ababa supply nearly 60 percent of the city's vegetable consumption, with a particular emphasis on green vegetables (Desta *et al.*, 2017a). These findings underscore the vital role of UA in addressing food security, economic opportunities, and environmental sustainability in Ethiopian urban settings.

1.2. Statement of the problem

The world, including Ethiopia, is currently undergoing an unprecedented wave of urbanization, with projections indicating that by 2050, the global population will reach 9.7 billion, with 70 percent residing in cities, predominantly in low- and middle-income nations (FAO *et al.*, 2022). Concurrently, the recent COVID-19 pandemic and the escalating climate crisis compel us to rethink how we produce, process, and distribute food.

In Addis Ababa, Ethiopia's capital, food security challenges are pervasive, driven by factors like rapid population growth, high youth unemployment, environmental degradation, and climate fluctuations. These issues resonate with challenges encountered in other burgeoning urban centers. Those living in poverty, especially households headed by women, encounter substantial obstacles in fulfilling both their food and non-food

requirements. The rising cost of living further diminishes the purchasing ability of low-income families, exacerbating their food and nutritional insecurities. Additionally, the city's expanding urban sprawl and the accompanying environmental degradation contribute to mounting concerns (Dersolegn *et al.*, 2023). In response to these challenges, UA is gaining grip among city residents and is actively promoted by municipal organizations as a viable solution (FAO *et al.*, 2022). In Addis Ababa, UA is commonly practiced informally or, at times, illegally. However, it has not received the research attention it merits, with no official data available on UA or its participants. Despite this limited information, increased research has shed light on the diverse food-growing practices in the city, emphasizing UA's crucial contributions, particularly during the COVID-19 pandemic (Zerssa *et al.*, 2021).

Residents in Addis Ababa neighborhoods often have restricted opportunities to grow their own food, leading them to rely heavily on markets, primarily sourced from rural areas. The extended travel distance contributes to a loss of nutritional value in the food. Additionally, disadvantaged urban households, especially in Addis Ababa, allocate a substantial portion of their disposable income to food. Minor inflation can significantly impact the purchasing power of the poor, reducing the quality and diversity of their diet. This underscores the potential benefits of UA in Addis Ababa as a means to address these challenges (Mekuria and Messay, 2018).

The widespread adoption of UA faces significant challenges stemming from a lack of a cohesive organizational structure. Key issues include the absence of an urban agricultural extension system, insufficient leadership, executive and community understanding, and a lack of expertise and skills in UA at various levels. Challenges also encompass resource availability and quality, the limited development and adaptation of suitable UA technology through research and higher education institutions, and the incomplete identification of land suitable for UA (Mansour *et al.*, 2022).

Recognizing UA's potential, the Addis Ababa city government has identified it as a crucial tool for poverty eradication and food security. Consequently, the city government has officially acknowledged and endorsed urban farming within and around the city. UA has been integrated into the city's development master plan, and a commission for farmer and UA development has been established at different administrative levels (city, sub-city, and Wereda) to address overall UA challenges, with a specific focus on vegetable production.

As awareness of the importance of the UA sector grows, supporting organizations are emerging. However, the governing structure for UA varies across cities and lacks

consistency. Support frameworks come from various entities such as small enterprise offices, technical and vocational education and training institutions, cooperative organizations, extension offices, and small loan provider institutions. Despite this support, there are numerous limitations, as indicated by EMUDH (2016).

Given that UA operates not only in small spaces but also in areas unsuitable for traditional farming, the implementation of new methods and technology is vital. While some higher education institutions have initiated research to address UA concerns, the existing activity falls short in terms of utilizing new techniques and essential technologies for the sector (FAO *et al.*, 2022).

The scope and impact of vegetable production on both producers and the broader community in Addis Ababa, Ethiopia, remain insufficiently explored. The influence of urban agriculture on household food security, income, employment, and livelihood enhancement, as well as its interaction with producer attributes, requires further investigation. Scientific research is crucial to identify the opportunities and challenges associated with urban farming in the city. This research initiative aims to address these information gaps, highlighting the significance of urban agriculture, particularly vegetable production, in Ethiopia and specifically in the study areas.

1.3. Research Questions

The research questions of this study were:

1. What are the factors influencing urban vegetable production in the study area?
2. What are the major benefits of urban gardening?
3. Does urban vegetable cultivation reduce producers' food insecurity?
4. What is the role of urban vegetable production in urban livelihoods?

1.4. Objectives

1.4.1. Main objective

The primary objective of the study was to investigate the overall vegetable production, challenges, and potentials of urban agriculture and food security in the case of Addis Ababa city, Ethiopia.

1.4.2. Specific objectives

1. Identify factors influencing vegetable production.
2. Find the opportunities and challenges of urban vegetable production.
3. Analyse the contribution of urban vegetable production in household food security.
4. Examine the role of urban vegetable cultivation in urban livelihoods enhancement.

1.5. Significance of the Study

Urban agriculture is considered a highly sustainable practice essential for urban areas, offering an alternative approach to safeguarding food production for both current and future generations. Globally acknowledged and notably in Ethiopia, UA stands out as a solution to address the challenges posed by food crises, playing a vital role in ensuring food security and nutrition. Beyond these fundamental aspects, UA has proven effective in augmenting household income and enhancing food access through continuous agricultural product production. This recognition underscores the significance of UA in fostering resilience and sustainability within urban communities. This research aims to provide substantial evidence regarding UA, specifically focusing on vegetable production and the characteristics of producers. It seeks to address the challenges, opportunities, and contributions of urban agriculture to key aspects such as food security, employment, and income.

The findings from this study are anticipated to serve as valuable educational resources, fostering awareness among farmers and local governments. Moreover, the insights gained will contribute to the design of essential policy interventions aimed at enhancing vegetable production. This research endeavors to augment the existing body of knowledge on production practices and offer insights into potential areas for further research in the development of urban agriculture, with a specific emphasis on vegetable farming.

1.6. Scope of the Study

The research aimed to encompass all urban vegetable producers in the sub-cities of Addis Ababa. However, due to practical constraints, the study is confined to the Nifasilk-Lafto Sub-city, chosen through a non probability sampling (purposive) method targeting well known vegetable producers in the area. It's important to note that various types of

vegetable production methods exist, but this study specifically focuses on home-based, community-based, and other shared gardening approaches. Additionally, in terms of the time dimension, the research adopts a cross-sectional survey methodology.

1.7. Literature reviews

1.7.1. Urban agriculture: The broad scope

Urban agriculture served as a vital food source in densely populated urban areas, notably during the 17th century in Sweden, where it became a lifestyle choice, reducing reliance on rural areas. The majority of the locally grown food was consumed within the city, rather than being distributed to markets (Martin-Moreau and Ménascé, 2019). Between 1893 and 1927, urban agriculture became a remedy for unemployment in the United States. Temporarily unemployed individuals were granted land to cultivate their own food, leading to the establishment of garden-based poverty relief programs throughout various cities (Anderson, 2014). In 1976, the U.S. Department of Agriculture initiated the Urban Gardening Program, concluding in 1993. Subsequently, the American Community Gardening Association was founded two years later, aiming to facilitate information exchange among communities and diverse stakeholders. Garden programs like the New York City Green Guerillas (established in 1973) and Boston Urban Gardeners (founded in 1977) emerged, dedicated to revitalizing communities through gardening, as noted by Lawson (2004).

In wealthier nations, new models such as Community-Supported Agriculture (CSA) and agritourism have surfaced, offering innovative supply channels for commercial farmers. CSA originated in the 1980s in the United States, with predecessors in Europe and Japan (McFadden, 2005). Participants in a CSA program pay an annual fee and receive a regular portion of the farm's output, cultivating a more profound connection between farmers and consumers through shared risks and rewards (Farmer *et al.*, 2014). Since the 1990s, this model has rapidly expanded across North America and has been swiftly adopted in other countries with local adaptations.

According to FAO (2014b), Cuba initiated national promotion of UA in 1997. In Havana, a network of agricultural supply outlets, seed farms, composting units, and veterinary clinics has been established, along with agricultural insurance and production loans available through Havana's Banco Metropolitano. Cuban urban farms engage in educational programs with schools and provide heavily subsidized food to various social organizations

(Fernandez, 2017). In Oslo, Norway, a large rooftop farm collaborates with a nearby high school. During the summer, the farm offers part-time work at a union wage, with mentors supporting youth in their work. Workshops are provided to teach essential workplace skills such as project planning and management (Curtis and Gallis, 2018). Agritourism, a blend of agriculture and tourism, combines entertainment and services in diverse agricultural settings. While not inherently urban, agritourism has a significant connection with urban populations, typically observed in peri-urban environments. In Nanjing and Yangling, China, peri-urban farms allow consumers to engage in the entire production process, while on-farm housing and restaurants enhance the agritourism experience (Luehr *et al.*, 2020).

Urban agriculture is viewed as a complementary strategy to alleviate urban poverty, enhance food security, and improve environmental quality (EU, 2018). It aids urban planners in achieving sustainable goals, including sustainable urban farms, environmental management, and overall urban development that respond to ecological and economic city needs (FAO, 2015). UA producers often prefer horticultural crops due to their higher value and shorter turnaround time. In China, both small-scale family gardens and large-scale commercial farms cultivate vegetables and fruits like cucumber, aubergine, and Chinese long bean (Luehr *et al.*, 2020). Approximately 70 percent of urban production and supply of green vegetables within 20 kilometers of the city center of Hanoi, Vietnam, come from urban areas (Moustier and Danso, 2006).

In numerous African countries, commonly consumed vegetables like lettuce, cabbage, and tomatoes are predominantly cultivated on commercial farms, particularly during the dry season (Bellwood-Howard *et al.*, 2015). Maize and other essential crops like sweet potato, groundnut, cassava, and plantain are the primary choices for UA producers across Africa (Chaminuka and Dube, 2017; Mackay, 2018). However, in certain regions, UA farmers have transitioned from growing staple crops to focusing on vegetable crops and high-value items like flowers. This shift is driven by factors such as higher market prices, increased profitability, growing demand for niche crops, and concerns about land tenure security (Pauleit *et al.*, 2019). Nevertheless, cultivating vegetables and flowers poses greater risks compared to staples like rice, demanding increased investments and labor inputs.

1.7.2. Typologies of urban vegetable farming

Home-based gardening is a prevalent practice in both urban and peri-urban areas, although there is limited available information on this type of gardening. This form of gardening plays a crucial role in enhancing food security and nutrition at the household level. By directly providing family members with access to fresh and nutritious food that can be harvested, prepared, and consumed, home gardening contributes significantly to overall well-being (Galhena *et al.*, 2013). Typically, home gardening takes place in small spaces within or around the house, such as balconies, windowsills, cellars, rooftops, kitchens, front and backyards, and patios. Cost-effective home gardening strategies include utilizing locally available planting materials, implementing home composting, growing climbing plants on trellises or fencing, and employing indigenous methods for pest control. Home gardening, to some extent, serves as a production system that is easily accessible to economically disadvantaged individuals (AVRDC, 1990). The benefits of home gardening are manifold.

Table 1.1 Summary of land resources used for typical typologies of urban farming

Urban and Periurban Agriculture Type	Urban/Peri-Urban	Location	Scale/Size	Tenure/Ownership
Home-based gardening	Urban, peri-urban	Backyard, patios, rooftops etc	Small	Privately owned or unclear ownership
Community-based and other shared gardening	Urban, peri-urban	Public vacant land, etc.	Small to medium	Owned by a community group, an organization, a municipality, a public, or land trust; allocated to individuals or groups
Commercial crop production, livestock and fisheries	Peri-urban	Alongside water sources, not far from central market	Small to large	Privately owned, borrowed or rented
Institutional food growing	Urban, peri-urban	Schools, universities, municipalities and governments, public authorities, etc.	Medium to large	Owned by institutions

Sources: based on FAO *et al.* (2022)

It's worth noting that distinctions between home gardening, communal gardens, allotments, and other forms of gardening are at times unclear, and these distinctions can vary significantly between countries and even among different gardens (Nasr, 2021).

Community-based or shared gardening is a widespread practice globally, with community gardens and allotments being the most prevalent forms of communal growing spaces in wealthier countries, particularly in the cities of the Global North (FAO *et al.*, 2022). These communal gardens are typically situated in urban areas on public, unoccupied, or open

spaces. Land for community gardens can be found along railways and roads, underneath power lines, on the grounds of community centers and churches, and in public parks and other green areas. Some community gardens or small plots are also established on rooftops, inside apartment buildings, or in densely populated locations. In these communal spaces, individuals cultivate vegetables, fruits, herbs, and occasionally small livestock for various purposes, including home consumption, recreational activities, promoting health, educational initiatives, and as part of community development programs (Veen, 2015). Participants in communal gardens include low- and middle-income families, individuals, seniors, and recent migrants, reflecting a diverse range of community members engaging in shared gardening practices.

Urban agriculture encompasses a diverse range of activities worldwide, including commercial crop production, livestock farming, and fisheries. Given the substantial demand for fresh vegetables and fruits, UA practitioners typically show a keen interest in horticultural production. Those involved in agriculture in and around cities often benefit from superior infrastructure, technical assistance from institutions, market intelligence, and, in some cases, financial support (Yuan *et al.*, 2023).

Commercial food producers within UPA contexts vary, ranging from small, family-based growers to rapidly expanding companies that secure external financing. The latter often engage in slightly more technical and controlled-environment agriculture operations at multiple sites. Cultivation practices within UPA span a wide range, encompassing intensive greens and specialty vegetable cultivation in controlled settings on rooftops or building facades, indoor mushroom production, large-scale greenhouses focusing on vegetables, to the implementation of aquaponics systems in light industrial buildings (FAO *et al.*, 2022). The diversity in cultivation practices reflects the adaptability and innovation within UA to meet the demands of local markets and urban environments.

Institutional food production encompasses a diverse array of gardens and farms situated on land owned by various institutions, including schools, universities, religious organizations, prisons, municipalities, and other governmental entities, as well as public authorities, hospitals, and clinics. These initiatives involve projects designed for personal use, therapy, enjoyment, knowledge and skill development, and job creation, as well as commercial farms aimed at generating profit and fostering economic development (Galhena *et al.*, 2013).

Gardens established in schools and universities serve as valuable resources for environmental and nutritional education. Within these non-traditional learning settings, young individuals are introduced to the importance of wholesome and nutritious foods, particularly fruits and vegetables. Programs implemented in these institutional gardens not only impart skills but also foster a lifelong interest that provides physical activity, intellectual stimulation, and social connections (Ozer, 2007). Institutional food production thus serves multifaceted purposes, contributing to education, health, and community engagement within diverse institutional settings.

1.7.3. Definition of vegetables, food security and livelihoods

The term "vegetable" refers to the edible parts of plants, including shoots, leaves, fruits, and roots, consumed either raw or cooked as a complement to starchy foods and meats (Haile, 2014; Fanos and Belew, 2015). Vegetables are typically consumed in smaller quantities as side dishes with staple foods, providing essential nutrients like vitamins and minerals, as well as dietary fiber, which is often lacking in traditional staple foods (Hunde, 2017). In Ethiopia, vegetable farming has been a longstanding industry, with numerous small-scale growers cultivating a limited variety of vegetables for local and regional markets. Local demand for horticultural produce is generally low, except for tropical fruits and selected vegetables like onions, cabbage, and tomatoes (Tadele and Derbew, 2015). The country's diverse climate, ranging from below sea level to over 3000 meters above sea level, facilitates the effective cultivation of various vegetable crops. Abundant labor, extensive land, and water resources further contribute to the country's potential for diverse vegetable production (Tadele and Derbew, 2015).

Vegetable crops play a crucial role in addressing malnutrition, providing essential vitamins, minerals, and proteins, especially in a country like Ethiopia heavily dependent on cereals. Additionally, vegetables contribute to food security during times of drought, famine, and food shortages. They offer a source of income for farmers, create employment opportunities, and contribute to the national economy (Habtamu and Adugnaw, 2016; Nimona, 2017). Vegetables can be categorized based on the part consumed, including leafy vegetables (e.g., lettuce, cabbage), fruit vegetables (e.g., tomato, pumpkin), root vegetables (e.g., sweet potato, carrot), and spices (e.g., chilli pepper, onion). Vegetable cultivation is accessible to individuals with limited experience, and the flexibility of land use makes it easier for growers to switch between crops. However, vegetable production demands more intensive management per unit area and time due to its seasonal nature (Tadele and

Derbew, 2015; Nimona, 2017). The production variety is often concentrated in specific regions (Kumilachew *et al.*, 2014).

Food security, as defined by FAO (1996), is the state in which all people have consistent physical and economic access to sufficient, safe, and nutritious food that meets their dietary needs and preferences for a healthy and active life. Livelihoods, on the other hand, encompass the capabilities, assets, and activities necessary for people to earn a living and sustain their means of life (Sanderson, 2000).

1.7.4. Theory of urban farming

1.7.4.1. Social Practice Theory

The theoretical framework underpinning this study is Social Practice Theory (SPT), which was developed to analyze and understand social phenomena and transitional dynamics within human societies. SPT views practices as the smallest and most fundamental unit of analysis, emphasizing that behavior is an everyday activity encompassing various interrelated components such as working, eating, and consuming. Individuals are seen as carriers of practices, reproducing interconnected practices shaped by social structures (Spaargaren and Van, 2000). SPT investigates individual behaviors, their underlying causes, interests, and goals within the context of socially shared, time- and space-bound practices. Beliefs, norms, and values related to ecologically friendly activities are considered to exist within a specific social practice shared with others, rather than in isolation (*ibid*). In essence, SPT shifts the focus from individuals and their consumption habits to social practices as the starting point for understanding and catalyzing social transformation (Reckwitz, 2002). It elucidates the interactions between actors and social systems (Touliatos, 2011).

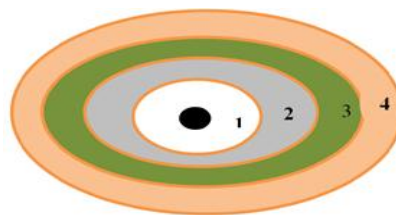
Theories of practice have become increasingly relevant in discussions of sustainable consumption, emphasizing how people pursue various concerns, become aware of new possibilities, and learn as they adjust their contributions to ongoing activities within specific practice settings and institutional structures (Welch *et al.*, 2015). Social theories, including SPT, are viewed as interpretive vocabularies influenced by empirical facts, providing contingent systems of interpretation rather than reaching the foundations of a concrete social reality. These theories offer cultural traditions for understanding ourselves and can serve as ways to break with existing cultural traditions, modifying them, and opening up new possibilities of self-understanding (Reckwitz, 2002).

In the context of this study, common practices are identified as UA practices through the evaluation of food-related activities such as purchasing, preparation, production, consumption, and disposal. This approach allows for a comprehensive understanding of the components essential for UA in the region. Viewing UA as a performance emphasizes the unique and distinctive features of UA practices.

1.7.4.1.1. Von Thünen's Economic Theory

Urbanization is a process where essential elements concentrate in cities, leading to the centralization of economies. In this process, cities become hubs or centers, while rural and agricultural areas transform into peripheral regions (Coquery-Vidrovitch, 1991). The theory proposed by Johann Heinrich von Thünen in the nineteenth century sheds light on how market distance influences the type of land use (agricultural) and the degree of intensity in agricultural production. It establishes the regularity of location-based land use and the comparative advantage of specific locations. According to this theory, a city acts as a center, and around it, an agricultural distribution zone expands in the form of concentric circles.

By the end of the twentieth century, the development of new economic geography, which focuses on regional development and industrial concentration within the context of globalization, contributed to the deepening of spatial location theory. This advancement allowed for spatial clustering in both agricultural and industrial scales (Tian *et al.*, 2011).



- =central city; 1=intensive farming and dairying; 2=Forest; 3=increasing extensive field crops; 4=ranching, animal products

Figure1.1 A Model of agricultural land use (Source: adapted from Tian, *et al.*, 2011).

1.7.4.2. Transformative Learning Theory

Transformative Learning Theory (TLT) is an adult learning theory developed by Jack Mezirow in 1978, and it aims to provide a comprehensive and universal model for adult learning. According to Mezirow (1978), Transformative Learning (TL) seeks to transform

individuals into more inclusive, discriminating, open, reflective, and emotionally capable beings. The theory defines two major learning domains: instrumental and communicative, both of which can result in changes in an individual's behavior and/or individual and/or community action.

In the context of TL theory, instrumental learning pertains to empirical learning about the world. The developmental logic of instrumental learning is hypothetical-deductive, and it typically involves the increased understanding of information and skills. On the other hand, communicative learning focuses on understanding what another person means by what they say. Unlike instrumental learning, communicative learning is significantly influenced by the environment and draws on ideal and normative conceptions. One crucial aspect of the learning process in TL theory is discourse and rational reflection. Discourse involves dialogues that assess beliefs, feelings, and values, contributing to an elevation in knowledge, such as urban farmers gaining better farming knowledge (Mezirow, 2003). Transformative Learning Theory provides a framework for understanding how adults undergo profound learning experiences that lead to personal transformation and the development of more inclusive and reflective perspectives.

Social Practice Theory, Johann Heinrich von Thünen's model, and Transformative Learning Theory each provide unique insights and frameworks that can be valuable to vegetable producers. These theories intersect and contribute to the understanding and improvement of agricultural practices, particularly for vegetable producers.

Social Practice Theory (SPT): Unit of Analysis: Practices, considered the fundamental units of analysis. Components: Considers behaviors as part of everyday activities involving various components such as working, eating, and consuming. Context: Focuses on the context of socially shared, time- and space-bound practices. Application to Vegetable Producers: Behavioral Insights: Helps understand the day-to-day practices of vegetable producers, including planting, harvesting, and selling. Practice Changes: By examining how practices are constructed and maintained, producers can identify opportunities for sustainable practices or efficiency improvements. Social Dynamics: Understanding how community norms and shared practices influence individual behaviors can aid in fostering cooperative agricultural methods or introducing new practices.

Johann Heinrich von Thünen's Model: Core Concept: The spatial model of agricultural land use and intensity based on market distance. Concentric Circles: Depicts how agricultural activities are distributed around a central city in concentric zones. Factors:

Market Proximity: Determines the type of crops grown and the intensity of agricultural production. Transport Costs: Higher costs lead to less intensive land use further from the market. Application to Vegetable Producers: Land Use Planning: Helps vegetable producers decide what crops to grow based on their distance from markets. Resource Allocation: Guides the efficient allocation of resources by understanding the economic implications of distance and transport costs. Market Strategies: Assists in developing marketing strategies that consider geographical location and market accessibility.

Transformative Learning Theory: Focus: Learning experiences that lead to profound personal transformation and the development of more inclusive, reflective perspectives. Instrumental Learning: Empirical learning about the world, understanding how things work. Transformational Learning: Involves changing one's worldview and deeply held beliefs. Application to Vegetable Producers: Educational Programs: Developing programs that not only teach new agricultural techniques but also encourage producers to reflect on their practices and beliefs. Adaptive Learning: Promotes adaptability and continuous learning in response to changing environmental and market conditions. Personal Development: Encourages producers to develop a deeper understanding of sustainable practices and their broader impact on society and the environment.

Integrating the Theories: Holistic Understanding: Combining these theories provides a comprehensive framework for understanding the complexities of agricultural practices. Behavioral and Spatial Analysis: SPT's focus on daily practices, combined with von Thünen's spatial analysis, helps in designing practices that are both efficient and contextually appropriate. Transformative Approaches: Leveraging Transformative Learning Theory, vegetable producers can undergo profound changes in their approach to farming, leading to more sustainable and innovative practices.

Practical Implementation: Training Programs: Develop training programs that incorporate elements from all three theories to educate producers on efficient, sustainable, and reflective farming practices. Community Engagement: Foster community-based initiatives that reflect shared practices and encourage collective learning and transformation. Market Analysis: Use von Thünen's model to conduct market analysis and strategic planning for crop selection and resource allocation. Reflective Practices: Encourage regular reflection sessions where producers can share experiences, challenges, and insights, fostering a culture of continuous learning and adaptation.

By integrating insights from SPT, von Thünen's model, and Transformative Learning Theory, vegetable producers can enhance their practices, leading to more sustainable, efficient, and innovative agricultural production.

1.7.5. Impacts of urban agriculture

1.7.5.1. Food security and nutrition

Urban hunger and food insecurity are global issues affecting countries worldwide (Battersby, 2013). The urban poor, spending between 60 to 80 percent of their income on food, are highly vulnerable to fluctuations in food prices (FAO, 2010). The rising costs of producing and transporting food from rural to urban areas, coupled with uneven distribution within cities; worsen food security challenges for low-income households in urban settings. Urban agriculture has emerged as a method to enhance the availability and accessibility of fresh, nutritious food for urban households facing food and nutrition security challenges (FAO, 2011). Urban farming, which can take place on small plots in various locations such as homesteads, abandoned lots, roadsides, field edges, or containers, is particularly beneficial for the neediest and landless individuals. The United Nations High-Level Task Force on the Global Food Crisis recognizes UA as a critical tool for reducing urban food insecurity and building more resilient cities (Stewart *et al.*, 2013).

Home gardens (HGs) are a significant component of urban farming, providing a variety of fresh foods, primarily horticultural goods, to families. HGs contribute to increased nutrient availability, potentially improving the quantity and quality of food for families, particularly those in poverty (Eigenbrod and Gruda, 2015). Studies have shown that poor urban families with HGs tend to consume more fresh vegetables compared to those without (Galhena *et al.*, 2013).

Food security in cities is heavily influenced by household income and market pricing, impacting individuals' purchasing power and disproportionately affecting the poor. Well-managed UA has the potential to provide a relatively continuous supply of food products for the impoverished (Mekuria and Messay, 2018).

Research indicates that families with adults participating in community gardens (CGs) tend to consume more fruits and vegetables, showcasing the positive impact of vegetable production (VP) on emotional health and physical exercise (Alaimo *et al.*, 2008; Kingsley *et al.*, 2009). Beyond nutritional benefits, individual advantages of UA include pride, a connection with nature, a defined role in the community, a sense of accomplishment,

spirituality, relaxation, and the opportunity to share experiences (Poulsen *et al.*, 2014). Overall, UA, particularly through home gardens and community gardens, plays a crucial role in addressing urban food insecurity and improving the well-being of vulnerable populations.

1.7.5.2. Economic development/poverty reduction/

The entire UA value chain, from inputs to waste, plays a crucial role in fostering a thriving Agri-food industry in urban and peri-urban settings. This contributes to job creation, local economic growth, and increased land productivity. Urban horticulture, in particular, is highlighted for its significance in creating jobs, enhancing the economic status of farmers and entrepreneurs, and boosting exports while reducing dependence on imports (FAO *et al.*, 2022).

In Spain, UA has evolved into a strategic approach for stimulating the local economy and generating jobs, especially during times of crisis. Initiatives like the Network of Agro-Ecological Reserve Territories, established in 2014 with the collaboration of several towns, have been instrumental in supporting new farmers. This assistance includes training, access to land and local markets, and mobilizing local resources to promote UA (Renting, van Veenhuizen, and Schans, 2014).

In Iraq, the Lemon Tree Trust has implemented UA programs in refugee camps to support displaced communities. These programs aim to provide employment opportunities for refugees, stimulate entrepreneurship, and offer training. The resulting gardens, benefiting from access to local markets and customers, enable displaced households to earn income by cultivating and selling vegetables (Adam-Bradford *et al.*, 2016; FAO *et al.*, 2022).

For UA to be sustainable, it must be profitable and economically feasible. The economic impacts of UA are observed at various levels: Household Level: Urban residents engaged in agricultural production experience direct economic benefits, including self-employment, income from surplus product sales, food savings, and reduced healthcare costs. Factors such as market orientation, farm size, family labor budget, availability and cost of hired labor, crop and animal selection, technology and capital access, and marketing capacity influence the net income of urban farm households. Despite being informal and rarely supported, studies show that irrigated open-space Vegetable Production (VP), especially in peri-urban regions, yields significant profits and is one of Africa's most productive farming systems (Dossa *et al.*, 2011).

Macro Level: UA contributes to the Gross Domestic Product (GDP) and has substantial effects on the efficiency of the national food system. UA provides products, especially perishable goods that rural agriculture may not easily supply. The labor-intensive nature of horticultural production, including VP, makes it a significant source of job creation, particularly for young entrepreneurs (ILO, 2013). Horticulture and small animal production are identified as leverage points for comprehensive, closed-loop sustainable development, addressing the need to train young people for meaningful employment amidst migration and challenges such as climate change (RUAF, 2018).

Table 1.2 Summary of commercialization employed for typical typologies of urban agriculture

<i>Urban and Peri-urban agriculture</i>	<i>Products sales</i>	<i>Market channel</i>	<i>Business models</i>	<i>Beneficiaries</i>
<i>Home-based gardening</i>	Self-consumption, direct sale	Home, wet market	Agritourism	Household
<i>Community-based and other shared gardening</i>	Self-consumption, direct sale	Community wet market, supermarkets, restaurants	Community support agriculture, E-commerce, agritourism	Household, community
<i>Commercial crop production, livestock and fisheries</i>	Direct sale	Consumers, supermarkets, food hub, intermediaries and institutions, restaurants	E-commerce, community support agriculture	Farmers' cooperatives, small and medium enterprises
<i>Institutional food growing</i>	Self-consumption, direct sale	Community wet market, restaurant	E-commerce, agritourism	Institutional members

Source: FAO *et al.* (2022)

1.7.5.3. Environmental and health benefits

Urban Agriculture plays a significant role in contributing to a sustainable and resilient urban environment through its impact on various aspects of the ecosystem:

Green Areas and Biodiversity: UA contributes to the extension and maintenance of green areas within urban spaces. These green spaces not only provide a healthy living environment for urban residents but also support pollination and contribute to biodiversity conservation in and around cities (Orsini and D'Ostuni, 2022). **Water Conservation:** Safe water is a critical resource for UA, and its sustainable use can be achieved by conserving waterways and preventing upstream pollution. Wastewater from urban areas can be utilized for irrigation in UA, improving water management and increasing freshwater availability for domestic consumption.

Urban Forestry and Climate Mitigation: Urban forestry, an integral part of UA, is essential for climate mitigation. By lowering the cost and pollution associated with long-distance food transportation, UA helps develop short supply chains. Proximity to urban amenities makes it easier to recycle urban waste, synergize energy consumption, and contribute to sustainable food production through appropriate agricultural practices (Skar *et al.*, 2020). **Waste Utilization:** UA benefits from the utilization of wastewater for irrigation and organic solid waste as fertilizer. This not only improves water management but also enhances freshwater availability for households. The practice of utilizing organic waste as fertilizer contributes to a circular economy in urban agriculture (Khan *et al.*, 2022).

Energy Efficiency: UA plays a role in energy conservation by reducing the need for long-distance transportation of food from rural to urban areas. Local food production saves energy in terms of storage and cooling. This reduction in energy consumption is particularly significant in the context of perishable farm products (Dressie, 2020). **Microclimate Improvement:** UA contributes to the improvement of the urban microclimate by providing windbreaks, reducing dust, and offering shade. These factors contribute to a more pleasant and healthier urban living environment. **Biodiversity and Carbon Sequestration:** UA helps maintain biodiversity and greening within urban areas. It also contributes to carbon sequestration, thereby mitigating the impacts of climate change. The localized production of fresh foods near consumers reduces the ecological footprint of urban regions.

1.7.5.4. Problems with urban farming

Quantifying the positive and negative impacts of UA at the city level has been a limited undertaking, and efforts to measure its economic value are even scarcer (Mougeot, 2000). Despite this, the consensus among UA academics and practitioners is that the benefits of UA for health and the environment far outweigh the drawbacks, particularly when considering the socioeconomic advantages (Boischio *et al.*, 2006). However, improper UA practices can lead to health issues, as highlighted by Berhanu *et al.* (2022). Contamination of crops with pathogenic organisms may occur when utilizing dirty streams or inadequately treated wastewater for irrigation, or through improper handling of vegetables during harvesting, shipping, processing, and marketing. Agrochemical residues, such as fertilizers, pesticides, and fungicides, pose a potential risk of polluting crops and drinking water supplies (Markhous *et al.*, 2019).

Briffa *et al.* (2020) point out that significant metal contamination in crops can result from soil, air, or water pollution caused by heavy vehicular traffic and industrial pollutants. There is also the risk of disease transmission from domestic animals to humans, along with occupational health hazards such as improper pesticide handling and the use of untreated wastewater in food production and processing. If not managed appropriately, UA can have severe environmental consequences. Local water supplies may be contaminated, especially when substantial quantities of chemical fertilizers and pesticides are employed (Berhanu *et al.*, 2022). Improper farming practices may lead to reduced vegetation and siltation in water bodies. Due to the limited attention UA typically receives and the competition for land, it is often relegated to marginal areas within the city, such as wetlands and hill slopes, where it may cause significant harm to fragile ecosystems if not properly guided (FAO, 2007).

1.7.6. Types of urban vegetable practises

Agriculture in the twenty-first century is experiencing a transformative impact from advanced scientific instruments and technologies, yielding powerful technical outcomes applicable in both rural and urban settings (Khan, 2021). Urban Agriculture plays a vital role in contributing to sustainable food systems by leveraging new technologies and innovative methods for local food production and diversity. However, the adoption of technological innovations poses challenges, especially for small farmers in developing countries, due to the high associated costs (Yuan *et al.*, 2022).

Various urban vegetable farming practices are:

Conventional Practices: Citizens utilize green spaces in and around cities to engage in agricultural production activities, primarily focused on growing vegetables, herbs, micro livestock, fruits, and berries. This enhances access to nutritious food for families and, in many cases, generates a small income through surplus sales.

Container-Based Micro Gardening: Micro gardening, a popular UA technique, involves cultivating food and other crops in relatively small areas, commonly at home or other locations.

Protected Cultivation (Greenhouses): These controlled environment agriculture systems employ structures with various covers, such as plastic and netting, providing partial or complete protection for crops. From low-cost timber or bamboo greenhouse frames to fully automated, high-tech greenhouses, the technology and costs vary. Greenhouses enable

year-round crop production, improving efficiency in the use of soil, water, nutrients, and sunlight while protecting high-value crops from pests and diseases.

Table 1.3 Summaries of practices for typical typologies of urban farming

<i>Urban and Peri-urban type</i>	<i>Products</i>	<i>Ground-based crop production</i>	<i>Zero-acreage farming</i>
Home-based gardening	Horticultural crops, livestock, aquaculture	Conventional growing, conservation agriculture, organic growing, micro gardening, micro livestock	Rooftop gardening, micro livestock, hydroponics
Community-based (shared) gardening	Horticultural crops, cereal crops, livestock, aquaculture	Conventional growing, conservation agriculture, organic growing, micro gardening, greenhouses and Shade house, micro-livestock	Rooftop gardening, micro livestock
Commercial crop production, livestock and fisheries	Horticultural crops, cereal crops, livestock, aquaculture	Conventional farming, conservation agriculture, organic farming, greenhouses and Shade house	Vertical farming, rooftop farming, hydroponics, aquaponics, livestock
Institutional food growing	Horticultural crops, cereal crops, livestock, aquaculture	Conventional farming, conservation agriculture, organic farming, micro gardening, greenhouses and Shade house	Rooftop farming, vertical farming, hydroponics, aquaponics, livestock

Sources: FAO *et al.* (2022)

Zero-Acreage Farming (ZFarming): This approach involves producing food within buildings without requiring additional land. ZFarming encompasses open-air rooftop farming, rooftop greenhouses, indoor farming, and other controlled environment agriculture forms. Challenges include capital-intensive investment, high energy consumption costs, limited crop varieties, a shortage of qualified personnel, and considerations related to UA politics and public acceptance (Specht *et al.*, 2014; Despommier, 2018).

Hydroponics and Soil-less Culture: These technologies allow the cultivation of agricultural products without soil, using inert growing media or substrates. Hydroponics involves delivering liquid nutrients directly to plant roots, consuming less space and water compared to traditional soil-based cultivation. High-tech UA practices, like hydroponics, contribute to more efficient resource use, especially for water and soil (Puri and Caplow 2009; Lim and Kishnani, 2010; Kalantari *et al.*, 2017; FAO, 2020a).

1.7.7. Urban vegetable production marketing chain

Urban farmers utilize various channels for selling their produce, ensuring accessibility to a diverse range of consumers. These channels include: Direct sales through farmers' markets which urban farmers engage in direct sales to consumers at local farmers' markets, fostering a direct connection between producers and buyers. Community-Supported Agriculture (CSA) Farms that involves a system where consumers purchase "shares" of a

farm's harvest in advance, securing a portion of the crops. CSA farms provide a direct link between farmers and supportive community members. Local Food Distribution Platforms: These platforms deliver fresh produce directly to consumers or businesses, enhancing accessibility and convenience. Food Hubs: Food hubs act as centralized points for the collection, processing, and distribution of locally produced food, facilitating connections between farmers and various market outlets. Wholesalers: Urban farmers may collaborate with wholesalers to distribute their produce to a broader market, including larger retail outlets. Retail Outlets: This encompasses a range of establishments, from small local shops to supermarkets, where consumers can purchase fresh produce from urban farmers.

Access to markets is crucial for urban farmers as it enables them to generate income, sustain their operations, and invest in farm improvements. For small-scale urban farmers with surplus produce, direct sales to consumers at local markets or through traditional retailing and wholesaling channels are commonly employed commercialization channels (FAO *et al.*, 2022). Studies, such as one conducted in Hanoi, Vietnam, highlight the cost differences, with supermarkets averaging 35 percent higher prices compared to traditional markets (Wertheim-Heck *et al.*, 2019). This emphasizes the significance of diverse market channels for the economic viability of urban agriculture (Bachman *et al.*, 2021).

1.7.8. Future threats of urban farming (vegetable production)

Unsustainable farming practices are prevalent in UA, posing potentially more severe consequences than in rural settings. The adoption of sustainable practices faces challenges such as limited resources (financial, time, labor), ingrained habits, lack of awareness about sustainable benefits, gender inequalities, educational levels, and land tenure rights (Tey *et al.*, 2017). Key threats associated with non-sustainable UA practices include environmental degradation, soil, water, and air pollution, public health hazards due to contaminated farm produce, land tenure insecurity, negative perceptions toward UA, and unregulated movement of livestock causing traffic and sanitation problems (FAO and IWMI, 2017).

Obtaining quality agricultural inputs poses difficulties for many UA practitioners. In Africa, farmers cite a lack of quality seeds, pesticides, and fertilizers as hindrances, leading some to abandon their gardens (FAO, 2012; Mwakiwa *et al.*, 2018; Nordhagen, Thiam, and Sow, 2019). Water for UA comes from diverse sources, including rainwater, groundwater, surface water, and wastewater, with varying implications for cost and water quality (DeVincentis *et al.*, 2015). Water scarcity, quality concerns, and unpredictable water

delivery due to power interruptions are critical issues in many urban areas globally (Pereira, 2017).

Financial constraints pose significant barriers to UA, with limited access to credit and collateral for agricultural activities, both in developing countries like Benin (Houessou *et al.*, 2020) and wealthier countries like the USA (Hunold *et al.*, 2017). In cities like Lubumbashi, Democratic Republic of the Congo, informal land use without proper permissions or titles hampers sustainable practices and poses environmental risks (FAO, 2010). Despite these challenges, urban agriculture, if well-informed and supported, can play a substantial role in urban development. Micro- and medium-sized businesses engage in various UA activities in cities, encompassing vegetable gardening, poultry husbandry, dairy cow rearing, pig production, and beekeeping (Maru and Juliet, 2016).

1.7.9. Empirical literature reviews

In the 1970s, Cuba successfully addressed its food challenges through UA, notably with the Urban Agriculture National Movement program. This initiative made Havana largely self-sufficient in food production, generating revenue and employment opportunities while maintaining organic practices. Havana currently produces 60 to 90 percent of its fresh food, both within the city and its suburbs, setting an example for other developing nations. By achieving 2,600 calories per day in 2000 and overcoming acute malnutrition, Cuba's experience serves as a potential model for others (Murphy, 1999; Weissman, 2005; LaFond, 2018).

In Asian countries, where urbanization has led to a shortage of agricultural products, there's a growing trend of implementing UA to address this issue. Cities like Shanghai, Hong Kong, Manila, and Singapore are taking steps to incorporate UA, recognizing that a significant portion of urban dwellers derive 60-70 percent of their income from food-related activities (Murdad *et al.*, 2022).

Rosario, Argentina, faced economic challenges before 2002 due to the closure of major industries, leaving a large portion of the population in poverty. To address this, the city established the Municipal Land Bank in 1997, connecting urban producers with landowners to promote urban farming. The Urban Agriculture Programme (Programa de Agricultura Urbana or PAU) in Rosario started small but has grown to produce about 2,500 tonnes of food annually (IDRC, 2010).

In Managua, Nicaragua, the Growing Greener Cities Programme, supporting UA activities, resulted in a 60 percent increase in vegetable consumption for participating households, reaching up to 100 grams per person per day. Similarly, in Tegucigalpa, Honduras, households participating in UA increased their daily fruit and vegetable consumption to 2.4 times, reaching 260 grams per person per day (FAO, 2014a).

Using UA in conjunction with other measures, 67 percent of Copperbelt Province households achieved food security, and 63 percent fulfilled their basic livelihood needs (Smart, Nel, and Binns, 2015). In Cagayan de Oro, the Philippines, 75 percent of poor urban families who participated in the city's allotment garden initiative doubled their vegetable consumption and increased their income by 20 percent. Allotment gardens' effective implementation inspired the city to incorporate the concept into broader city planning and development (Tixier and Bon, 2006). In Quito, Ecuador, urban gardens might generate 1.35 million kg of food per year, with 57 percent consumed by producer households and 43 percent marketed via short supply chains (FAO, 2020b).

In Nantes, France, the "Nourishing Landscapes" project was created to plant vegetables in urban areas in order to provide free food to 1,000 low-income people. Production facilities are located at 11 different sites throughout the city. Between July and October 2020, 250 urban gardeners harvested around 25 metric tonnes of vegetables using totally organic agriculture practices (FAO, 2020b). In Lyon, France, local food accounts for 55 percent of the food served in primary schools (Faucher and Lançon, 2021). Supporting farmers and their organizations in increasing their production, postharvest activities, storage, processing, management, organizational, and marketing abilities might help them achieve local government standards (FAO, 2018c).

Singapore's premier rooftop farming company utilizing specialized rooftop greenhouse technology and state-of-the-art American Hydroponics (AmHydro) hydroponic growing systems to address skyrocketing demand for locally grown, sustainable produce (Swartz, 2020). Converting previously neglected rooftop spaces into urban farms, ComCrop is the first and only certified rooftop farm in all of Singapore. Their goal is to increase the volume of domestically produced food, as over 90 percent is currently imported (ibid.).

The community engagement project conducted in Bangkok, Thailand, has demonstrated the viability of guiding community involvement to meet both local needs and environmental objectives. Fraser (2002) notes that the community's green plans, developed during workshops, reflected a genuine commitment to enhancing the environment.

Residents in Bangkok expressed a desire for their properties to contribute to local ecology improvement, create recreational spaces, serve as ecological educational areas for local children, strengthen community bonds, and serve as a source for vegetables and other goods.

In the United States, data from the National Gardening Association (2014) indicates that approximately 42 million households are engaged in food gardening. Notably, young people, particularly millennials (ages 18–34), represent the fastest-growing segment of food gardeners, with a 63 percent increase in millennial participation in farming from 2008 to 2013.

The Feed Yourself Program initiated in Accra, Ghana, in 1972 has left a lasting impact on the city's urban development. Post-independence in 1966, Ghana initiated widespread agricultural efforts. However, faced with economic, political, and social challenges in Accra, government leaders and officials recognized the potential of UA in addressing food insecurity, especially during economic downturns. Consequently, over 50 percent of the city's food production is now covered by UA, making it a crucial element in Accra's urban growth (Obosu-Mensah, 2002; Diao *et al.*, 2019).

Tewodros (2007) highlights the significant contribution of urban farming in Addis Ababa (AA) to the livelihoods of urban farmers, accounting for 65 percent at both the sectoral and household levels, with livestock constituting 40 percent and crop production 45 percent, respectively. However, Tesfay *et al.* (2014) note that despite having enough food, Addis Ababa's diets are predominantly cereal-based, lacking the necessary diversity for optimal nutrition. Moreover, informal wastewater irrigation, as emphasized by Bogale (2017), plays a crucial role in the production of essential vegetables and leafy greens, making UA a practical and essential component of the city's food supply (Mengist, 2020).

Messay (2013) underscored the significance of establishing a policy framework for UA in Ethiopian cities, particularly in AA and its surroundings. The author emphasized that UA often operates without a clear legal foundation and proper standing within the administrative structure of the cities. Abraham and Misikire (2014), in their study on "Power, Knowledge, and Interests of Stakeholders in UA Engagement in AA, Ethiopia," found that 80 percent of the stakeholders considered UA to be beneficial and supported the existing situation. However, the remaining stakeholders expressed concerns, attributing issues such as pollution and public health problems in the city to urban agriculture.

1.8. Success stories of urban farming from COVID-19

During the COVID-19 outbreak, governments in Fiji, Samoa, the Solomon Islands, Tonga, Tuvalu, and Vanuatu took measures to enhance local food production by distributing planting supplies and inputs to UPA communities (FAO, 2020b). Similarly, in Victoria, Canada, the municipal council redirected park staff to cultivate and distribute 50,000 to 75,000 seedlings, along with planting materials and growth instructions, to promote local food production (ibid).

FAO's global COVID-19 survey revealed that 38 percent of respondent cities identified direct purchasing from local producers as a crucial strategy to mitigate the pandemic's impact (FAO, 2020a; FAO *et al.*, 2022). In Davao, the Philippines, the city government purchased produce from local growers at above-average prices, repackaged it, and distributed it to 12,000 needy families, providing economic support to urban producers (FAO, 2020b). Additionally, the city of Davao initiated the "Buyback, Repack, and Distribute" program during the lockdown, purchasing excess produce from local small farmers, repacking it, and distributing fresh vegetables to vulnerable families (FAO *et al.*, 2022).

The COVID-19 pandemic disrupted the global marketing of UA goods. In Bolivia, where UA is crucial for food supply, the closure of many markets prompted collaboration between the municipality and FAO with UA farmers to explore new distribution methods. Urban farmers organized safe home delivery of fresh produce to meet the needs of urban families (FAO, 2020a).

A qualitative assessment of city case studies by FAO in September 2020 found that communities engaged in UA could ensure a steady supply of fresh food during the pandemic, addressing the needs of the most vulnerable populations. The COVID-19 crisis offers opportunities to accelerate the adoption of innovations for resilient and sustainable local food systems. This goes beyond responding to immediate shocks, aiming to embed equitable, climate-smart, and efficient practices into long-term UA policies (Bisoffi *et al.*, 2021).

In Addis Ababa, Ethiopia, UA significantly contributes to the food supply. According to a CSA (2015) assessment, UA provides 30 percent of vegetables, 60–70 percent of milk, and 40–60 percent of eggs consumed in the city. Additionally, AA produces approximately 62 metric tonnes of honey each year. Despite its substantial contributions in various areas,

UA's share of total employment is estimated at only 3 percent in AA (Gebremichael *et al.*, 2014). The majority of dairy farms in AA, numbering around 31,000, are situated in residential areas with limited management options, and UA-related activities, including animal fattening, dairy production, and crop cultivation, are vital for around 6,000 households in Sululta (Gebremichael *et al.*, 2014; Mekuria and Messay, 2018).

1.9. Urban agriculture policy framework

Urban agriculture is intricately linked to various stages of the food system, including processing, distribution, and consumption, all of which intersect with urban management areas overseen by local governments (Smit, 2016). Aspects such as land use, planning, transportation, environmental and waste management, economic development, public health, education, and social and community development impact and are influenced by the food system. UA encompasses diverse systems and involves various stakeholders, ranging from input provision, vegetable production, aquaculture, and animal production to agroforestry, processing, marketing, waste management, and resource recovery (Dorr *et al.*, 2023).

The development of a successful food system requires a systematic approach that recognizes the multi-functionality of food and UA. It should engage different sectors and scales, be adaptable, participatory, and inclusive (El-Bilali *et al.*, 2019). UA is a crucial component of the broader city-region food system, maintaining connections with the complex network of actors, processes, and relationships in food production, processing, marketing, and consumption (Blay-Palmer *et al.*, 2018).

Despite the unfamiliarity of many municipal and regional governments with UA, it is gaining attention from urban planners and politicians globally. This increased interest is driven by factors such as diet-related diseases, food security, food poverty, and greenhouse gas emissions from the food chain, biodiversity, and ecosystem services. The importance of local access to food became more apparent during the COVID-19 crisis in 2020 (Slade *et al.*, 2016; FAO *et al.*, 2022).

Local governments play a vital role in developing sustainable food systems, but they cannot act in isolation. Local government policies are intertwined with those at the state/provincial, national, and international levels (Gupta *et al.*, 2018). Collaborations with other government levels, community organizations, the commercial sector, and universities are crucial for developing and implementing effective food policies. Increasingly, local

governments in various cities are recognizing the relevance of urban agriculture and are formulating new policies or revising existing ones.

In the context of Ethiopia, the Federal Green Economy Plan (2019) outlines the Climate-Resilient Green Economy (CRGE) initiative, focusing on various initiatives to achieve development goals while limiting greenhouse gas emissions. The plan includes improving crop and livestock production practices, protecting and re-establishing forests, expanding renewable energy generation, and adopting modern, energy-efficient technologies.

The Structure Plan of Addis Ababa (2017-2027), as per the Addis Ababa City Administration (2017), follows urban planning principles, ensuring conformity with planning hierarchies, alignment with national vision and standards, consideration of inter urban and urban-rural linkages, efficient land utilization, public participation, transparency, and accountability, balanced and mixed population distribution, environmental preservation, and sustainable development that balances public and private interests.

1.10. Conceptual framework

The investigation focuses on four research studies designed to extract concepts and examine their connections with urban vegetable farming and food security. In broad terms, urban agriculture aims to provide city residents with food security, income, employment opportunities, and various socioeconomic benefits. The research inquiries likely delve into specific aspects related to these broad goals, seeking to understand the difficult relationships and dynamics between urban vegetable farming practices and the overarching objectives of enhancing food security, generating income, and creating employment opportunities in urban areas. The study may explore how these aspects interconnect and contribute to the overall socioeconomic well-being of city dwellers engaged in urban agriculture.

Understanding the primary prospects and problems associated with urban vegetable growing practices in the area is deemed crucial for bridging the gap between producers, government entities, and stakeholders. While the potential benefits and drawbacks of vegetable farming in the urban context are acknowledged, the available evidence appears to be unclear. This suggests a need for more comprehensive research and data to better grasp the shades of urban vegetable cultivation, identify potential advantages and challenges, and ultimately facilitate informed decision-making and collaboration among key stakeholders. The study likely aims to shed light on the complexities of urban

vegetable farming, providing a clearer understanding of the landscape for those involved in the production, as well as for policymakers and other stakeholders

According to the FAO report (2017), agriculture plays a crucial role in ensuring food security (FS) globally, with significant impacts on poverty reduction, employment generation, and income elevation, particularly in low- and middle-income countries. The issues of FS and nutrition have profound implications for individuals and their surroundings.

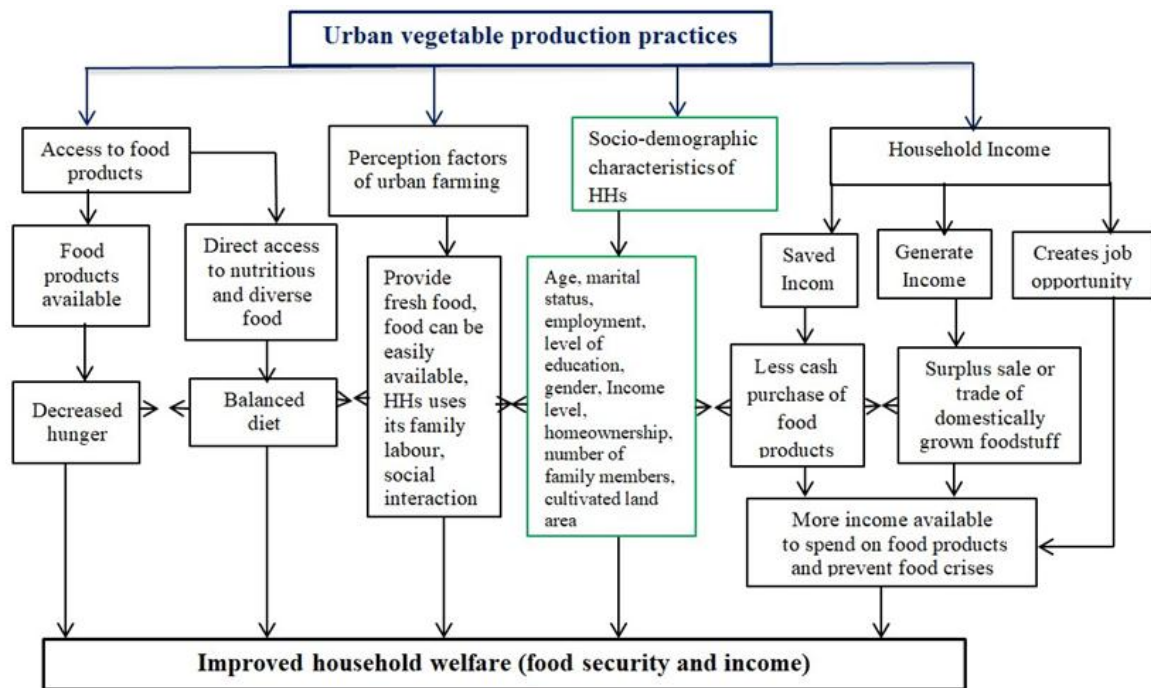


Figure1.2 Conceptual frameworks to assess the effect of urban vegetable production on household food security and socioeconomic implications

Sources: Own design based on literature (Stewart *et al.*, 2013; Korth *et al.*, 2014; Siegner *et al.*, 2018).

In response to the challenges faced by expanding urban populations, urban vegetable production (UVP) has emerged as a proposed solution. UVP is seen as a means to address the food crisis, offering sustenance and potential income sources for urban communities while also contributing to environmental improvement and reducing reliance on scarce farmland. Additionally, UVP serves as an alternative production source, providing diversity in food procurement options and acting as a buffer against the impacts of climate change.

The study also seeks to explore the socio-economic consequences of urban vegetable cultivation, specifically examining whether it has positive implications for urban farmers. The conceptual framework, as depicted in Figure 1.2, guides the study in assessing the efficiency of urban vegetable producers in Addis Ababa.

Drawing from the conceptual framework (Figure 1.2), the effectiveness of urban vegetable farming is linked to key outcomes, including a reduction in food insecurity, increased household income, and the creation of employment opportunities for households engaged in vegetable production. The study aims to evaluate and understand the impact of UVP on these critical socio-economic aspects in the context of Addis Ababa.

1.11. Research Methodology

1.11.1. Research Philosophy

Research philosophy encompasses the fundamental beliefs about the nature and acquisition of knowledge (Bajpai, 2011; Tsung, 2016). It shapes researchers' perspectives on how to collect, analyze, and interpret data when investigating a phenomenon. Within the social sciences, three prominent researches Philosophy exist: positivism, interpretivism, and pragmatism.

Positivists place a strong emphasis on objectivity in research, aiming to eliminate bias and personal opinions. This orientation aligns with quantitative research methods, emphasizing measurable and observable phenomena. On the other hand, interpretivism underscores the subjective nature of human experience. It focuses on understanding social phenomena through the meanings and interpretations that individuals attribute to them (Tsung, 2016). Pragmatism serves as a research philosophy that seeks to bridge the gap between positivism and interpretivism. It prioritizes the practical consequences of knowledge and encourages researchers to adopt a flexible, problem-solving approach. Pragmatists assert that the value of knowledge lies in its practical utility and its ability to address real-world problems (Creswell, 2014).

The present study aligns with the pragmatist paradigm, integrating both qualitative and quantitative methodologies. This approach involves the use of multiple data-gathering and analysis strategies, reflecting a commitment to practical application and a flexible, problem-solving orientation.

1.11.2. Research Approach

The research adopts a mixed-methods approach to address the research questions. This research design combines elements of both qualitative and quantitative research approaches to offer a more comprehensive and nuanced understanding of a central phenomenon. The approach involves collecting and analyzing both qualitative and quantitative data at specific phases within a single study.

The underlying principle of this methodological design is grounded in the belief that the integration of qualitative and quantitative approaches yields a more thorough comprehension of the research topics than either approach would achieve independently (Sami, 2016; Md-Shidur, 2017). This integration allows for a richer exploration of the vital phenomenon, providing a more holistic view that captures both the depth and breadth of the research inquiry.

1.11.3. Study Design

The research adopts a cross-sectional study design to examine urban agriculture, with a specific emphasis on vegetable production in Addis Ababa. Within the city, urban agriculture activities can be delineated into two primary categories (Abrham, 2012):

Backyard and core urban farming: This category encompasses vegetable cultivation in residential backyards, utilization of open spaces around houses for farming purposes, cultivation in low-lying areas within the central areas of the city, and farming along riversides situated in the city core. The second category Peri-urban farming involves agricultural activities in peri-urban areas surrounding Addis Ababa. This includes farming practices in regions transitioning from urban to rural characteristics. Peri-urban farming often reflects a combination of urban and rural agricultural features.

In the study, the first category is designated as urban agriculture because it is predominantly situated within residential areas, offices, and other facilities that may or may not have designated farming spaces. This category includes farming activities in backyards, open spaces around houses, low-lying areas, and along riversides within the city core. The second category is characterized as a peri-urban area, situated away from the city core, consisting mainly of residential houses with relatively larger farming areas compared to the urban setting, as described by Tewodros (2007).

For the purposes of this research, the primary focus is on the first category—Urban Agriculture within the city core. The study aims to delve into the dynamics, challenges, and opportunities associated specifically with vegetable production in urban areas characterized by residential houses, offices, and mixed-use facilities, contributing to a deeper understanding of urban agricultural practices in Addis Ababa.

1.11.4. Description of the study area

1.11.4.1. Geographical location and administrative division

This study was conducted in the Nifas Silk Lafto sub-city of Addis Ababa, covering an expansive area of 5876.02 hectares. The land area occupied by Nifas Silk Lafto constitutes 11.31 percent of the total land area of the city, ranking it fifth among the ten sub-cities (in the time of data collection) based on land coverage. Positioned in the southwestern part of Addis Ababa, Nifas Silk Lafto is bordered to the south by the Oromia Special Zone, to the northwest by Kolfe Keranio, to the east by Bole and Akaki Kality, and to the north by Lideta and Kirkos. Currently, the sub-city is divided into 13 weredas (administrative districts) as of the most recent information available (Abnet, 2010).

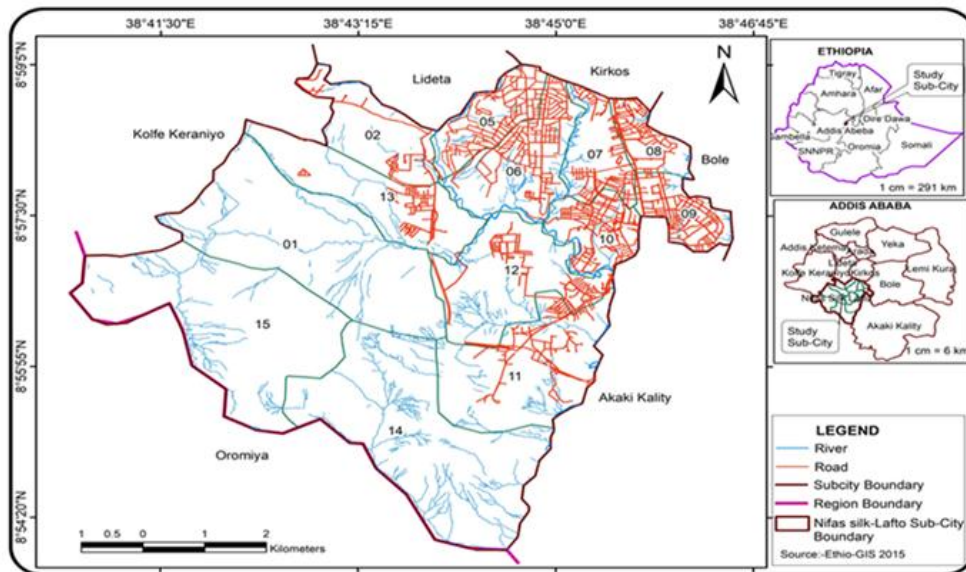


Figure1.3 Map of Nifas Silk Lafto sub city, Addis Ababa, Ethiopia (Source: AACA, 2020).

1.11.4.2. Physical characteristics

The Nifas Silk Lafto sub-city exhibits a moderately downslope topography with noticeable elevation variations, particularly around river gorges in certain areas. The landscape is shaped by the presence of the Little Akaki River, with the sub-city encompassing the majority of the river's sub-catchment (Deshu *et al.*, 2021).

The climate in the area is characterized by two distinct seasonal patterns. The primary wet season, known locally as Kiremt, spans from June to September and contributes to approximately 70 percent of the total annual rainfall. A secondary, minor rainy season referred to as "Belg" occurs from mid-February to mid-April, providing additional moisture. The remaining months are marked by a complete lack of rainfall (Abrham, 2012; Ferezer, 2021). The daily average temperature in the region ranges from 9.90 to 24.60 degrees Celsius, and the average annual rainfall is reported to be 1254 millimeters (Deshu *et al.*, 2021).

The presence of the Little Akaki River is notable for the agricultural landscape, as numerous cooperatives and small-holder vegetable producers cultivate a variety of vegetable products along its course. This river eventually flows into the lower catchment of the larger river system.

1.11.4.3. Demographic and Socioeconomic characteristics

The 2007 census revealed that Nifas Silk Lafto sub-city constitutes 10.42 percent of the total population of Addis Ababa, positioning it as the seventh most densely populated sub-city in the region. Unfortunately, this area is characterized by a high incidence of poverty and a notable deficiency in electricity services, as reported by UN-Habitat in 2008. Residents of Nifas Silk Lafto face challenging living conditions, with poverty levels being a significant concern.

Table 1.4 Nifas Silk Lafto sub city total population estimated from the 2007 census report

	2007			2020		
The total population in the sub-city	Both sex 316,283	Male 148,984	Female 167,299	Both sex 425,935	Male 198,929	Female 227,006
KEBELE 03/04/05	34,846	16,089	18,757	46,934	21,483	25,451
KEBELE 06/07/08	40,364	19,140	21,224	54,355	25,556	28,799
KEBELE 09/14	33,529	15,698	17,831	45,155	20,961	24,195
KEBELE 10/18	41,299	19,560	21,739	55,615	26,117	29,497
KEBELE 12/13	28,023	12,806	15,217	37,747	17,099	20,648
KEBELE 16/17	36,081	17,447	18,634	48,580	23,296	25,284
KEBELE 01	31,627	15,323	16,304	42,583	20,460	22,123
KEBELE 02	32,224	15,096	17,128	43,398	20,157	23,241
KEBELE 11	16,010	7,722	8,288	21,557	10,311	11,246
KEBELE 15	22,280	10,103	12,177	30,013	13,490	16,523

Source: CSA, (2020) * Kebele – the lowest administrative unit

The sub-city, situated alongside Bole and Gulelle sub-cities, is witnessing the emergence of informal settlements, often referred to as squatter settlements. These areas are

proliferating, serving as a transitional zone between the urban center and the surrounding agricultural regions, highlighting the complex urban-rural dynamics at play in Addis Ababa.

1.11.5. Study subjects and duration

The primary focus of the study centered on urban vegetable producers in the Nifasilk-Lafto sub-city, given their pivotal role in urban farming and their potential impact on the region's food security status. In addition to examining urban vegetable producers, the study also investigated broader aspects related to urban farming, including opportunities, challenges, and the socioeconomic benefits derived from urban agriculture. By exploring these diverse subjects, the study aimed to provide a comprehensive understanding of the urban farming landscape in the specified sub-city. Notably, the data collection for the study occurred through a single round of surveys conducted in mid-October 2021. This strategic choice allows for a snapshot analysis of the various facets of urban agriculture and its implications on food security and socioeconomic dynamics within the specified timeframe.

1.11.6. Sampling design and frame

It appears that the study focused on Addis Ababa city and employed a multistage sampling frame to examine the population of interest and distinguish relevant sub-groups at the sub-city level, specifically regarding vegetable production capacity. Multistage sampling involves dividing the population into various stages and then randomly selecting samples from each stage.

At the city level, the Addis Ababa Urban Agriculture and Farmers' Development Commission (AAUAFDC) holds jurisdiction over all urban vegetable growers. Consequently, the sampling strategy was designed with consideration for the selection of vegetable producers at the municipal level. Utilizing data from the commission, it was identified that the Nifasilk-Lafto sub-city stood out as a significant hub for urban vegetable production. To investigate the various factors affecting urban vegetable production in this sub-city, a simple random sampling method was used to select producers. The sampling frame utilized for the selection of urban vegetable farmers was derived from the AAUAFDC (2021) report, specifically the list of producers at the Wereda level within the Nifasilk-Lafto sub-city. This systematic approach aimed to provide a representative

sample, allowing for the examination of diverse causes contributing to unobserved situations among urban vegetable producers in the study area.

1.11.7. Sample size determination

Sample size determination is a critical process in research, involving the selection of an appropriate number of observations or individuals from a larger group to establish a sample. The objective is to strike a balance, ensuring that the sample is sufficiently large to yield statistically valid results and accurate estimates of population parameters, while also being manageable and cost-effective. Various approaches exist for determining the sample size, depending on factors such as population size, study objectives, and available resources.

Common methods include conducting a census for small populations, rivalling sample sizes from similar studies, referencing published tables, and applying specific formulas tailored to calculate sample size. In the case of this study, the approach relies on the simplified formula introduced by Yamane in 1967. This formula, designed for social science studies, serves as a practical tool to strike the right balance between statistical rigor and resource efficiency in determining an appropriate sample size for the research at hand.

In the city, there are two categories of UA producers. The first category comprises individual producers, while the second category consists of producers formally organized by the government or groups of producers under Small and Micro Enterprises Producers (SMEP), facilitated by the Addis Ababa Job Creation and Food Security Agency based on their interests. As per the information provided by the AAFUADC in 2021, Nifasilk-Lafto stands out among the ten sub-cities, with vegetable-producing households in its thirteen weredas demonstrating the highest vegetable production performance in the town. This is illustrated in Table 1.5, indicating that the host weredas are predominantly inhabited by individuals engaged in urban vegetable farming.

To conduct the study, the number of sample households was determined to be approximately 388. This estimation was based on a 95 percent confidence level and a 5 percent sampling error, calculated using the simplified formula proposed by Yamane in 1967. This approach ensures a statistically sound and representative sample size for the research, allowing for a reliable exploration of urban vegetable production dynamics in the context of Nifasilk-Lafto sub city.

$$n = \frac{N}{1 + N(e)^2}$$

$$n = 13,199 / 1 + 13,199(0.05)^2$$

$$= 13,199 / 1 + 32.9975$$

$$= 13,199 / 33.9975$$

$$n = 388$$

Where N, n and e stand for number of total vegetable-producing households in the sub-city, sample size and sample error, respectively.

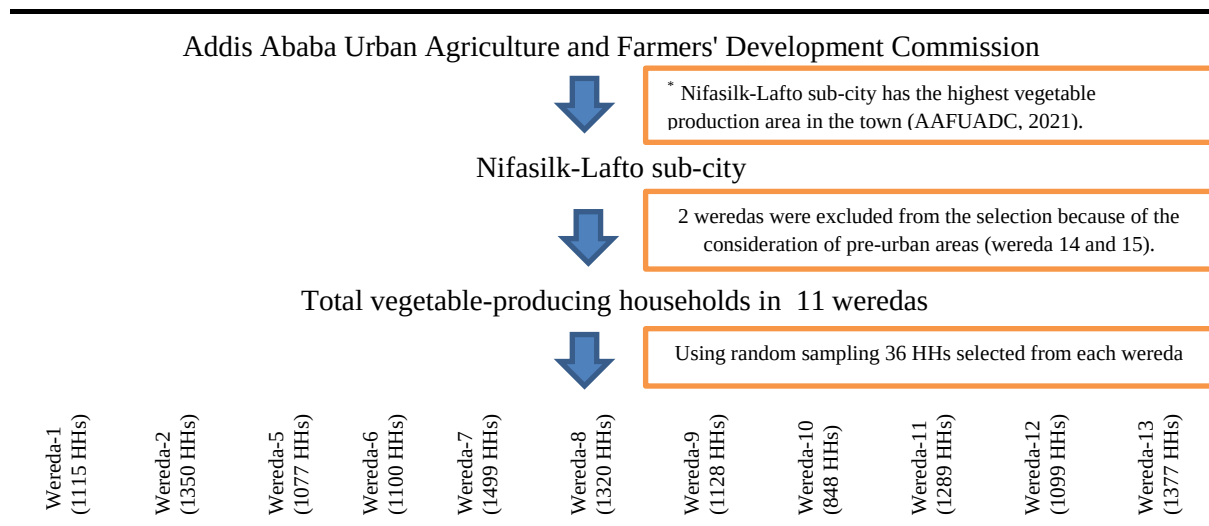
Table 1.5 Total households engaged in vegetable production in Addis Ababa

<i>Sub-cities</i>	<i>Urban vegetable producers</i>				
	<i>unit</i>	<i>VP using irrigation</i>	<i>Backyard gardening</i>	<i>Mushroom production</i>	<i>Total vegetable producers</i>
	hectares	366			
Yeka	number	224	6106	8	6338
Bole	number	255	11449	-	11704
Akaki	number	255	6363	8	6626
Nifas Silk	number	555	12644	3	13202
Kolfe	number	314	12166	20	12500
Gulelle	number	191	11694	-	11885
Arada	number	70	8805	2	8877
Kirkose	number	20	12287	-	12307
Lideta	number	22	11354	9	11385
Addis Ketema	number	172	11284	-	11456
Lemi Kura	number	-	-	-	-
Total		2,078	104,152	50	106,280

Source: AAFUADC (2021)

1.11.8. Sampling technique

This study has six enumerators. Five enumerators took responsibility for two weredas each, collecting 36 households in each wereda. 5 enumerators × 2 weredas per enumerator × 36 households per wereda = 360 households. One enumerator took care of one wereda, collecting 36 households. 1 enumerator × 1 wereda × 36 households per wereda = 36 households. The total number of households surveyed was 360 + 36 = 396. The total number of households surveyed matches the expected number of 388 households. However, to minimize the non-respondent rate, eight more households were added.



* Nifasilk-Lafto sub-city has 13 weredas, but with the new city reform, weredas 3 and 4 went to other sub-cities

1.11.9. Data sources and collection tools

In this study, a comprehensive approach was employed to collect both quantitative and qualitative data, utilizing primary and secondary sources. The primary data collection involved various methods, including the use of a self-administered structured questionnaire (see Appendix I). This questionnaire was designed to gather quantitative information from the study participants. Additionally, discussions were held with selected key informants (KI) as part of the qualitative data collection process (see Appendix II). These key informants provided valuable insights based on their expertise and experience.

Furthermore, focus group discussions (FGD) were conducted to capture qualitative data and facilitate in-depth exploration of specific topics related to urban vegetable production (see Appendix III). The FGDs allowed for a more interactive and dynamic exchange of ideas among participants. Field observations were also carried out, employing a pre-designed checklist, to complement the data collected at the household level within Nifas Silk Lafto sub-city Weredas. These observations provided context and additional insights into the actual practices and conditions related to urban vegetable production.

The questionnaires used in this study underwent a pre-testing phase involving fifteen randomly selected vegetable producers from the study area. Following successful pre-testing, household surveys were conducted with 388 vegetable producers to systematically collect quantitative data. The aim was to investigate and quantify the impact of socioeconomic and demographic characteristics of households on vegetable production.

Quantitative data were gathered through interactions with six experts functioning as urban farming extension officers at the wereda level in the Nifas Silk Lafto sub-city. Additionally, two focus group discussions were conducted in November 2021, involving two groups of six participants each. These participants, predominantly well-known urban vegetable farmers, were strategically selected from different parts of the study area to contribute diverse perspectives.

In the same month, a Key Informant (KI) interview was conducted, involving six vegetable farmers. This interview utilized a pre-designed checklist to gather valuable insights. To further enrich the understanding of the urban vegetable production system, fieldwork participation and observation were incorporated. Transect walks were undertaken to observe the field, and facts about urban vegetable production were gathered. The process involved participatory learning and action (PLA) tools, including force field and SWOT analysis, to make inferences and gain a comprehensive understanding of the overall system.

Secondary data for this study were acquired through an extensive desk review, encompassing a thorough examination of both published and unpublished literature. The sources included peer-reviewed journals, conference papers, government records, and research reports. This comprehensive review allowed the researcher to gather information and insights from existing studies and official records related to urban vegetable production and relevant socioeconomic and demographic factors. By drawing on a range of secondary sources, the study aimed to contextualize its findings within the broader body of knowledge and to supplement the primary data collected through surveys, interviews, focus group discussions, and field observations. This dual approach, combining primary and secondary data, enhances the depth and breadth of the study's analysis and contributes to a more nuanced understanding of the research questions.

1.11.10. Techniques of data analysis

The study employed a combination of descriptive and analytical approaches to meet its objectives effectively. Qualitative data obtained through focus group discussions, key informant interviews, and field observations underwent thematic content analysis. This analysis involved organizing, summarizing, interpreting, and drawing insights from the qualitative data to complement and contextualize the survey results. Thematic content

analysis provided a framework for understanding the patterns and themes emerging from the qualitative information.

On the quantitative front, numerically collected data from the household survey was subjected to descriptive statistics and inferential methods (regression analysis). Descriptive statistics allowed for the summarization and presentation of key features of the dataset. Regression analysis, a statistical method for modeling the relationship between a dependent variable with three or more categories, was used to explore the impact of various socioeconomic and demographic factors on vegetable production.

To assess food security at the household level, the study utilized the Household Food Insecurity Access Scale (HFIAS) and Food Consumption Score Analytical Tools (FCSAT). These tools provided a structured way to evaluate food security status. Additionally, a logistic regression model was applied to identify factors influencing food security and to assess their relative importance in determining the likelihood of a household being food insecure. This integrated approach, combining qualitative and quantitative methods, facilitated a comprehensive exploration of the factors influencing urban vegetable production and food security in the study region.

1.11.10.1. Descriptive analysis

In conducting the study, a descriptive analysis approach was employed to gain insights into the nature of variables and to present a summary of the data. Descriptive statistics, including frequencies, percentages, and cross-tabulation, were utilized to explore the relationships between the study variables. This method allowed for the examination of the distribution and characteristics of the data.

Tabulation, a key component of the descriptive analysis, was employed to organize the data in a systematic table format. This facilitated a structured presentation of key findings and patterns within the dataset. Additionally, various charts and graphs were employed to visually represent the general socioeconomic and demographic characteristics of the vegetable producers. These visual aids contributed to a more intuitive understanding of the data, offering a clear and concise overview of the study population.

By employing descriptive analysis techniques, the study aimed to provide a comprehensive and accessible summary of the key variables, enhancing the interpretation and communication of findings related to the socioeconomic and demographic aspects of vegetable producers in the study area.

1.11.10.2. SWOT and force field analysis

The SWOT analysis, employed as a tool within the framework of Participatory Learning and Action (PLA), serves as an initial step in delineating a problematic situation. This analysis aims to identify internal strengths and weaknesses within a system, along with external factors that can either be leveraged for positive change (opportunity) or should be mitigated to prevent adverse outcomes (threat). The exploration of advantages, disadvantages, possibilities, and risks is conducted from diverse perspectives, encompassing economic, environmental, and social considerations. This comprehensive approach allows for all-inclusive understanding of the situation and facilitates informed decision-making in addressing the identified issues.

Force Field Analysis, introduced by Kurt Lewin in the 1940s, is a systematic method for analyzing the dynamics involved in reaching a specific goal (Lewin, 1951). The process involves defining the intended state, identifying driving forces that push towards the goal, recognizing restraining forces that hinder progress and assessing and prioritizing the impact of these forces. Driving forces initiate and propel change, while restraining forces act to impede or resist change. Stakeholder perspectives are considered in the analysis, and strategies are developed to enhance driving forces and overcome or mitigate restraining forces (Harry, 1967). The ultimate goal is to implement effective strategies and monitor their impact to move the situation toward the desired state.

1.11.10.3. Measuring household food security status

The United States Agency for International Development (USAID) developed the HFIAS to assess the household food security status of households. The method is based on the assumption that incidents of household food insecurity result predictable reactions and responses that can be captured, quantified, and summarized on a scale using a survey.

1.11.10.4. Multivariate analysis

In conducting the study, an econometric model was employed to analyze cross-sectional data and address the research questions at hand. A key statistical tool utilized for this purpose was the regression model. This model proves to be robust in assessing the impact of multiple explanatory variables on a dependent variable, while concurrently accounting for the influence of various other independent variables. In the context of this research, the regression model was specifically applied to discern and interpret the primary factors

influencing the adoption of urban vegetable production practices among urban farmers in the study area.

The model allowed for the identification and interpretation of significant factors affecting the household vegetable production practices. Various potential explanatory variables related to the conditions of vegetable production within households were considered in the analysis. The logistic regression model thus served as a valuable analytical tool to unravel the complex interplay of factors influencing urban farmers' choices and practices in cultivating vegetables in the urban environment.

1.12. Ethical Consideration

The collection of data from the urban vegetable producers involved devotion to established ethical principles and procedures. Each participant in the study was approached in accordance with ethical standards, ensuring that they were thoroughly informed about the research objectives. Prior to the distribution of questionnaires and the initiation of interviews, explicit consent was sought and obtained from all research participants, underscoring the importance of their willingness to partake in the study.

To uphold the privacy rights of the respondents, the study meticulously maintained anonymity. Recognizing the sensitivity of individual identities, the research refrained from disclosing specific names. Instead, collective designations such as "respondents" were employed consistently throughout the study. This precautionary measure aimed to protect the confidentiality of the participants and foster a trustworthy environment, emphasizing the commitment to ethical conduct in the research process.

1.13. Scope of the Study

The research aimed to encompass all urban vegetable producers in the sub-cities of Addis Ababa. However, due to practical constraints, the study is confined to the Nifasilk-Lafto Sub-city, chosen through a non probability sampling (purposive) method targeting well known vegetable producers in the area. It's important to note that various types of vegetable production methods exist, but this study specifically focuses on home-based, community-based, and other shared gardening approaches. Additionally, in terms of the time dimension, the research adopts a cross-sectional survey methodology.

1.14. Limitations of the study

During the course of this research, several challenges were encountered. One significant obstacle was the difficulty in reaching the right person, often the head of the household, due to their busy engagement in field and market activities. This challenge necessitated repeated visits to the residential areas of the households to ensure accurate and comprehensive data collection. Additionally, the lack of prior research studies on the topic posed a challenge, limiting the availability of reference points and comparative data.

Time constraints were another hindrance, affecting the research process. The lack of well-organized information in the Wereda office, along with delays in disseminating information and underestimation of the items requiring specific amounts, added complexity to the data collection process. Issues related to measurement, such as quantifying variables like yearly vegetable production in kilograms, presented further challenges. The inherent difficulty in obtaining precise measurements and quantifying certain aspects of the study created complexities in data analysis.

1.15. Structure of the dissertation

The dissertation is organized as follows:

Chapter I: Introduction, Literature Review, Objectives, and Methods. This chapter begins with an overview of the research, offering a comprehensive literature review related to the topic. It outlines the research objectives and details the methodologies used throughout the study. Chapter II: Determinants of Urban Vegetable Production and Producer Attributes. This chapter investigates the factors that affect urban vegetable production and provides an analysis of the characteristics of producers in Addis Ababa, Ethiopia. Chapter III: Opportunities and Challenges of Urban Farming in Ethiopia. This chapter examines the opportunities and obstacles associated with urban farming in Ethiopia, using insights from the experiences of vegetable producers in Addis Ababa. Chapter IV: Contribution of Urban Agriculture to Household Food Security. This chapter explores the role of urban agriculture, particularly vegetable production, in enhancing household food security for urban producers in Addis Ababa, Ethiopia. Chapter V: Role of Urban Vegetable Production in Livelihood Enhancement. This chapter assesses the broader impact of urban vegetable production on the livelihoods of producers in Addis Ababa, focusing on employment, income, and market production. Chapter VI: Synthesis, Conclusions, and

Recommendations. This chapter synthesizes the research findings, presents the key conclusions, and offers recommendations for future research directions.

CHAPTER 2: DETERMINANTS OF URBAN VEGETABLE PRODUCTION AND ATTRIBUTES OF PRODUCERS IN ADDIS ABABA, ETHIOPIA¹

Abstract

Background: The swift pace of urbanization is exerting substantial stress on global food supplies and urban agricultural practices. In Ethiopia, the cultivation of vegetables emerges as a promising avenue to diversify employment, increase income, and improve food security for urban households. The adoption of vegetable farming practices in Addis Ababa, the capital city of Ethiopia, is influenced by a range of socioeconomic factors. Against this backdrop, the primary objective of this study is to scrutinize the determinants that shape urban vegetable production and to characterize the attributes of producers in Addis Ababa. By delving into these dynamics, the research aims to contribute to a comprehensive understanding of the factors influencing vegetable farming in the urban context of Addis Ababa, offering insights that can inform policies and practices for sustainable urban agriculture development in Ethiopia.

Methods: For this research initiative, a combination of data collection methods was utilized, incorporating questionnaires, focus group discussions and field observations. The selection of respondent households was carried out through a probability sampling technique. The collected household data underwent a dual analytical process. Descriptive statistics were employed to provide a comprehensive summary of the key characteristics and trends within the dataset. Additionally, an inferential method (Ordinal Logistic Regression) was conducted, enabling the exploration of the relationships between multiple independent variables and the dependent variable. By employing these mixed-methods approach and analytical framework, the research aimed to capture a good understanding of the factors influencing urban vegetable production.

Findings: The study's findings reveal distinct demographic and socio-economic characteristics among participants engaged in vegetable production activities. The majority of individuals involved were young adults, specifically in the age range of 31 to 40 years old, and predominantly male. Furthermore, most participants had attained education at the primary and secondary levels. The vegetable producers were primarily

¹ Based on:

Habtamu Serbessa, Teferee Makonnen & Meskerem Abi (2023). Determinants of urban vegetable production and attributes of producers in Addis Ababa, Ethiopia. *Journal of Economic and Sustainable Development*, 14 (9)

married individuals who owned their private houses and operated on relatively small plots of land. The analytical results from the ordinal logistic analysis reveal significant factors impacting vegetable production among the sampled households. Particularly, gender, age, and marital status were identified as variables with statistically significant effects on vegetable production. This emphasizes the pivotal role of demographic characteristics as crucial determinants shaping the landscape of vegetable cultivation within the study area. The findings provide valuable insights into the socio-demographic profiles of vegetable producers, shedding light on their influence on urban vegetable production practices.

Suggestions: *The study recommends several policy interventions aimed at fostering sustainable and productive vegetable production in the future. Implementing initiatives to enhance the education of farmers, particularly focusing on improving skills and knowledge related to modern and sustainable agricultural practices, Implementing measures to reduce gender inequality in agriculture means ensuring that both male and female farmers have equal access to resources, education, and opportunities. By focusing on education, land management, gender equality, and resource availability, policymakers can create a conducive environment for sustainable and resilient vegetable production in the future.*

Keywords: *Food security; Vegetable production; Urban agriculture; Addis Ababa*

2.1. Introduction

Traditionally, agriculture has been closely linked with rural settings, serving as a means to sustain the global human population. However, contemporary research suggests a paradigm shift with the recognition that Urban Agriculture (UA) plays a substantial role in meeting the nutritional needs of urban populations. This form of agriculture makes a noteworthy contribution by supplying fresh and nutritious food directly to urban dwellers, offering diverse food products, reducing expenditure on food bills, and fostering social benefits within the community (Korth *et al.*, 2014; Opitz *et al.*, 2015; FAO, 2017; Martin-Moreau and Ménascé, 2019). This evolving perspective underscores the importance of urban spaces in food production and highlights the multifaceted advantages that Urban Agriculture brings to urban communities.

The practice of UA has a historical foundation as old as the existence of cities themselves. In essence, UA involves the cultivation of perishable products such as vegetables, animal products, and flowers within urban and peri-urban areas (Yan *et al.*, 2022). In the face of rapid global urbanization, there is an increasing demand for food supply in urban environments, especially in swiftly developing cities. This phenomenon exerts considerable pressure on both the food supply chain and the urban environment due to the emergence of intricate socioeconomic and demographic characteristics (Ranagalage *et al.*, 2021). The role of UA becomes increasingly crucial in navigating these challenges and ensuring sustainable food production in urban and peri-urban settings.

In Ethiopia, UA presents a unique opportunity for urban households, offering avenues for diversifying employment, income sources, and dietary options. Additionally, it plays a role in recycling and reusing urban waste, making a substantial contribution to long-term urban development (Amsalu, 2020). The practice of home gardening, including the cultivation of flowers and ornamental plants, has a rich historical tradition in Ethiopia. Notably, gardening has evolved beyond its traditional focus on herbal medicines to become an additional investment for city dwellers alongside their regular businesses. Recognizing the significance of UA, especially as a source of food, nutrition, and income for urban residents, is gaining momentum in Ethiopia (Dejen, 2020). The sector primarily concentrates on high-value vegetable crops, positioning itself as a crucial mechanism for poverty alleviation in towns and cities (Ashebir *et al.*, 2007). Despite its potential, UA in Ethiopia faces challenges due to inadequate institutional and policy support (Yalew, 2020). Today, urban farming is adopting new technologies and modern practices to adapt to

limited space and resources in cities. Particularly in vegetable and fruit farming systems, urban agriculture plays a pivotal role in producing both household and market-oriented fresh products while contributing to the creation of cleaner air in pollution-prone cities.

Urban vegetable production has been a longstanding practice in Addis Ababa for nearly three decades, with vegetable producers forming cooperatives along riverbanks (Tamirat and Bezabih, 2011). The city municipality has recently launched a campaign to encourage urban dwellers to engage in agricultural activities individually or collaboratively in groups within their neighborhoods, gardens, and along riverbanks. Prior to this campaign, urban farming was less organized among various households, but a significant number of households have since taken up farming, particularly to cultivate vegetables for household consumption within their limited land (Nimona, 2017).

Addis Ababa's urban farmers primarily cultivate vegetables for both personal consumption and profit (Yared, 2019). Vegetables, known for their nutritional and protective qualities, play a crucial role in balancing the human diet, positively impacting health (Khan *et al.*, 2012). According to Messay (2013), at least 11,716 registered households in Addis Ababa were practicing Urban and Peri-Urban Agriculture (UPA). However, recent data from the Addis Ababa Urban Agriculture and Farmers' Development Commission (AAFUADC) in 2021 indicates a substantial increase, with 106,280 registered urban vegetable producers in the city. Presently, these urban farmers contribute approximately 60 percent of the city's vegetable consumption, with a focus on leafy vegetables (Dejen, 2020).

Despite the growth in participation, traditional tools like hoes, spades, and sickles are still commonly used by Addis Ababa's vegetable producers for various tasks such as seedbed preparation, diverting river water to farmlands, building diversion sites along major rivers, and trimming vegetables (Tamirat and Bezabih, 2011). This reflects a mix of traditional and modern agricultural practices within the urban farming landscape of Addis Ababa.

This study delves into the critical elements and challenges faced by vegetable producers in Addis Ababa from both production and sustainability perspectives. While previous research in Addis Ababa has extensively explored urban agricultural practices (Teferee, 2003; Tewodros, 2007; Abraham, 2012; Thomas, 2013; Fekadu, 2013; Messay, 2013; Abraham and Misikire, 2014; Assefa, 2016; Sophia, 2015; Bogale, 2017; Dejen, 2020), there has been a notable gap in understanding the socioeconomic factors that significantly impact sustainable vegetable production in the region.

The primary objective of this study is to identify the determinants of vegetable production and assess the characteristics of producers in the study area. The analysis aims to provide valuable insights for stakeholders involved in urban agriculture, urban land use planning, environmental activism, politics, research, and urban sustainable development. The findings are expected to benefit the communities of urban farmers in the study area, fostering a more comprehensive understanding of the factors influencing vegetable production and contributing to informed decision-making and policy development.

2.2. Methods

To scrutinize the qualitative data acquired from focus group discussions and field observations, the study employed thematic content analysis. This involved systematically organizing, summarizing, and evaluating the information to identify recurrent themes and patterns. The insights derived from this qualitative analyses were then organized to provide support and validation for the findings obtained through the survey.

The quantitative data collected through the household survey was analyzed using descriptive statistics to succinctly present the key features of the dataset. Additionally, ordinal regression was employed to statistically assess the relationships between various research variables. This quantitative method allowed for a numerical examination of the links and associations among the variables, offering a statistical foundation to complement the qualitative insights. By integrating both qualitative and quantitative methods, the research achieved a comprehensive understanding of the subject, leveraging the strengths of each approach to enrich the overall analysis.

2.2.1. Description of the study Variables

The investigation focuses on vegetable production as the dependent variable and aims to explore how various factors, including household demographics and socioeconomic characteristics, might impact it. Informed by a review of relevant literature, the study identifies ten potential explanatory variables that could clarify variations in vegetable production within the study area. These explanatory variables encompass types of vegetable production, land size, source of land, housing status, gender, age, household size, education, employment, and marital status. The study's objective is to analyze and comprehend how these factors contribute to and elucidate patterns in vegetable production in the specified region.

Table 2.1 Dependent and independent variables descriptions

<i>Dependent variable</i>	<i>Description</i>
Purpose of vegetable production	food, income and job creation
Total vegetable production in Kg	The amount of vegetable produced in Kg
<i>Independent variable</i>	<i>Description</i>
Types of vegetable production	kale, chard, and lettuce etc
Land size in m ²	1= < 300, 2= 301- 600, 3=601-1000, 4= > 1001
Types/ source of land	1= river side, 2= park, 3= *damped area, 4=Private residential, 5= Condominium
Housing/shelter status	1= own house, 2= private rented house, 3= Wereda rented house
Gender of the house head	Dummy; 1 if head is male 0 if female
Age of the house head	1=18 - 30, 2=31- 40, 3=41-50, 4= >50
Households Size	Number of members of the household (Continuous)
Educational status	0= unable to read and writing,1= non-formal education but reading and writing,2= primary,3= secondary,4= diploma,5= bachelors,6= postgraduate and above
Main employment status of HHs	civil servant, work for private sector, own farm, home maker, student, retired, community farming
Marital status	1= married, 2= single, 3= divorce

* *Damped area- A damp location includes mostly outdoor areas that are covered with dirt, and households clean the area to practise vegetable production.*

Age: Farmer age can have a notable impact on agricultural productivity. Initially, as farmers age and accumulate experience, their productivity and managerial skills tend to improve. However, in later stages of life, productivity may decline. Studies, such as one conducted by Loomis and supported by Long, have identified a cyclical relationship between farmer age, farm size, input usage, and output (Tauer, 1995).

Sex: Gender plays a crucial role in agriculture, especially in activities like vegetable production. Women contribute significantly to agricultural labor, but they often face unequal access to productive resources and opportunities compared to men. Women's substantial participation in the agricultural labor force positively impacts national-level agricultural productivity (IFPRI, 2014).

Education: Education is widely recognized as a positive influence on agricultural output. Several mechanisms explain how education can enhance agricultural productivity. Education equips farmers with the skills to acquire, interpret, and understand information effectively. This, in turn, enables them to make informed decisions and devise solutions to challenges related to production, marketing, and financing (Ninh, 2020).

Marital status: The marital status of women can significantly impact their productivity in agriculture, influenced by various factors including access to resources, educational opportunities, training, and societal norms. The assumption that married women might be more productive in cash crop production is based on the premise that household decisions

about land use are often influenced by economic considerations (Kiriti *et al.*, 2003). In the context of agricultural activities, the marital status of women is considered a relevant factor that can shape their engagement and effectiveness in cash crop production.

Employment status: The urban employment and unemployment survey conducted in 2020 indicates a 19.3% unemployment rate in Addis Ababa, with particularly high youth unemployment (age 15–29 years) (WFP, 2020). Vegetable cultivation has played a pivotal role in addressing unemployment challenges by creating employment opportunities across various stages, from the production phase to the final transaction of the products. As documented by Khan *et al.* (2012), engagement in vegetable cultivation has emerged as a source of income, contributing to economic activities and livelihoods in the region.

Housing: The surge in housing demand in the early twenty-first century has led to an increased need for land by housing construction companies. This uptick in demand has a notable impact on farmers' choices, often prompting them to sell their farmland and exit farming (Bekkerman, 2007).

Family Size: Demographic and household characteristics significantly influence decisions in household farming. Regarding family size, there's an argument that larger households are more inclined to engage in intensive farming practices and execute essential farming operations at the right times compared to smaller households (PFE, IIRR, and DF, 2010).

Land Size: Farmland serves as the cornerstone of farmers' livelihoods and represents the most fundamental agricultural resource. However, the availability of land is increasingly becoming a constraint in agricultural production. The food output from small farms is struggling to keep pace with the demands of a growing population (Gemechu, 2017).

2.3. Results and Discussion

2.3.1. Demographic and Socio-economic characteristics of the respondents

The finding presented in Table 2.2 indicates that a majority of the respondent households (59.3%) engaged in vegetable production were male, while 40.7 percent were female. This finding aligns with the observations made by Banchamlak and Akalu (2022), suggesting that there is a greater male presence in the vegetable production sector. The assertion of male dominance in this context is further supported by the work of Mumbi *et al.* (2006), who claim that male farmers are taking the lead in both vegetable production and marketing. The gender disparity in vegetable production could be influenced by various socio-economic, cultural, and historical factors that shape roles and responsibilities within

households. It's important to note that such differences may have implications for equitable access to resources, decision-making power, and overall well-being within the community. Understanding the gender dynamics in agriculture is crucial for developing inclusive and gender-sensitive agricultural policies and interventions. Efforts to promote gender equality in agriculture often involve addressing systemic barriers that limit women's participation and providing support mechanisms to ensure that both men and women have equal opportunities to contribute to and benefit from agricultural activities.

According to the study, the age groups 31- 40 make up a significant portion of respondents, while the overall working age group of 18–50 represents the majority. In contrast, Godfrey *et al.* (2012) found that younger generations, often characterized as having a negative attitude, perception, and belief towards farming, were less likely to participate in urban agriculture. According to Godfrey, the elderly were more likely to engage in urban vegetable production, and he attributed this trend to the younger generation's negative attitudes, perceptions, and beliefs about farming, as well as their perceived view of farming as time-consuming and exhausting. This difference in perspectives on urban agriculture participation among age groups highlights the importance of understanding the socio-cultural factors that influence individuals' decisions to engage in farming activities. It also suggests that efforts to promote urban agriculture among the youth may need to address and change negative attitudes and perceptions while emphasizing the potential benefits and importance of sustainable food production in urban environments. Additionally, educational programs that provide knowledge and skills related to urban agriculture could help bridge the gap between different age groups and encourage wider participation in this form of farming.

The additional information from Table 2.2, stating that 19.0 percent of respondents were over 50, reinforces the notion that the working age group (18–50) plays a crucial role in the capacity of vegetable production in the studied urban agriculture context. This finding aligns with the observations of Tauer (1995), who, based on data from the 1978 Agricultural Census, concluded that farmers' productivity tends to follow a pattern of increasing and then decreasing with age. Specifically, Tauer found that farmers aged 35 to 44 were identified as the most productive group. The consistency in findings across different studies suggests a common trend wherein individuals within a certain age range (in this case, 35 to 44 years) tend to exhibit higher productivity in agricultural activities. This could be influenced by a combination of factors, including accumulated experience,

knowledge, and possibly a balance between physical capability and maturity. Understanding these age-related patterns in agricultural productivity can be valuable for policymakers, researchers, and practitioners involved in promoting sustainable and efficient agricultural practices. It can inform targeted interventions, support systems, and training programs that cater to the specific needs and characteristics of different age groups engaged in agricultural activities.

The information from Table 2.2 indicates that significant proportions, specifically 67.8 percent, of vegetable producers in the studied urban agriculture context were married. This finding suggests a strong association between marriage and participation in urban vegetable production. This trend is in line with similar findings reported by Baba *et al.* (2010), Pedzisai *et al.* (2014), and Filmon and Mitke (2022), who observed that married farmers tend to be more engaged in vegetable farming, often as a means of supporting their families. The connection between marital status and agricultural engagement can be influenced by various factors, including the need for household income, shared responsibilities within a family, and the desire to secure a stable source of food for the household. It's noteworthy that approximately 21.3 percent of respondents were single, and 10.9 percent were divorced. These different marital statuses could be associated with varying levels of engagement in agriculture, influenced by factors such as individual preferences, economic considerations, and available resources. Understanding the demographics and social dynamics of vegetable producers, including their marital status, can be valuable for designing targeted agricultural policies and support programs. It permits a more detailed comprehension of the reasons behind and obstacles confronted by different groups, contributing to the formulation of efficient approaches for sustainable urban agriculture.

Table 2.2 Households' demographic characteristics

<i>Item</i>	<i>Categories</i>	<i>Frequency</i>	<i>Percent</i>
sex	male	227	59.3
	female	156	40.7
age	18-30	86	22.3
	31-40	133	34.5
	41-50	93	24.2
	> 51	73	19.0
	married	261	67.8
marital status	Single (unmarried)	82	21.3
	divorce	42	10.9

Table 2.3 reveals significant insights into the educational background of the respondents: Nearly one-third (30.9%) of respondents lacked formal education, being unable to read and write. The majority (56.2%) had completed primary and secondary school. In terms of higher education, 32.0 percent had completed secondary school. Moreover, 7.0 percent held diplomas, 4.4 percent possessed bachelor's degrees, and 1.5 percent had postgraduate degrees. These educational statistics align with the perspective emphasized by Masuku and Xaba (2013), underscoring the essential role of education in farming. Masuku and Xaba argue that education facilitates farmers' ability to embrace change and innovation more readily compared to those without formal education. The data underscores the importance of educational access and attainment in influencing the approach to agricultural practices, reflecting the broader impact of education on the agricultural sector.

As per the findings presented in Table 2.3, the family demographics of urban vegetable farmers are noteworthy: A significant proportion (55.0%) of urban vegetable farmers reported having families consisting of 4-6 members. About 34.4 percent had smaller families, with 1-3 members. Notably, 17.8 percent indicated having larger families with 7 or more members. The data underscores the relevance of family size as a crucial factor in farming practices. Larger families can serve as a substantial source of family labor in agriculture, a practice commonly employed by farmers to mitigate labor costs. This observation agrees with similar findings reported by Uuld *et al.* (2021) and Filmon and Mitke (2022). Understanding the correlation between family size and agricultural labor provides insights into the dynamics of resource availability and utilization within farming households. Such understandings are valuable for developing strategies and policies that consider the role of family structure in supporting sustainable and cost-effective agricultural practices.

Table 2.3 Households socioeconomic characteristics

<i>Item</i>	<i>Categories</i>	<i>Frequency</i>	<i>Percent</i>
employment	civil servant	19	4.9
	private sector	78	20.2
	urban farmer	247	64.0
	home maker	22	5.7
	student	1	0.3
	retired	15	3.9
	community farming	4	1.0
	unable to read and writing	57	14.7

	non formal education	63	16.2
	primary	144	37.1
Educational status	secondary	74	19.1
	diploma	27	7.0
	bachelors	17	4.4
	postgraduate and above	6	1.5
	up to 5 years	272	73.9
Farming experience	up to 10 years	44	12.0
	up to 15 years	13	3.5
	>15 years	39	10.6
	own house	234	61.3
Housing status	private rented house	138	36.1
	kebele rented house	10	2.6
	up to - 300 m ²	302	79.1
	301 - 600 m ²	38	9.9
Land size	601 - 1000 m ²	7	1.8
	> 1001 m ²	35	9.2
	1-3 family	133	34.4
Family size	4-6 family	213	55.0
	7-9 family	38	9.8
	> 9 family	3	8.0

The result presented in Table 2.3 illustrates that the primary occupation for 64.0 percent of households is vegetable production, highlighting its significant role in the community. Additionally, 20.2 percent are employed in the private sector, 4.9 percent are public servants, and 5.7 percent are homemakers. Other occupations include 3.9 percent retired, 1.0 percent working as community farming, and 0.3 percent students. This distribution underscores the importance of vegetable production as a key livelihood strategy in the study community. Furthermore, 73.9 percent of participants have five or fewer years of experience in vegetable production, indicating a recent increase in vegetable farming capacity and a corresponding rise in greenery coverage in the study area.

Urban vegetable farming practices are closely tied to housing ownership, providing participants with permanent and additional farming space. In the study area, 61.3 percent of those engaged in urban vegetable production live in their own houses, 36.1 percent live in privately rented houses, and 2.6 percent live in government-rented houses (Kebele). The majority of participants in the study have limited land holdings, with 79.1 percent owning up to 300 m² of land, 9.9 percent owning land in the range of 301–600 m², 1.8 percent owning land between 601–1000 m², and 9.2 percent owning 1001 m² or more. This

distribution highlights the prevalence of relatively small land sizes among those involved in urban vegetable production.

The study employed focus group discussions and key informant interviews, revealing both positive and challenging aspects. One notable issue raised during the discussions was the availability of free lands, previously designated as dumping spaces. Implementing vegetable production not only cleared these areas from unpleasant odors but also transformed them into productive and friendly environments.

A positive aspect highlighted in the discussions was the minimal space required for the production system, presenting a wonderful opportunity for both food and income generation. Moreover, the community's attitude towards urban farming, especially in vegetable production, has evolved positively. Engaging in urban agriculture has provided participants with the chance to connect, share experiences, and support each other, even during challenging times, as emphasized in the discussions.

2.3.2. Attributes of urban vegetable production

The information from Table 2.4 highlights the primary motivation for producers engaging in vegetable production, emphasizing the simplicity of the production system as a key factor. 43.1 percent of respondents agreed that vegetable production is characterized by simplicity and a low barrier to entry. This finding suggests that the perceived ease of engagement in vegetable production acts as a significant driver for producers. 59.8 percent of respondents farm vegetables twice a year while 32.6 percent produce vegetables three times a year. This indicates a notable frequency in vegetable farming among the surveyed producers. Moreover, a positive aspect is that 92.4 percent of participants had the opportunity to engage in vegetable production more than twice per year, signaling a trend toward intensification. In contrast, 7.5 percent produced vegetables only once per year. The result agreed with "The Growth and Transformation Plan II (GTP-II)," emphasizing accelerated growth in agricultural productivity for food security and supporting the food industry. The plan focuses on increasing crop production, enhancing crop productivity through good agricultural practices, and improving extension services. These findings shed light on the factors influencing vegetable production, including the perceived simplicity of the system, the frequency of farming, and the alignment with broader agricultural development plans (NPC, 2016; Bezabih *et al.*, 2017).

Table 2.4 Reasons for engagement in vegetable production sector

<i>Reasons for participation</i>	<i>Frequency</i>	<i>Percent</i>
Simplicity	79	20.5
Intensive farming	140	36.4
simplicity and intensive farming	166	43.1
<i>frequency of vegetable farming</i>		
once per year (1x)	29	7.5
twice per year (2x)	231	59.8
three times per year (3x)	126	32.6

Figure 2.1 illustrates the locations where the study farmers engage in vegetable production, revealing diverse patterns. A majority of farmers, 61.3 percent, utilize riverside areas for vegetable cultivation. This practice involves leveraging river resources for irrigation, emphasizing a dual purpose of vegetable production and ensuring the sustainability of the river ecosystem. 45.9 percent of producers cultivate vegetables in their private residential spaces, indicating the integration of agriculture into personal living spaces. 28.6 percent of farmers use dumping areas for vegetable production, 8.8 percent use park areas, and 3.9 percent use condominium residential areas. The findings bring into line with the insights from Dejen (2020), providing support to the study's observations regarding the diverse locations chosen by farmers for vegetable production.

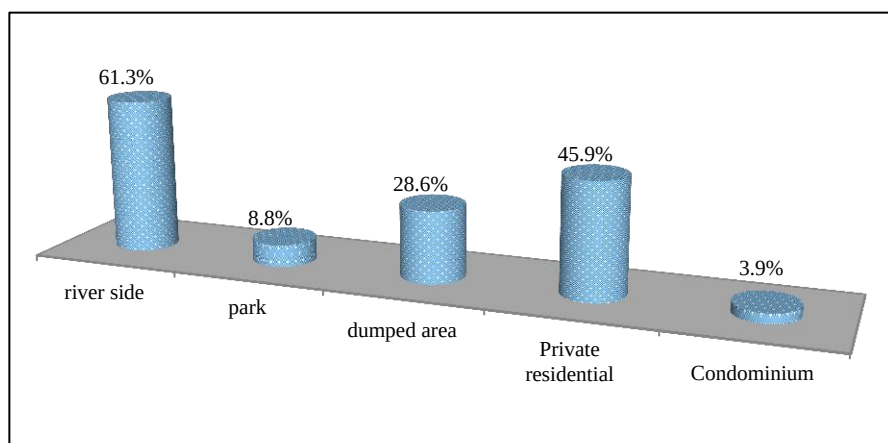


Figure 2.1 Producers sources of land (*respondents may choose more than one source*)

The result implies that farmers adopt varied strategies for integrating vegetable cultivation into their surroundings, utilizing different types of spaces. The emphasis on riverside areas indicates a watchful approach to irrigation practices and environmental sustainability, showcasing the multi-functional use of these spaces for agricultural purposes.

Understanding these patterns can inform land-use planning and conservation efforts in urban agriculture.

2.3.3. Types of vegetables produced and production capacity

It appears that Figure 2.2 indicates that a significant majority of respondents engage in the production of vegetable products. Remarkably, 91.0 percent of respondents are involved in producing leafy vegetables such as kale, chard, and lettuce. The reference to Selamawit *et al.* (2021) suggests that the findings are consistent with or supported by this particular study. Additionally, the text mentions that urban vegetable producers prioritize the cultivation of other vegetables, such as onions, carrots, potatoes, and peppers, which collectively dominate the overall production. This information provides insights into the prevalent types of vegetables produced by respondents in urban settings.

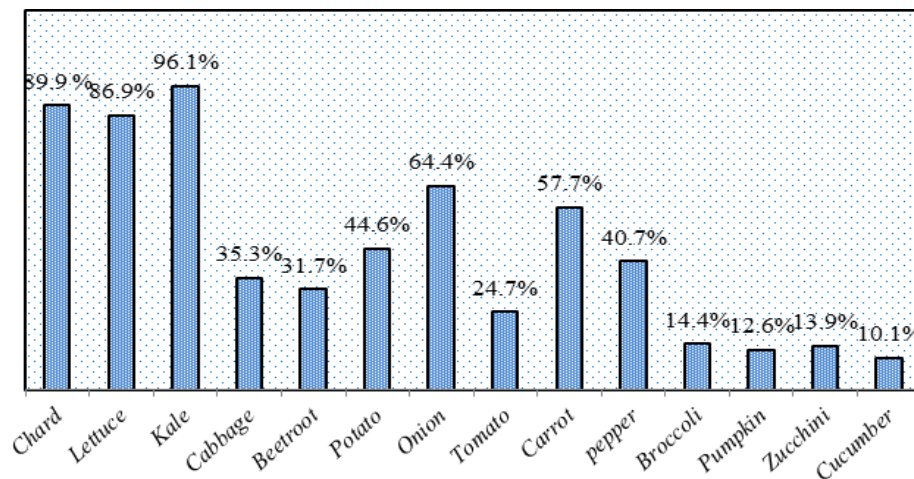


Figure 2.2 Different varieties of vegetable production in the study area

The household's production capacity per square meter appears to be low, as indicated in Table 2.5. The standard deviation closely aligns with the mean, suggesting minimal variability in production across households. Especially, potatoes exhibit the highest yield at 6 kg per square meter, while lettuce, zucchini, and cucumber have the lowest yields, each recorded at 2 kg per square meter. This descriptive analysis provides insights into the distribution and variability of vegetable production within households, with a notable emphasis on the disparities in yield among different crops.

Table 2.5 Total vegetable production per square metre in kg

<i>Types of vegetable</i>	<i>Maximum</i>	<i>Mean</i>	<i>Std. Deviation</i>
Chard	5	2.37	1.301
Lettuce	2	2.21	1.054
Kale	4	2.62	1.179
Cabbage	4	1.34	1.893
Beetroot	3	1.05	1.668
Potato	6	2.29	2.895
Onion	4	1.97	1.773
Tomato	3	.70	1.295
Carrot	5	1.76	2.003
Pepper	4	.94	1.317
Broccoli	3	.46	1.168
Pumpkin	5	.59	1.670
Zucchini	2	.39	1.017
Cucumber	2	.28	.882

2.3.4. Determinants of vegetable producers (cross-tabulation)

The finding from cross-tabulation reveals important disparities in vegetable production capacity based on gender, age, educational attainment, and marital status among respondents. Male producers exhibit higher activity levels compared to their female counterparts, with 77.8 percent of men producing three times per year, while only 22.2 percent of women have the same opportunity. Age appears to be a significant factor influencing production capacity, with 30.2 percent of respondents aged 31 to 40 producing vegetables three times per year. In contrast, those aged 18 to 30 have a lower production rate at 15.9 percent. This suggests a positive correlation between age and annual production capacity, indicating an increase as producers grow older.

Educational background also plays a role, as respondents with primary and secondary education (60.3%) demonstrate a higher likelihood of producing three times per year compared to those with lower formal education (30.2%). Marital status is another factor influencing production, with 67.5 percent of married respondents producing three times per year, while 23.8 percent of singles and 8.7 percent of divorced respondents have the same production frequency. These findings collectively highlight the diverse factors contributing to variations in vegetable production capacity among the surveyed population.

Urban agriculture, particularly vegetable production for self-sufficiency, was more popular. According to the data, 94.7 percent of civil servants (government employees) and 95.5 percent of homemakers in the study area grow vegetables for their own consumption. Small-landholder vegetable producers (79.1%), with land sizes up to 300 m², primarily produced leafy vegetables (chard, lettuce, and kale). The vast majority (76.6%) of vegetable producer respondents engaged in income-generating activities (Table 2.6). According to the study, the majority of respondents with 5 or fewer years of experience (61.9%) agreed that the sectors were important for job opportunities. According to Ibrahim *et al.* (2021), vegetable production is very important for income, including employment, self-consumption, and hobbies.

Table 2.6 Income and employment opportunities from cross-tabulation with year of farming experience

	What are the purposes for your engagement in vegetable Production?					
	<i>Income</i>					
Year of farm experience	strongly disagree	disagree	neutral	agree	strongly agree	Total
< 5 years	19	20	22	112	99	272
> 5 and <10 years	8	0	10	10	16	44
> 10 and < 15 years	0	0	2	3	8	13
> 15 years	2	3	0	2	32	39
	<i>Employment opportunity</i>					
< 5 years	13	49	41	89	78	270
> 5 and <10 years	10	10	5	7	12	44
> 10 and < 15 years	1	8	0	0	4	13
> 15 years	3	6	3	8	19	39

Table 2.7 presents a significant finding with a p-value of 0.000 for gender status. Rejecting the null hypothesis at this level of significance indicates a substantial correlation with the overall land cover of vegetable production in the surveyed households. The remarkably low p-value underscores the significance of being male as a predictor, distinguishing it from being female, concerning the total land cover in vegetable production. The positive estimate of 1.562 suggests, on average, a 1.562-unit increase in the total land cover associated with a one-unit change in male respondents.

Table 2.7 Ordinal logistic regression estimates the effects of the total land area on vegetable production

Model Fitting Information								
-2 Log								
Model	Likelihood	Chi-Square	df	Sig.				
Intercept Only	152.381							
Final	101.588	50.794	6	.000				
Link function: Logit.								
Goodness-of-Fit			Pseudo R-Square					
Chi-Square	df	Sig.	Cox and Snell	.128				
Pearson	46.067	54	.770	Nagelkerke	.169			
Deviance	48.963	54	.669	McFadden	.096			
Link function: Logit.			Link function: Logit.					
Parameter Estimates								
		Estimate	Std. Error	Wald	df	Sig.	95% C. I.	
							Lower	Upper
Threshold	[land area covered = 1]	21.428	.623	1183.873	1	.000	20.208	22.649
	[land area covered = 2]	22.282	.640	1210.410	1	.000	21.027	23.538
	[land area covered = 3]	22.470	.645	1213.652	1	.000	21.206	23.734
Location	[gender=1]	1.562	.362	18.624	1	.000	.853	2.272
	[gender=2]	0 ^a	.	.	0	.	.	.
	[age=1]	.780	.506	2.377	1	.123	-.212	1.773
	[age=2]	.944	.407	5.376	1	.020	.146	1.741
	[age=3]	.733	.425	2.979	1	.084	-.099	1.566
	[age=4]	0 ^a	.	.	0	.	.	.
	[marital status=1]	18.531	.381	2364.353	1	.000	17.784	19.278
	[marital status=2]	17.978	.000	.	1	.	17.978	17.978
	[marital status=3]	0 ^a	.	.	0	.	.	.
Link function: Logit.								
a. This parameter is set to zero because it is redundant.								

a. This parameter is set to zero because it is redundant.

Similarly, (Table 2.7) for aged 31-40 status, with a p-value of 0.020, the rejection of the null hypothesis implies a significant association with the total land cover of vegetable production in the sampled households. The significance of this p-value suggests that the age group 31-40 status is a notable predictor of the total land cover in vegetable production. The positive estimate of 0.944 implies, on average, a 0.944-unit increase in the total land cover associated with a one-unit change in respondents aged 31-40.

Again, the reported p-value for the variable "married" is 0.000, rejecting the null hypothesis implies a substantial correlation with the total land cover of vegetable production within the studied area. The extremely low p-value underscores the significance of marital status as a significant predictor for the total land cover in vegetable production. The positive estimate of 18.531 suggests, on average, an 18.531-unit increase in the total land cover associated with a one-unit change in married women.

2.4. Conclusion and recommendations

This study provides a comprehensive understanding of the factors influencing vegetable production in the Addis Ababa region, shedding light on the demographics, land usage, and prevalent types of vegetables grown. The key findings suggest a growing interest in vegetable production among households, with a distinguished presence of newly engaged participants, predominantly males but with encouraging female participation as well.

The study emphasizes the importance of young producers with lower levels of education in driving vegetable production in urban areas. It notes that privately owned houses are closely linked to urban vegetable farming practices, providing participants with access to more permanent and larger farming spaces.

Family-related factors, such as gender, age and marital status, are identified as crucial determinants in vegetable production due to their impact on the availability of family labor. Most vegetable growers in the area cultivate small plots of land, primarily for home consumption. Leafy vegetables like kale, chard, and lettuce are highlighted as the most commonly grown vegetables.

The study also underscores the significance of multiple planting cycles for generating income, creating employment opportunities, and ensuring self-consumption. It suggests that collaboration between governments and development partners is essential to enhance household capacity and diversify livelihoods. This partnership could be facilitated through policies that ensure urban farm households and vulnerable communities have access to necessary inputs and resources.

The study concludes by observing that despite being dependent on regional states for consumption, Addis Ababa has the potential to feed itself. Overcoming challenges, including negative attitudes and a lack of new ideas, requires innovative approaches and a positive shift in mindset. The study holds promise in contributing to greater economic stability and food security in the region by addressing barriers and fostering supportive policies for increased self-sufficiency in vegetable production.

CHAPTER 3: OPPORTUNITIES AND CHALLENGES OF URBAN FARMING IN ETHIOPIA: EVIDENCE FROM VEGETABLE PRODUCERS IN ADDIS ABABA²

Abstract

Background: *In the context of productivity challenges confronting urban residents in developing nations like Ethiopia, a burgeoning trend is emerging whereby individuals are turning towards vegetable cultivation as a strategy to enhance food security. This research endeavor seeks to explore the barriers faced by vegetable growers and the promising prospects for urban agriculture in Addis Ababa, Ethiopia.*

Methods: *Employing a blend of qualitative and quantitative methodologies, the study leveraged household surveys, focus group dialogues, interviews, and desk assessments to collect data. The selection of households for participation was executed through probability sampling. Examination of the household survey findings encompassed descriptive statistical analyses along with correlation and regression studies. The impediments associated with urban vegetable cultivation were scrutinized utilizing a Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis in conjunction with a Force Field Analysis.*

Findings: *The outcomes of the study underscore favorable inclinations among respondents towards vegetable cultivation. Most producers contribute to household food availability, earn supplementary income, and value the sector's accessibility without necessitating substantial financial investments. Nonetheless, notable challenges within vegetable production operations include land access constraints, pest and disease issues, and water scarcities. Correlation assessments unveiled a robust positive link between fertilizer and seed accessibility levels. Furthermore, binary logistic regression models identified certain age and employment groups as being more predisposed to engage in leafy vegetable cultivation compared to other demographics.*

Suggestions: *The study proposes opportunities for expanding existing production capacities, notably through initiatives like household food gardens. Moreover, there exists*

² Based on:

Habtamu Serbessa, Teferee Makonnen & Meskerem Abi (2024). Opportunities and challenges of urban farming in Ethiopia: Evidence from vegetable producers in Addis Ababa. *Journal of Equity in Sciences and Sustainable Development*, 7(1)

potential for augmenting community food sovereignty by harnessing local insights on urban vegetable cultivation practices.

Keywords: *Urban Agriculture; Vegetable Cultivation; Food Security; Productivity Challenges*

3.1 Introduction

Urbanization stands out as one of the most significant forces shaping the twentieth century. Over half of the global population now resides in cities, a figure projected to reach 60 percent by 2030 (Bisaga *et al.*, 2019; WB, 2022). This rapid urbanization exerts considerable pressure on food supplies and urban environments, particularly in swiftly developing cities, leading to the emergence of intricate socioeconomic and demographic challenges (Burak *et al.*, 2017; Ranagalage *et al.*, 2021).

In the fight against urban poverty and food insecurity, numerous developing countries have embraced the adoption of urban agriculture as a strategy (Zezza and Tasciotti, 2010). Urban agriculture involves the cultivation, processing, and distribution of a wide range of goods, including food and non-food products, within urban or peri-urban regions (Mougeot, 2000). It primarily focuses on domestic food production and income generation, crucial for supporting the livelihoods of urban poor populations who allocate a significant portion of their income (60 to 80 percent) to food expenses (Egbuna, 2008; Mahteme and Akalewold, 2020). The potential of UA to enhance urban livelihoods is a topic of concern amid the simultaneous trends of escalating urbanization and urban food insecurity (Davies *et al.*, 2021).

In modern times, Urban Agriculture (UA) has become a pivotal source of household food, particularly in reducing the vulnerability of urban households in African cities (Arku *et al.*, 2012; Davies *et al.*, 2021). While many African governments historically focused on rural agriculture, there is a growing recognition of the importance of urban agriculture. Governments are establishing agencies to manage UA, emphasizing the need for policy and planning interventions to facilitate urban food production and exchange, acknowledging UA's integration into urban food systems (Mougeot, 2000; Alemayehu *et al.*, 2017; White and Hamm, 2017).

Up until approximately two decades ago, participating in agricultural practices within metropolitan settings across much of Africa was prohibited by legislation dating back to the colonial era (Foeken, 2004; Mahteme and Akalewold, 2020). Urban farmers encountered a multitude of obstacles, including land tenure uncertainties, crop and livestock theft, financial limitations, risks of eviction, and crop destruction, as elucidated by Foeken (2004).

In Ethiopia, UA serves as an avenue for urban households to diversify their employment, income, and dietary options while also facilitating the recycling and reuse of urban waste, thereby contributing to sustainable urban development (Amsalu, 2020). The predominant focus of UA activities in the country is on the production of high-value vegetable crops, which play a crucial role in poverty alleviation in Ethiopian towns and cities (Ashebir *et al.*, 2007). Despite its potential, the sector faces challenges due to insufficient institutional and policy support (Amsalu, 2020).

Urban farmers in Addis Ababa primarily engage in cultivating vegetables for personal consumption and income generation (Yared *et al.*, 2019). According to the Addis Ababa Urban Agriculture and Farmers' Development Commission (AAFUADC) in 2021, the city is home to 106,280 registered urban vegetable producers, supplying approximately 60 percent of the city's vegetable consumption, particularly leafy vegetables (Dejen, 2020). Addis Ababa boasts favorable soil conditions, altitude, and year-round small rivers, which are tributaries of the Akaki River, serving as a vital source of irrigation water for most vegetable growers in the city (Assefa, 2016). Despite these advantages, the true impact of urban vegetable production on the lives of the urban poor in the city has not been comprehensively evaluated.

Research shows that urban vegetable production specifically impacts the livelihoods of urban communities. In Ethiopia, particularly in Addis Ababa, there exists a dearth of comprehensive quantitative and qualitative data both nationally and locally. Consequently, policymakers and development stakeholders lack substantial evidence to comprehend the opportunities and challenges faced by producers in the region. Therefore, empirical evidence from Addis Ababa, the capital city of Ethiopia, is imperative to formulate practical strategies for future interventions aimed at ensuring the sustainable livelihoods of urban vegetable producers.

Furthermore, this research endeavours to lay down the groundwork for prospective inquiries into the topic, positioning it as a notable scholarly contribution. The primary objectives of the study are to pinpoint the critical determinants influencing the outcomes of urban vegetable cultivation and to suggest measures for fostering this practice while tackling prevalent challenges in the studied context. To achieve these aims, the study sets forth two fundamental research inquiries: Firstly, what hurdles are faced in the realm of urban vegetable production within the study area? Secondly, what benefits does urban vegetable farming offer in urban settings like Addis Ababa?

3.2 Methods

3.2.1 Description of study area

This research was carried out in the Nifas Silk Lafto Sub-city, Addis Ababa, Ethiopia. The sub-city is located at the southwest edge of Addis Ababa. The climate in the area is cool temperate type (Abraham, 2012). The main rainy season lasts from June to September and accounts for roughly 70 percent of total annual rainfall. The average annual temperature is 17.25 degrees Celsius. The daily average temperature in the region ranges from 9.90 to 24.60 degrees Celsius, and the average annual rainfall is reported to be 1254 millimetres (Deshu *et al.*, 2021). The average annual temperature is 17.25 degrees Celsius.

The Little Akaki River, along with its tributaries, runs through the sub-city, through which many smallholder vegetable producers grow a variety of vegetable products (Deshu *et al.*, 2021). UA activities, particularly vegetable production, are common in the study area, including backyard farming, open spaces around houses, and riverside farming (Tewodros, 2007).

3.2.2 Demographic and socioeconomic characteristics

The 2007 census revealed that Nifas Silk Lafto sub-city constitutes 10.42 percent of the total population of Addis Ababa, positioning it as the seventh most densely populated sub-city in the region. This area is characterized by a high incidence of poverty and a notable deficiency in electricity services, as reported by UN-Habitat in 2008. Residents of Nifas Silk Lafto face challenging living conditions, with poverty levels being a significant concern. The sub-city, situated alongside Bole and Gulelle sub-cities, is witnessing the emergence of informal settlements, often referred to as squatter settlements. These areas are proliferating, serving as a transitional zone between the urban center and the surrounding agricultural regions, highlighting the complex urban-rural dynamics at play in Addis Ababa.

3.2.3 Research design and approach

The research adopts a mixed research approach to address the research questions. This research design combines elements of both qualitative and quantitative research approaches to offer a more comprehensive and nuanced understanding of a central phenomenon. The underlying principle of this methodological approach is grounded in the belief that the integration of qualitative and quantitative approaches yields a more thorough

comprehension of the research topics than either approach would achieve independently (Sami, 2016; Md-Shidur, 2017). This integration allows for a richer exploration of the vital phenomenon, providing a more holistic view that captures both the depth and breadth of the research inquiry.

The research adopts a cross-sectional study design to examine urban agriculture, with a specific emphasis on vegetable production in Addis Ababa. In the study, is designated as backyard and core urban farming because it is predominantly situated within residential areas, offices, and other facilities that may or may not have designated farming spaces. This urban farming includes farming activities in backyards, open spaces around houses, low-lying areas, and along riversides within the city core. The study seeks to explore the opportunities and challenges faced by urban vegetable farmers residing in the urban areas of the Addis Ababa metropolitan area.

3.2.4 Sampling procedure and sample size

According to the Addis Ababa Urban Agriculture Office, there are thirteen thousand, one hundred ninety-nine vegetable-producing households in the thirteen weredas (the smallest administrative unit in Addis Ababa) of Nifas Silk Lafto Sub-city. Using a simplified formula, the number of sample households was estimated to be around 388, assuming a 95 % level of confidence and a 5 % level of sampling error (Yamane, 1967).

$$n = \frac{N}{1 + N(e)^2}$$

$$n = 13,199 / 1 + 13,199(0.05)^2$$

$$n = 388$$

Where N = stand for number of total vegetable-producing households in the sub-city, n = sample size and e = sample error, respectively.

3.2.5 Data sources and data collection tools

To collect quantitative and qualitative data for this study, primary and secondary data sources were used. Household survey, interviews, focus group discussions, and field observations were used to collect primary data at the household level from Nifas Silk Lafto in urban vegetable producer areas. An intensive desk review of peer-reviewed journals, conference papers, government records, and research reports was used to collect secondary data from existing sources.

Three hundred eighty-eight vegetable producers participated in household surveys. Quantitative data were gathered through interactions with six experts functioning as urban farming extension officers at the wereda level in the Nifas Silk Lafto Sub-city. Additionally, two focus group discussions were conducted in November 2021, involving two groups of six participants each. These participants, predominantly well-known urban vegetable farmers, were strategically selected from different parts of the study area to contribute diverse perspectives.

3.2.6 Description of variables

The focus of the investigation in this research is vegetable production, covering both the opportunities and challenges inherent in the practices, serving as the dependent variable. Farmers' perceptions suggest that the opportunities associated with vegetable production significantly contribute to the well-being of households.

The study integrates explanatory variables that are anticipated to have an impact on urban vegetable producers, consequently influencing their practices in vegetable production. Drawing insights from a literature review and on-the-ground observations, ten potential explanatory variables were identified and scrutinized for their effects on production. These variables include aspects such as production frequency per year, seed, extension services, farm credit, pests and diseases, fear of eviction, fertilizer, water, unregulated movement of livestock, and theft. The study aims to delve into how these variables shape the dynamics of vegetable production within small urban holdings.

3.2.7 Data analysis

The qualitative data obtained through interviews, focus group discussions and field observations underwent analysis through SWOT (Strengths, Weaknesses, Opportunities, and Threats) and force field analysis methods. This information was systematically organized, summarized, analyzed, and interpreted to complement and reinforce the findings derived from the survey.

On the other hand, the quantitative method entailed data collection and recording in numerical and/or categorical forms. The quantitative data underwent analysis through descriptive, correlation, and regression analyses to explore the relationships between the study variables and offer a comprehensive description of the prevailing challenges and opportunities faced by vegetable producers in the study area.

3.3.7.1 SWOT and force field analysis

The utilization of SWOT analysis within the framework of a participatory learning and action (PLA) tool was the initial step in outlining a challenging situation. This method aimed to identify internal strengths and weaknesses within a system, along with external factors that could either be leveraged for positive change (opportunity) or should be guarded against (threat). Various perspectives, including economic, environmental, and social considerations, were considered in examining the advantages, disadvantages, possibilities, and risks associated with the situation. Additionally, the economic and sociological aspects of the primary components of vegetable production in the region were examined.

The definition of key elements stated in the SWOT analysis:

River side: Vegetable production areas located near a river. Manual weeding: refers to the practice of removing weeds from gardens by hand. Own labour is refers to the personal effort or work. Government initiatives: actions, policies, programs, or projects undertaken by a government. Youth initiatives: refer to projects, programs, or actions led by young people. Policy bottleneck: refers to a situation in which the development, implementation, or effectiveness of a policy is hindered or slowed down. Soil infertility: refers to a condition in which the soil lacks essential nutrients. Technical skill: refer to the specialized knowledge, abilities, and competencies. Extension services: referred to as agricultural extension services, are programs and activities designed to provide farmers and rural communities with access to information, knowledge, technologies, and resources to improve their agricultural practices, productivity, and overall well-being. Poverty reduction: refers to efforts and strategies aimed at reducing the extent and severity of poverty, with the ultimate goal of improving the well-being and living standards of individuals and communities. Solid waste: refers to any discarded, useless, or unwanted material in a solid state. Job creation: refers to the process of generating new employment opportunities within an economy or a specific industry. Provide fresh food: involves ensuring the availability, accessibility, and distribution of nutritious and perishable food items to individuals and communities. Easily available food: to make nutritious and affordable food accessible to all members of a community. Save money and time: Making food easily available at home and in the backyard can contribute significantly to saving both money and time. Unregulated livestock movement: Unregulated animal movements have the potential to influence urban farming. Land shortage: refers to a

situation where the available land is insufficient to meet the demands or needs of a growing population or various competing land uses. Water shortage: A shortage of sources of water occurs when the available natural water bodies, such as rivers, lakes, reservoirs, or groundwater, are insufficient to meet the demand for water in a particular area. Land tenure: Land tenure refers to the relationship between individuals, communities, or institutions and the land they occupy, use, or control. Fear of eviction: refers to the anxiety and apprehension individuals or communities may experience due to the potential loss of their housing or land. Theft: Theft, in a legal context, refers to the unlawful taking of someone else's property with the intent to permanently deprive them of it. Input provision: generally, refers to the supply or provision of inputs needed for a specific process or activity. Limited awareness: refers to a situation in which individuals, groups, or communities have a lack of knowledge or understanding about a particular topic, issue, or concept. Pests and diseases: Pests and diseases are significant challenges in various contexts, including agriculture, public health, and ecosystems. Market availability: refers to the presence and accessibility of a product, service, or resource in the marketplace. Social interaction: refers to the dynamic exchange between individuals or groups in which they engage in communication, share information, express emotions, and influence each other's behaviour in the time of production.

Force Field Analysis, on the other hand, is a systematic examination of the forces influencing or hindering progress towards a specific goal. This process involves defining the desired state, identifying the factors propelling and hindering progress, and assessing and prioritizing these forces with input from stakeholders (Harry, 1967). Driving forces are those that impact a situation, pushing it in a particular direction and sustaining change, while restraining forces are those acting to hinder or diminish the impact of driving forces.

3.3 Results and discussions

3.3.1 Benefits from vegetable production (SWOT and force field analysis)

Ethiopia boasts a diverse array of vegetable crops cultivated across various agro-ecological zones, catering to the livelihoods of both commercial and small-scale farmers who rely on them for income and sustenance. However, the variety of crops is somewhat limited, with production concentrated in specific areas. Urban vegetable production in Ethiopia spans from small-scale cultivation in backyards for personal use to larger-scale production for domestic markets, as noted by Kumilachew *et al.* (2014), Haile (2014), and Nimona (2017).

In the study area, vegetable production is integrated into an intercropping system, where different crops are grown on the same plot or in rotation with others. Some vegetables are cultivated as sole crops or intercropped with other vegetables or cereals, depending on land availability and crop compatibility (AVRDC, 1990; Erana and Zelalem, 2020). Commonly grown vegetables include tomatoes, beetroot, chard, lettuce, carrots, cabbage, onions, kale, and pepper. This integration contributes significantly to food and nutrition security, as vegetables offer essential vitamins and minerals to supplement staple foods for a balanced diet.

The SWOT analysis findings (Table 3.1) reflect farmers' perspectives after a discussion where they identified challenges and crucial points. Farmers' perceptions of urban vegetable production situations differ, with the majority highlighting it as a source of income and food for their families.

According to focus group respondents, the production environment is favorable, allowing for two or three cultivation cycles per year. Additionally, a significant number of farmers operate along rivers, ensuring access to irrigation water. Government initiatives and an available labor force further strengthen production. The household heads emphasize market availability as a key advantage in the production process.

Additionally, the farming area in close proximity to the respondents' residences facilitated convenient access to food, resulting in cost and time savings. Nevertheless, the respondents identified challenges in production, especially a shortage of inputs and inadequate extension services. Anticipated future threats included issues such as land scarcity, limited water sources, and the risk of theft. It is emphasized that practitioners or farmers should remain vigilant about the sustainability of their practices by being aware of existing strengths and actively seeking external opportunities.

In general, vegetable production emerged as a source of fresh, nutritious, and economical food, aligning with findings from Bolang and Osumanu (2019), Fortes *et al.* (2020), Banchamlak and Akalu (2022), and Bokelmann *et al.* (2022).

Table 3. 1 A summary of major concerns raised in vegetable production (SWOT) analysis

strengths	weaknesses	opportunities	threats
- river side	- policy bottleneck	- poverty reduction	- unregulated livestock movement
- manual weeding	- soil infertility	- market availability	- land shortage
- available market	- input provision	- solid waste	- watering sources
- own labour	- technical skill	- job creation	- input provision
- social motivation	- extension services	- social interaction	- land tenure
- awareness	- limited awareness	- provide fresh food	- pests and diseases
- government initiatives	- pests and diseases	- easily available	- fear of eviction
- youth initiatives		- save money and time	- theft

Source: Own survey: November, 2021

In the vegetable production system, various factors contribute to both positive and negative influences. However, the study conducted in the specified area (as indicated in Table 3.2) reveals numerous opportunities within the domain of vegetable farming. Notably, the primary driving forces in the sector include the availability of a skilled workforce, good environment, the motivation of farmers, and supportive government initiatives. The study underscores that, on the production front, producers find particular eagerness in making food readily available to households, generating additional income, and, particularly, the sector's accessibility without substantial financial investments.

Table 3. 2 Force field analyses showing the driving and hindering forces for the production

Driving Forces		Hindering Forces
food security initiative	➡	⬅ lack of improved farm equipment's
labour availability	➡	⬅ limited extension services
market availability	➡	⬅ dwellers attitudes
farmers motivation	➡	⬅ fear of eviction
farm income	➡	⬅ input provision
environment benefit	➡	⬅ public health issues
government initiatives	➡	⬅ farmers skill and knowledge

Source: Adapted from Lewin, 1951

Conversely, the study identifies key barriers impeding the success of urban vegetable production in the investigated area. These obstacles include a lack of inputs, knowledge, and, significantly, the attitudes of producers. The study results align with previous research conducted by Steve *et al.* (2010), Galhena *et al.* (2013), Joosten *et al.* (2015), FAO (2017), and Bokelmann *et al.* (2022), all of whom have highlighted the significance of these factors as hindrances to production activities.

The data from Table 3.3 highlights the distribution of extension services among local producers during the production phase. The breakdown of extension services is as follows:

Local Government Agents: Local producers receive the majority of extension services from local government agents, accounting for 72.7 percent of the total services. **NGOs (Non-Governmental Organizations):** NGOs contribute to extension services, providing 14.9 percent of the support to local producers. **Private Agencies:** Private agencies play a smaller role, offering 2.1 percent of extension services to local producers during the production process.

In addition to formal extension services, the findings indicate that a substantial portion of producers, specifically 76.3 percent, engage in sharing their experiences with one another regarding vegetable farming processes and practices. This high percentage suggests a strong culture of peer-to-peer knowledge exchange among local producers, emphasizing the importance of informal learning and community collaboration in the context of vegetable farming.

Table 3. 3 Household access to extension services

Items	Frequency	Percent
government	282	72.7
NGOs	58	14.9
privet sectors	8	2.1
knowledge sharing	296	76.3

Source: Own survey: November, 2021

The results are visually represented in Figure 3.1, illustrating the perceptions of vegetable producers. A significant 99.2 percent of respondents agree that vegetable production activities contribute to the provision of fresh food for their households. Similarly, 98.5 percent acknowledged it as a source of healthy food. Additionally, 91.0 percent of producers highlighted the environmental benefits of vegetable production, with 87.9 percent noting its role in reducing household expenses. A substantial percentage (84.5%)

recognized its contribution to food security, while 83.5 percent emphasized its provision of low-cost food and 81.1 percent its role in making food easily accessible.

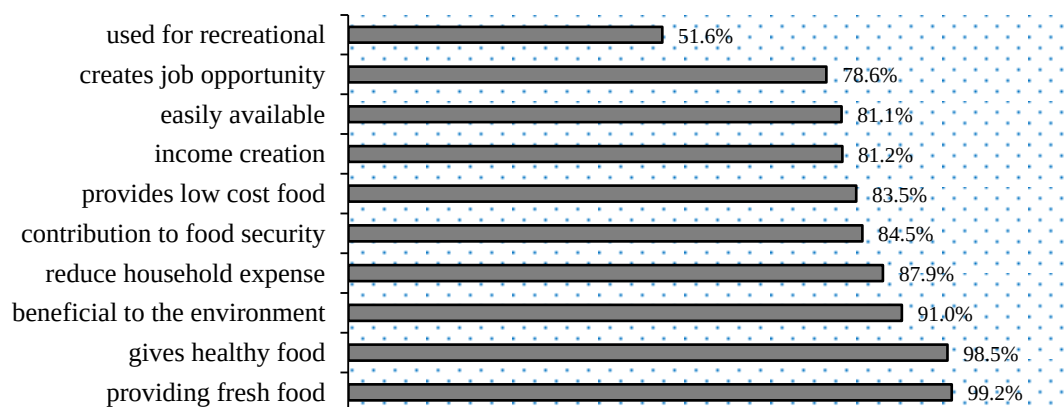


Figure 3.1: Respondent vegetable production opportunities (multiple replies are possible)

Moreover, 81.2 percent of households affirmed the vital role of urban vegetable production in generating income, and 78.6 percent appreciated its contribution to job opportunities. Additionally, 51.6 percent reported using the activity for recreation. These findings align with research conducted by FAO (2007), Walters and Midden (2018), Martin and Wagner (2018), and FAO (2022), indicating a consistent recognition of the positive impacts of vegetable production on various aspects of household well-being and sustainability.

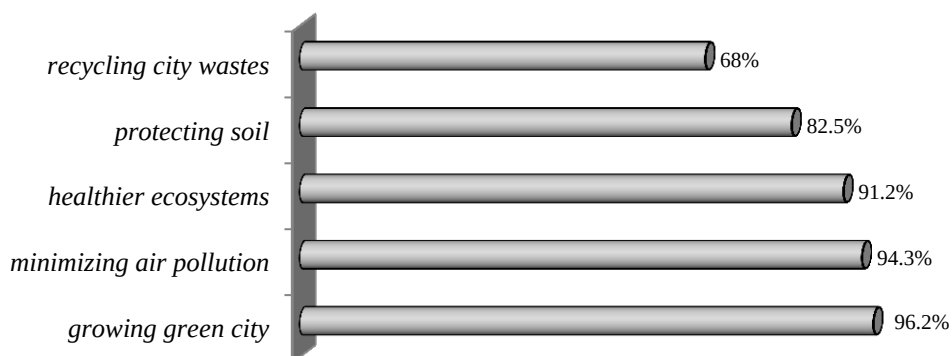


Figure 3.2 Perceptions of respondents regarding the environmental benefits of vegetable production.

The findings showed in Figure 3.2 highlight the positive impacts of vegetable production on the city ecosystem. 96.2 percent of the respondents explicitly confirmed and agreed that urban farming contributes to the expansion of green spaces in cities. Furthermore, respondents recognized its role in reducing air pollution (94.3%), promoting healthier ecosystems (91.2%), protecting soil (82.5%), and facilitating the recycling of city waste

(68.0%). These results are in line with previous studies conducted by Heather (2012), Ortolio (2017), Walters and Midden (2018), Aubry and Manouchehri (2019), and Manga *et al.* (2021), which consistently found a significant positive effect of vegetable production on enhancing city environments.

3.3.2 Factors affecting the practices of urban vegetable production

As per Figure 3.3, a significant majority of respondents (83.0%) have reported facing challenges related to limited access to land. Additionally, 60.1 percent of respondents express concerns about pests and diseases influencing their vegetable farming activities. Other notable challenges include difficulties in accessing water (50.0%), inability to secure farm credit (46.4%), fear of eviction (43.2%), and limited access to seeds (44.1%). Respondents also highlighted additional challenges affecting their vegetable farming, including unregulated livestock movement in cities (32.7%), shortages of fertilizers (31.4%), flooding (29.5%), theft (30.2%), and a lack of extension services (27.5%).

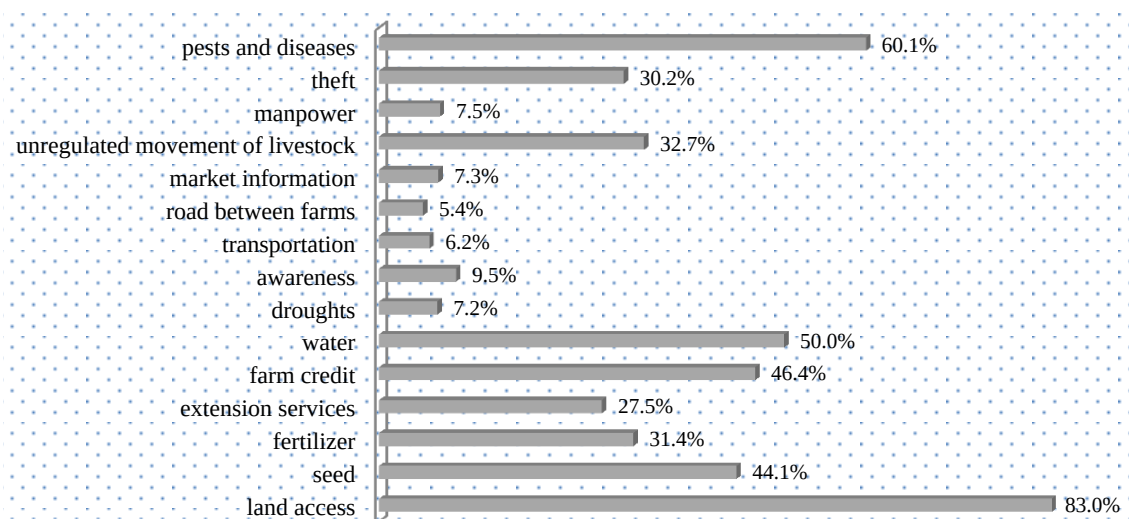


Figure 3.3 Factors that affect the practices of vegetable production in total HHs

These findings support with the results of Adebayo *et al.* (2018), underscoring the prevalence of these challenges in the context of vegetable farming. Other factors such as awareness, droughts, labor shortages, transportation challenges, poor road conditions between farms, limited market information and linkage, and land infertility were reported to have relatively minor effects on vegetable farming according to respondents.

In Table 3.4, Spearman's correlations were conducted to explore the relationships between the level of fertilizer and seed access in terms of factors affecting vegetable production.

Table 3. 4 The correlation of factors that affect the vegetable production (Spearman)

			Correlations								
Spearman's rho			land	seed	fertilizer	farm credit	watering of crops	unregulated movement of livestock	Theft	Pests and diseases	Fear of eviction
	land	Correlation	1.000								
		Sig. (2-tailed)	.								.
	seed	Correlation	.393**	1.000							.
		Sig. (2-tailed)	.000	.							.
	fertilizer	Correlation	.327**	.654**	1.000						.
		Sig. (2-tailed)	.000	.000	.						.
	farm credit	Correlation	-.008	-.060	.096	1.000					.
		Sig. (2-tailed)	.874	.238	.059	.					.
	watering of crops	Correlation	-.204**	-.346**	-.244**	.212**	1.000				.
		Sig. (2-tailed)	.000	.000	.000	.000	.				.
	Unregu. Move. of livestock	Correlation	-.245**	-.473**	-.334**	.262**	.380**	1.000			.
		Sig. (2-tailed)	.000	.000	.000	.000	.000	.	.		.
	Theft	Correlation	.101*	.325**	.338**	.024	-.228**	-.116*	1.000		.
		Sig. (2-tailed)	.048	.000	.000	.639	.000	.022	.		.
	Pests and diseases	Correlation	.075	.108*	.115*	.157**	-.148**	-.029	.346**	1.000	.
		Sig. (2-tailed)	.139	.033	.024	.002	.003	.564	.000	.	.
	Fear of eviction	Correlation	.232**	.318**	.400**	-.039	-.267**	-.240**	.287**	.154**	1.000
		Sig. (2-tailed)	.000	.000	.000	.450	.000	.000	.000	.002	.
**. Correlation is significant at the 0.01 level (2-tailed).											
*. Correlation is significant at the 0.05 level (2-tailed).											

The analysis revealed a strong positive correlation ($r = 0.65$) between the level of fertilizer and seed access. Importantly, this correlation was statistically significant ($p < 0.000$), indicating a robust association between the two variables. Specifically, the r-value ($r = 0.654$) confirmed that the positive correlation observed between fertilizer level and seed access is unlikely to have occurred by chance, further emphasizing the significance of this relationship in influencing vegetable production.

Omnibus Tests of Model Coefficients used to test the model fit. If the model is significant this shows that there is a significant improvement in fit as compared to the null model; hence, the model is showing a good fit (Table 3.5).

The Hosmer and Lemeshow Test is also a test of model test. The Hosmer and Lemeshow statistic indicates a poor fit if the significance value is less than 0.05. Here, the model adequately fits the data. Hence, there are no differences between the observed and predicted model (Table 3.5).

Table 3. 5 Binary logistic regression estimates for determinants of leafy vegetable production in the households

Omnibus Tests of Model Coefficients								
		Chi-square	df	Sig.				
Hosmer and Lemeshow Test								
Step		Chi-square	df	Sig.				
1		2.033	8	.980				
Step 1	Step	26.112	6	.000				
	Block	26.112	6	.000				
	Model	26.112	6	.000				
Variables in the Equation								
	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
							Lower	Upper
gender	1.898	1.196	2.519	1	.113	6.674	.640	69.579
age	1.338	.527	6.444	1	.011	3.811	1.357	10.708
academic	-.221	.434	.259	1	.611	.802	.342	1.878
marital_status	.947	.533	3.158	1	.076	2.577	.907	7.323
employment	1.310	.447	8.565	1	.003	3.704	1.541	8.905
family_size	.964	.659	2.140	1	.143	2.622	.721	9.536
Constant	-18.745	4.671	16.102	1	.000	.000		
a. Variable(s) entered on step 1: gender, age, academic, marital_status, employment, family_size.								

The odds of the age Category with p-value of 0.011 offering leafy vegetable production are 3.811 times higher than those of other categories not offering leafy vegetable production. Confidence Interval (CI): 95% CI of 1.357 to 10.708. This means that we are 95% confident that the true odds ratio falls within the range of 1.357 to 10.708. The odds of the employment category with p-value 0.003 offering leafy vegetable production are 3.704 times higher than those of other categories not offering leafy vegetable production. Confidence Interval (CI): 95% CI of 1.541 to 8.905. Similar to the first case, this means that we are 95% confident that the true odds ratio falls within the range of 1.541 to 8.905. For age and employment categories, the odds ratios are greater than 1, suggesting a positive association between these categories and the likelihood of offering leafy vegetable production. The confidence intervals provide a range within which we can reasonably estimate the true odds ratio with 95% confidence. In practical terms, these results imply that households within certain age categories and employment categories are more likely to engage in leafy vegetable production compared to other categories (Table 3.5).

3.4 Conclusion and recommendations

The aim of this research was to explore the opportunities and challenges encountered by urban vegetable producers in Addis Ababa, Ethiopia, shedding light on the importance of

vegetable production as a means of livelihood in the area. The results underscore several positive aspects of vegetable farming, such as improved access to fresh and nutritious food, reduced household expenses, contributions to food security, provision of affordable food, and generation of income for households.

Nevertheless, the study also pinpoints various obstacles that impede the optimization of output and desired outcomes in urban vegetable production. These hurdles encompass limited access to pest and disease control, water scarcity, inadequate farm credit, fear of eviction, seed shortages, lack of fertilizers, theft, restricted extension services, and unregulated livestock movement within the city.

In response to these challenges, the study recommends that the Addis Ababa city administration, urban agricultural offices, and other stakeholders play a pivotal role in enhancing opportunities and mitigating constraints for improved urban vegetable production. Proposed strategies include bolstering workforce capacity, advocating for supportive policies by sharing compelling narratives with policymakers and planners, and reinforcing input provision and extension services through collaborative efforts among engaged and efficient stakeholders.

By addressing these challenges and implementing the suggested strategies, there is potential for further advancement of urban vegetable production in Addis Ababa, ultimately benefiting producers in the study area. The study furnishes valuable insights for policymakers, planners, and stakeholders to devise and execute initiatives that bolster and promote the sustainability of urban vegetable production in the region.

CHAPTER 4: THE CONTRIBUTION OF URBAN AGRICULTURE TO HOUSEHOLD FOOD SECURITY AMONG URBAN VEGETABLE PRODUCERS IN ADDIS ABABA, ETHIOPIA³

Abstract

Background: The city of Addis Ababa has a longstanding tradition of engaging in urban vegetable production, spanning multiple decades. This research is focused on examining how urban agriculture, particularly vegetable cultivation, impacts household food security among urban producers in Addis Ababa, Ethiopia. The study aims to understand the different ways in which urban agriculture, specifically the growing of vegetables, affects and enhances the food security of households in the urban context of Addis Ababa. By investigating these dynamics, the paper aims to offer insights into the importance of urban vegetable production as a crucial element of food security strategies in urban areas.

Methods: Data were gathered by conducting a survey encompassing 388 households. To enhance the reliability of the findings, additional input was obtained through interviews with key informants, focus group discussions, and on-site observations. The quantitative data obtained from households were subjected to analysis using descriptive statistics and ordinal logistic regression. Simultaneously, information gathered from key informants and focus group discussions was transcribed, organized into themes, and thoroughly analyzed for interpretation. To evaluate household food security, the Household Food Insecurity Access Scale (HFIAS) and Food Consumption Score Analytical Tools were employed. The utilization of various data collection methods and tools aimed to provide a comprehensive and well-rounded understanding of the topic under investigation.

Findings: The analyses conducted revealed positive attitudes among respondents toward vegetable production, with a significant majority expressing an intention to continue engaging in such agricultural activities in the future. However, results from the Household Food Insecurity Access Scale (HFIAS) indicated that only about 14.9 percent of households could be classified as food secure. Further exploration through ordinal logistic regression provided insights into the determinants of the food security status among households. Notably, in ordinal logistic regression, a significant finding with a p-value of

³ Based on:

Habtamu Serbessa, Teferee Makonnen & Meskerem Abi (2023). The contribution of urban agriculture to household food security among urban vegetable producers in Addis Ababa, Ethiopia. *Journal of Sustainable Development in Africa*, 25(1)

0.015 emerged for the age group between 31 and 40. The positive estimate of 0.859 suggests that, on average, there is a 0.859 unit increase in total food security associated with a one-unit change in respondents from other age groups.

Suggestions: To establish a successful vegetable cultivation system, it is imperative for the government to formulate a comprehensive urban agricultural plan, addressing challenges associated with vegetable production. By doing so, potential obstacles can be minimized, and a framework for sustainable and productive urban agriculture can be put in place. The development of such a plan should encompass various aspects, including infrastructure, resource management, and support mechanisms for urban farmers. Additionally, considering the widespread issue of food insecurity and the unpredictable nature of global and local food markets, there is a crucial need for research. This research should aim to inform and implement best practices that can effectively enhance food security among urban populations. By understanding the unique dynamics of urban agriculture and its role in addressing food insecurity, policymakers and stakeholders can make informed decisions to create resilient and sustainable urban food systems. This approach ensures a holistic and strategic response to the challenges associated with food security in urban settings.

Keyword: Food security; vegetable production; urban farming; Addis Ababa

4.1. Introduction

Global authorities continue to grapple with the persistent issue of food insecurity. In 2021, an estimated 702 to 828 million individuals experienced hunger, with Africa bearing the highest burden, affecting over one-third of its population (Bapolisi *et al.*, 2021; FAO, 2022). The World Food Summit defines food security as the state in which all individuals have both physical and economic access to sufficient, safe, and nutritious food supply, enabling them to fulfill their dietary requirements and preferences for an active and healthy life consistently (FAO, 1996).

Food insecurity presents a significant and escalating challenge in Ethiopia, with a visible increase over recent years (Teshager, 2020; Messay, 2020). Multiple factors contribute to this issue, encompassing extreme weather conditions, environmental degradation, population pressure, evolving but gradually improving governmental commitment, and policy shortcomings (Messay, 2020). According to the 2021 Global Hunger Index, Ethiopia is ranked 90th out of 116 countries in terms of hunger severity (GHI, 2021). The country grapples with a range of challenges, including a predominantly market-based food supply, persistent chronic poverty, and escalating food prices, particularly affecting household food security in major urban centers like Addis Ababa (Tesfay, 2014). As highlighted by Birhane *et al.* (2014), an alarming 79.9 percent of the population in Addis Ababa experiences food insecurity.

Several factors contribute to the soaring food prices, including an imbalance in food supply and demand attributed to rapid urban population growth (Miccoli *et al.*, 2016). Furthermore, changes in land use and land cover, converting farmlands into built-up areas, are identified as significant contributors to the challenges faced (Alemu, 2015; Abo-El-Wafa *et al.*, 2017). This complex interplay of factors underscores the intricate nature of food insecurity in Ethiopia, necessitating a multifaceted approach to address the root causes and enhance the overall food security situation in the country.

Urban agriculture (UA) is practiced to varying extents in both developing and developed countries globally, drawing increased attention from policymakers due to its potential contributions to urban food security and poverty alleviation (Korth *et al.*, 2014). Approaches in some countries are evolving as the recognized benefits of UA for food security, environmental management, and economic development gain traction in policy discussions (Arku *et al.*, 2012). Urban farming emerges as a significant strategy for

achieving sustainable agriculture and ensuring an ample supply of fresh food for households, playing a pivotal role in enhancing food security (Hayuningtyas, 2017).

The cultivation of vegetables in urban areas has gained popularity as a means of promoting agricultural sustainability, making urban areas more resource-efficient and contributing to local food security (Walters and Midden, 2018). UA has shown resilience during economic crises, serving as a coping mechanism while augmenting food availability in cities and influencing the diets of urban consumers (FAO, 2001). Van-Veenhuizen (2006) defines UA as the cultivation of plants and raising of animals for food and other purposes within and around cities, encompassing related activities such as input production, processing, and marketing.

Local food production in urban areas reduces dependence on the global food system, diminishing vulnerability to disruptions in food supply (Morgan, 2015). Simultaneously, there is a growing interest among urban citizens in locally produced food (Winiewska-Paluszak and Grzegorz, 2021). The educational aspect of local food production promotes sustainability by reconnecting urban dwellers with the origins of their food, emphasizing ecological and social links in food processes and recognizing the limits of the involved ecosystems (Gunilla *et al.*, 2016). Given that the majority of the global population resides in cities (UN, 2018), UA facilitates food production closer to consumption, utilizing land that might otherwise remain unproductive (Mcdougall *et al.*, 2020).

In Ethiopia, UA offers opportunities for urban dwellers to diversify employment, income, and dietary options while addressing waste management issues (Yalew, 2020). Despite its potential, the sector lacks institutional and policy support in Ethiopia (Ibid). The Ethiopian National Urban Green Infrastructure Standard and the Addis Ababa City Structure Plan outline provisions for improving UA to ensure food security, economic empowerment, increased production, and environmental protection (MUDHo, 2015; AACA, 2020).

Urban farmers in Addis Ababa primarily grow vegetables for personal consumption and additional income, with approximately 106,280 registered urban vegetable producers providing around 60 percent of the city's vegetable consumption (AAFUADC, 2021; Dejen, 2020). Addis Ababa possesses favorable conditions for vegetable cultivation, including suitable soil, altitude, and consistent water flow from tributaries of the Akaki River, supporting irrigation for vegetable growers (Assefa, 2016). This study aims to assess the role of UA in understanding the food security situation among urban farmers in the Nifas Silk Lafto Sub-region, a major vegetable farming hub in Addis Ababa. The focus is

on examining urban household vegetable production, describing food security status, and evaluating socio-economic well-being in the study area. The paper aims to address information gaps and contribute valuable insights to the understanding of the contributions of vegetable production to household food security in the region.

4.2. Methods

4.2.1. Data analysis

The research adopted a mixed-methods approach, integrating both qualitative and quantitative data analysis techniques. Thematic content analysis was employed to examine qualitative data derived from focus group discussions, key informant interviews, and field observations. This analytical method involved identifying and categorizing recurring themes within the qualitative dataset.

For the assessment of food security at the household level, the study applied the Household Food Insecurity Access Scale. This scale served as a tool to gauge the extent of food insecurity experienced by households, providing a comprehensive measure of their access to food.

To explore the factors influencing food security and evaluate their respective significance in determining the likelihood of household facing food insecurity, a logistic regression model was utilized. Binary and ordinal logistic regression, a statistical technique, was employed to identify and quantify the impact of various factors on the probability of households experiencing food insecurity. This model enabled an examination of the relative importance of different factors contributing to the likelihood of food insecurity at the household level.

4.2.1.1. *Measuring household food security status using HFIAS and FCS*

The HFIAS score was calculated based on responses to nine questions related to the frequency of specific conditions over the past month. Each household head was individually asked whether each condition had occurred during that timeframe. Additionally, information was gathered on the types and average number of foods consumed by the study households over the last seven days. This approach provides a comprehensive snapshot of the food security status of the households under examination, considering both the occurrence of specific conditions and the dietary patterns over a defined period.

If the condition occurred, households were asked to rate its frequency of occurrence as rarely, occasionally, or frequently. Participants were given one of three options: "never," "sometimes," or "often," with scores of 1, 2, or 3. When the scores for each sampled household were added up, the lowest score was 0, and the highest score was 27, indicating that the higher the score, the more likely a household will experience food insecurity (Coates *et al.*, 2007). According to the HFIAS indicator guide, the continuous score should be classified into four categories: food secure, mildly food insecure, moderately food insecure, and severely food insecure (Knueppel *et al.*, 2010).

Y_i^* is not observed, and we can only determine whether the household belongs to the category "0," "1," "2," or "3." So, what did the following actual placement in the discrete category reveal?

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \dots, \beta_m X_m + \varepsilon \dots\dots\dots (1)$$

$Y_i = 0$ if $\mu_1 < y_i^* \leq \mu_0$ - severely food insecure: percentage HFIAS score 75.5 – 100;

$Y_i = 1$ if $\mu_2 < y_i^* \leq \mu_1$ - moderately food insecure: percentage HFIAS score 50.5 - 75.4;

$Y_i = 2$ if $\mu_3 < y_i^* \leq \mu_2$ - mildly food insecure: percentage HFIAS score 25.5 - 50.4; and

$Y_i = 3$ if $0 < y_i^* \leq \mu_3$ - Food secure: percentage HFIAS score 0 - 25.4.

Where Y is the dependent variable, β_0 is the intercept, and $\beta_1, \beta_2, \beta_3 \dots \beta_n$, are the slopes of the parameters of the model in use; X_i is the vectors of exogenous variables. ε = error term.

4.2.2. Description of variables

In this study, the dependent variable is the food security status, while the explanatory variables are hypothesized to influence the food security status of vegetable producers. The study suggests that vegetable production contributes to food security, improved food consumption, and enhanced livelihood well-being.

Table 4.1 provides a summary of the variables under investigation, detailing the key elements that will be considered in the regression model. The dependent variable (food security status) and the following table shows information on various independent variables that are expected to have an impact on it, outlining the factors being examined in the study.

Table 4. 1 Summary of study variables and their descriptions

<i>Independent variable</i>	<i>Description</i>
Farming experience	1= 5 years, 2= 10 years, 3= 15 years,4=> 15 years
Housing/shelter status	1= own house, 2= private rented house, 3= Wereda rented house
Gender of the house head	Dummy; 1 if head is male 0 if female
Age of the house head	1=18 - 30, 2=31- 40, 3=41-50, 4= >50
Households Size	Number of members of the household (Continuous)
Educational status	0= unable to read and writing,1= non-formal education but reading and writing,2= primary,3= secondary,4= diploma,5= bachelors,6= postgraduate and above
Main employment status of HHs	civil servant, work for private sector, own farm, home maker, student, retired, community farming
Marital status	1= married, 2= single (unmarried), 3= divorce

4.3. Results and Discussions

4.3.1. Socio-Economic Profile of Vegetable Producers

Demographic and socioeconomic factors play a crucial role in vegetable production and marketing, as outlined in the study. According to Table 2.2, a substantial majority (59.3%) of the households engaged in vegetable production were headed by males, aligning with the findings of Banchamlak and Akalu (2022), who noted male predominance in this industry.

Age emerged as a significant factor in vegetable production, with the majority (81.0%) falling within the 18-50 age group (Table 2.2). This supports with the observation that younger generations, as per Godfrey *et al.* (2012), may be less inclined to participate in urban agriculture due to negative attitudes, perceptions, and beliefs about farming, along with a perceived lack of knowledge.

Table 2.2 also revealed that 19.0 percent of respondents were over 50 years old, indicating a diverse age range among vegetable producers. Additionally, a considerable portion (67.8%) of vegetable producers were married, a trend consistent with findings by Baba *et al.* (2010), Pedzisai *et al.* (2014), and Filmon and Mitke (2022), who observed a higher likelihood of engagement in vegetable farming among married individuals, often driven by the need to support their families.

Education played a role, with 30.9 percent of respondents having no formal education, 56.2 percent completing primary and secondary education, and 12.9 percent attending higher education (Table 2.3). Masuku and Xaba (2013) emphasized the positive impact of education in farming, facilitating a quicker adoption of change and innovation. Household size varied, with 55.0% having 4-6 members, and 34.4 percent having 1-3 members (Table

2.3). Household size is a significant source of family labor in farming, and similar findings were reported by Uuld *et al.* (2021) and Filmon and Mitke (2022).

The primary occupation for 64.0 percent of households was farming (vegetable production) (Table 2.3), and 20.2 percent worked in the private sector. Additionally, 73.9 percent of participants had five or fewer years of experience in vegetable production, suggesting a recent increase in vegetable farming capacity. A noteworthy finding was that 61.3 percent of urban vegetable producers in the study area lived in their own homes, indicating a strong connection between private house ownership and urban vegetable farming practices.

4.3.2. Producers' food insecurity status

Table 4.2 outlines nine crucial variables measuring food access, ranging from general concerns about food scarcity to experiences of going a whole day and night without consuming any food. The responses to these nine questions are combined to create the dependent variable.

Table 4. 2The Household Food Insecurity Access Scale questions and household responses

<i>Frequency</i>	<i>Percent</i>
In the past four weeks, did you worry that your household would not have enough food? Yes/248	63.9
In the past four weeks, were you or any household member not able to eat the kinds of foods you preferred because of a lack of resources? Yes/276	71.1
In the past four weeks, did you or any household member have to eat a limited variety of foods due to a lack of resources? Yes/272	70.1
In the past four weeks, did you or any household member have to eat some foods that you really did not want to eat because of a lack of resources to obtain other types of food? Yes/74	19.1
In the past four weeks, did you or any household member have to eat a smaller meal than you felt you needed because there was not enough food? Yes/256	66.0
In the past four weeks, did you or any other household member have to eat fewer meals in a day because there was not enough food? Yes/233	60.1

According to the table, 63.9 percent of respondents expressed worry about food shortages in the past four weeks, while 71.1 percent reported being unable to eat their preferred food.

Additionally, 70.1 percent mentioned having a limited variety of food, 19.1 percent couldn't eat their preferred variety due to resource constraints, and 66.0 percent reported household members consuming less food. Furthermore, 60.1 percent did not meet the recommended number of meals per day, aligning with findings by Adimasu *et al.* (2019).

Table 4. 3Types and average number of foods consumed by the study households over the last seven

Food types and consumption (percent)			If yes, the average frequency of foods consumed per week	average food consumed (percent)
Cereals	yes	100	4.5	16.7
	no	-		
Roots and tubers	yes	100	4.0	25.0
	no	-		
Vegetables	yes	100	4	14.3
	no	-		
Fruits	yes	92.8	4	13.3
	no	7.2		
Meat, poultry	yes	62.6	2.5	15.7
	no	37.4		
Eggs	yes	63.7	2.5	15.9
	no	36.3		
Fish and seafood	yes	30.9	2.5	7.7
	no	69.1		
Pulses, legumes, nuts	yes	81.7	4.5	13.6
	no	18.3		
Milk and milk products	yes	69.6	3.5	11.6
	no	30.4		
Oil/fats	yes	94.6	5	18.9
	no	5.4		
Sugar/honey/sweets	yes	95.4	5	19.1
	no	4.6		
Spices, salt, tea, coffee, alcoholic drink or local drinks	yes	94.3	5	18.9
	no	5.7		

Table 4.3 provides insights into the types and average quantities of foods consumed by the households in the study over the past seven days. It specifically highlights the daily consumption of cereals, roots and tubers, and vegetables, presenting the average frequency

of food consumption per week (as mentioned in (Table 4.3)). This table likely offers a detailed breakdown of the dietary habits of the sampled households (caloric availability).

Table 4. 4Household food security and Household Food Consumption status summary

Food insecurity status	N	Percent
food secure	58	14.9
mildly food insecure	54	13.9
moderately food insecure	258	66.5
severely food insecure	18	4.6
Food consumption status		
poor	29	7.5
borderline	103	26.5
acceptable	256	66.0

Table 4.4, on the other hand, outlines the prevalence of Household Food Insecurity Access. It indicates that nearly 14.9 percent of the respondents have achieved food security, while the majority of sampled families (85.1%) are classified as food insecure. Within this category, 13.9 percent experience minor food insecurity, 66.5 percent face a moderate food gap, and 4.6 percent endure extreme food insecurity. This distribution aligns with the findings of Firehiwot and Degefa (2015).

Moreover, Table 4.4 presents a summary of household food consumption status, revealing that 7.5 percent are classified as poor, 26.5 percent as borderline, and 66.0 percent as having acceptable household food consumption status. This classification provides an overview of the overall well-being in terms of caloric availability for the surveyed households.

According to the Central Statistical Agency (CSA) in 2002 and Pauleit *et al.* (2019), approximately 70 percent of vegetable production in Addis Ababa is consumed by households. This highlights the significant role of locally produced vegetables in contributing to balanced diets and reducing food insecurity among households in the area.

4.3.3. Vegetable production's contribution to food security

Urban vegetable farming is widely acknowledged as a valuable mechanism for enhancing community household resilience. Figure 3.1 illustrates that an overwhelming majority of respondents, specifically 99.2 percent, agreed that vegetable production activities play a crucial role in providing fresh food for their households. Additionally, 98.5 percent of

respondents recognized vegetable cultivation as a source of healthy food. These high percentages suggest a strong consensus among participants about the positive impacts of vegetable production on household nutrition.

Furthermore, the findings in Figure 3.1 demonstrate that a substantial proportion of respondents perceive various economic benefits from vegetable production. Specifically, 87.9 percent believe that it reduces household expenses, 84.5 percent see it as a contributor to food security, 83.5 percent view it as a source of low-cost food, and 81.1 percent consider it a means of providing easily accessible food. Moreover, 81.2 percent of households identified urban vegetable production as crucial for generating income. These results align with the observations of FAO (2007), Walters and Midden (2018), Martin and Wagner (2018), and FAO (2022), which emphasize the multifaceted benefits of vegetable production, including economic advantages and improved food security.

In summary, the high agreement percentages among respondents indicate a strong recognition of the positive impacts of vegetable production, not only in terms of providing fresh and healthy food but also in reducing household expenses, contributing to food security, offering low-cost food options, ensuring accessibility, and generating income

Table 4. 5 Cross-tabulation of employment and households' food security status

employment status	<i>Household food insecurity access scale score</i>				Total
	food secure	mildly food insecure	moderately food insecure	severely food insecure	
civil servant	2	4	12	1	19
private sector	6	22	50	0	78
urban farming	37	22	175	13	247
home maker	4	1	15	2	22
student	1	0	0	0	1
retired	5	4	4	2	15
community farming	1	1	2	0	4
otal	56	54	258	18	386

The information from Table 4.5 indicates a noteworthy relationship between employment as urban vegetable farmers and food security outcomes among the respondents. Specifically, 66.0 percent of the total respondents who reported being food-secured were employed as urban vegetable farmers. This suggests that a significant portion of those achieving food securities is associated with engagement in urban vegetable farming. It

implies that the vegetable farming sector plays a positive role in enhancing food security for a substantial proportion of the surveyed population.

On the other hand, despite the positive association with food security, the table highlights a concerning observation. Within the same sector of urban vegetable farming, 72.2 percent of households were categorized as severely food-insecure. This suggests a paradoxical situation where, although urban vegetable farming is linked to achieving food security for many, a considerable portion of households within this sector still faces significant challenges in terms of food insecurity.

This detailed information underscores the intricate web of factors that impact food security in the realm of urban vegetable farming. It may indicate variability in the outcomes and challenges faced by households engaged in vegetable production, highlighting the need for a more in-depth understanding of the specific circumstances contributing to food security or insecurity within this particular sector.

4.3.4. Determinants of households' food security status

The factors influencing the food security status of households are varied and depending on the specific context. Low income and unemployment, associated with insufficient financial resources, limit access to a varied diet. Higher education levels are linked to improved job opportunities and income, positively impacting food security. Limited access to crucial resources like land, water, and agricultural technology affects a household's ability to produce or purchase sufficient food. Geographic location, health status, social support networks, and government policies also play vital roles. Climate change and environmental degradation can disrupt agriculture, while efficient distribution systems and market access are crucial. Household size, structure and along with cultural and dietary practices, influence food security. Conflict or displacement in regions can severely disrupt food production and distribution. Recognizing these interconnected factors is crucial for developing effective strategies to enhance food security.

Table 4.6 unveils a significant finding, highlighting a p-value of 0.015 for the age group between 31 and 40. Rejecting the null hypothesis at this level of significance signifies a substantial correlation with the overall household food security in vegetable production among the surveyed households.

Table 4. 6 Ordinal logistic regression estimates for determinants of food security status

Pseudo R-Square								
Cox and Snell	.074							
Nagelkerke	.086							
McFadden	.039							
Link function: Logit.								
		Estimate	S.E.	Wald	df	Sig.	95% C. I.	
							Lower	Upper
Thresh old	[HFIAS_Score_and_FS_Status = 1]	-.562	1.351	.173	1	.677	-3.211	2.087
	[HFIAS_Score_and_FS_Status = 2]	.286	1.351	.045	1	.833	-2.363	2.934
	[HFIAS_Score_and_FS_Status = 3]	4.410	1.376	10.275	1	.001	1.714	7.107
	[gender=1]	-.541	.266	4.127	1	.042	-1.063	-.019
Location	[gender=2]	0 ^a	.	.	0	.	.	.
	[age=1]	.399	.420	.902	1	.342	-.424	1.222
	[age=2]	.859	.353	5.916	1	.015	.167	1.551
	[age=3]	.264	.349	.576	1	.448	-.419	.948
	[age=4]	0 ^a	.	.	0	.	.	.
	[marital_status=1]	.183	.418	.191	1	.662	-.637	1.003
	[marital_status=2]	-.572	.491	1.358	1	.244	-1.535	.390
	[marital_status=3]	0 ^a	.	.	0	.	.	.
	[Farm_experience=1]	-.827	.455	3.307	1	.069	-1.719	.064
	[Farm_experience=2]	-1.490	.508	8.602	1	.003	-2.486	-.494
	[Farm_experience=3]	-.496	.723	.470	1	.493	-1.913	.921
	[Farm_experience=4]	0 ^a	.	.	0	.	.	.
	[family_size=1]	2.250	1.359	2.743	1	.098	-.413	4.913
	[family_size=2]	1.777	1.345	1.745	1	.186	-.859	4.413
	[family_size=3]	1.813	1.381	1.722	1	.189	-.895	4.520
	[family_size=4]	0 ^a	.	.	0	.	.	.
Link function: Logit.								
a. This parameter is set to zero because it is redundant.								

As evident in Table 4, 6 low p-values underscores the significance of belonging to the 31-40 age group as a predictor, setting it apart from other age groups, particularly those aged 50 or higher, concerning the food security status in vegetable production. The positive estimate of 0.859 suggests that, on average, there is a 0.859 unit increase in total food security associated with a one-unit change in respondents from other age groups.

The information from Table 4.7 indicates significant gender disparities in terms of food security within the study area. Male respondents exhibit higher levels of food security compared to their female counterparts. Specifically, males account for 14.9 percent of all food-secure households, making up 19.4 percent of total food-secure households with an adjusted residual of 2.8, indicating that the observed proportion is higher than expected. On the other hand, females comprise 9.0 percent of food-secure households, with a -2.8 adjusted residual, lower than expected.

The data further reveals that the majority of food-insecure households are composed of females, with 91.0 percent, while males make up 80.6 percent of food-insecure households. This gender disparity in food security agree with findings from previous research by Tefera

et al. (2011), Ayenew *et al.* (2020), and Gebre *et al.* (2021), which consistently report that female-headed households are more likely to experience food insecurity compared to male-headed households.

Table 4. 7 Sex of the respondents and household food insecurity access Cross tabulation and Chi-Square tests

		<i>Household food insecurity access scale score</i>				Total
		food secure	mildly food insecure	moderately food insecure	severely food insecure	
sex of the respondents	Count	44	34	138	11	227
	Expected Count	34.4	30.8	151.1	10.7	227.0
	% within sex of the respondents	19.4	15.0	60.8	4.8	100.0
	% within HFIAS	75.9	65.4	54.1	61.1	59.3
	Adjusted Residual	2.8	1.0	-2.9	.2	
male	Count	14	18	117	7	156
	Expected Count	23.6	21.2	103.9	7.3	156.0
	% within sex of the respondents	9.0	11.5	75.0	4.5	100.0
	% within HFIAS	24.1	34.6	45.9	38.9	40.7
	Adjusted Residual	-2.8	-1.0	2.9	-.2	
female	Count	14	18	117	7	156
	Expected Count	23.6	21.2	103.9	7.3	156.0
	% within sex of the respondents	9.0	11.5	75.0	4.5	100.0
	% within HFIAS	24.1	34.6	45.9	38.9	40.7
	Adjusted Residual	-2.8	-1.0	2.9	-.2	

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	10.249 ^a	3	.017
Likelihood Ratio	10.689	3	.014
Linear-by-Linear Association	8.293	1	.004

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 7.33.

The mention of the prevalence of food insecurity among female-headed households increasing during the SDGs period compared to the MDGs period highlights a concerning trend. Despite Ethiopia's commitment to improving food security through the implementation of the Sustainable Development Goals (SDGs), particularly Goals 2 and 5, the finding suggests that challenges persist and, in some cases, have intensified for female-headed households. This underscores the importance of targeted interventions and policies

to address the specific vulnerabilities and obstacles faced by different demographic groups in achieving food security.

A Chi-Square test was conducted to explore the relationship between gender and food security status among respondents. The results, detailed in Table 4.7, reveal a statistically significant association at a 5 percent significance level. Key points include:

Chi-Square Statistic (χ^2): The recorded value of 10.249 indicates a notable difference between observed and expected frequencies. Degrees of Freedom (df): With 3 degrees of freedom, the test considered three food security status categories. P-value: At 0.017, the p-value falls below the 5 percent threshold, leading to the rejection of the null hypothesis. Implications: The significant association suggests a non-independent distribution of food security status with respect to gender, indicating visible differences in prevalence between male and female respondents. Strength of Association: The higher χ^2 value (10.249) signifies a robust association between gender and food security status.

In conclusion, the Chi-Square Test outcomes underscore a meaningful link between gender and food security status within the studied population, contributing to a deeper understanding of how gender influences food security levels.

Table 4.8 provided a discrepancy between conventional expectations regarding family size and poverty, and the observed dynamics in the context of vegetable production. Typically, a larger family size is associated with an increased likelihood of poverty due to a higher dependence ratio and potentially fewer available resources per individual. However, the findings in Table 4.8 contradict this expectation.

According to the data, respondents with larger family sizes, specifically those with ten or more households, show higher food security, with 33.3 percent being food secure. Moreover, none of the respondents with larger family sizes were classified as severely food insecure. This counterintuitive result implies that, in the specific context of vegetable production, larger family sizes may contribute positively to food security outcomes.

The explanation provided in the text suggests that larger family sizes in the context of vegetable production enable the availability of more household labor forces. This increased labor force may enhance the efficiency and productivity of vegetable farming, contributing to improved food security for the household.

Table 4. 8 Household family size and household food insecurity access scale score

Contingency tables and Chi-Square tests

household family size	<i>Household food insecurity access scale score</i>				Total
	food secure	mildly food insecure	moderatel y food insecure	severely food insecure	
Count	17	18	91	7	133
Expected Count	19.9	18.2	88.7	6.2	133.0
1-3 % within household family size	12.8	13.5	68.4	5.3	100.0
% within HFIAS	29.3	34.0	35.3	38.9	34.4
Adjusted Residual	-.9	-.1	.5	.4	
Count	33	31	139	10	213
Expected Count	31.9	29.2	142.0	9.9	213.0
4-6 % within household family size	15.5	14.6	65.3	4.7	100.0
% within HFIAS	56.9	58.5	53.9	55.6	55.0
Adjusted Residual	.3	.5	-.7	.0	
Count	7	3	27	1	38
Expected Count	5.7	5.2	25.3	1.8	38.0
7-9 % within household family size	18.4	7.9	71.1	2.6	100.0
% within HFIAS	12.1	5.7	10.5	5.6	9.8
Adjusted Residual	.6	-1.1	.6	-.6	
Count	1	1	1	0	3
Expected Count	.4	.4	2.0	.1	3.0
> 10 % within household family size	33.3	33.3	33.3	0.0	100.0
% within HFIAS	1.7	1.9	0.4	0.0	0.8
Adjusted Residual	.9	1.0	-1.2	-.4	

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	4.651 ^a	9	.864
Likelihood Ratio	4.710	9	.859
Linear-by-Linear Association	1.338	1	.247
N of Valid Cases	387		

a. 5 cells (31.3%) have expected count less than 5. The minimum expected count is .14.

It's important to recognize that these findings are specific to the study area and the nature of vegetable production. The context of agriculture, including the type of crops grown,

labor requirements, and other contextual factors, can influence the relationship between family size and food security. Understanding such nuances is crucial for tailoring interventions and policies to address the unique challenges and opportunities associated with different agricultural practices.

A Chi-Square test was also (Table 4.8) employed to investigate the connection between household family size and the food security status of respondents. The results indicate a non-significant association at the 5 percent significance level regarding the household family sizes of respondents ($\chi^2=4.651$, $df=9$, $p=.0864$).

This implies that, based on the statistical analysis, there is no substantial relationship between household family size and food security status among the respondents at the specified significance level. The chi-square statistic of 4.651, with 9 degrees of freedom, resulted in a p-value of 0.0864, which is greater than the 5 percent significance level (0.05). Therefore, the null hypothesis cannot be rejected, suggesting that there is no statistically significant association between these variables. This finding contributes to the understanding that, at the chosen significance level, variations in household family size do not appear to be linked to differences in food security status among the studied population.

The study employed a combination of qualitative research methods, including focus group discussions, key informant interviews, and personal observations. Here are the details about each of these methods:

Focus Group Discussions (FGDs): Participants: Two groups of six participants each, all involved in vegetable cultivation. Focus: The discussions centered on urban agriculture, particularly vegetable production, and its role in achieving food security and generating income for low- and middle-income households. Key Findings: Respondents highlighted widespread practice of vegetable production for food security and income, Driving forces in the sector included the availability of land, manpower, a suitable environment, farmer motivation, and government initiatives, Producers expressed excitement about making food available to households, earning extra income, and the ease of entering the sector without significant financial investments, Government initiatives and a readily available labor force were identified as contributors to increased production strength, Market availability was seen as advantageous, along with proximity to the farming area saving time and money, Challenges mentioned included the lack of government policies, scarcity of inputs, and poor extension services and Future threats included concerns about land scarcity, water sources, and theft.

Key Informant Interviews: Informant: A key informant who provided insights into urban vegetable production and its impact on food security. Key Statements: Emphasized the opportunity for engaging in vegetable production due to an available market and the provision of fresh food, Highlighted the drawbacks of imported vegetables, such as potential contamination during transportation and a longer time before reaching consumers. The combination of these qualitative research methods allows for a comprehensive understanding of the perspectives, experiences, and challenges associated with urban vegetable production and its implications for food security. The insights gathered from focus group discussions, key informant interviews, and personal observations contribute to a rich narrative that goes beyond quantitative data, providing a grate view of the factors influencing vegetable production in the study area.

4.4. Conclusion and recommendations

The main goal of this paper, which focuses on the contribution of urban vegetable farming to food security in Addis Ababa, Ethiopia, provides valuable insights into the increasing significance of vegetable cultivation in the region over the last five years. The study, based on survey data from 388 vegetable households and qualitative information, highlights how vegetable farming has become a crucial source of food, income, and employment in the study area.

The findings highlight the positive impact of vegetable cultivation in providing fresh and healthy food, reducing household expenses, offering low-cost food options, and generating income for households. The study employs multiple regression models, identifying significant variables such as gender, marital status, employment, and shelter index that positively influence household food security status. Particularly, logistic regression analysis suggests that females are more likely to experience food insecurity.

Recognizing the city's objective to provide residents with sustainable, local, and fresh food, the study acknowledges the challenges associated with achieving this goal. Factors such as available land parcels, farm size, revenue generation potential, postharvest handling, and distribution methods are identified as critical considerations.

To develop an effective and sustainable vegetable production system in Addis Ababa, the study suggests that the government should encourage producers while addressing challenges related to vegetable production. There is an emphasis on prioritizing the strengthening of the capacity of female-headed households. Additionally, the study

highlights the importance of addressing food insecurity among city dwellers through development intervention strategies, including long-term policies, training programs, and research initiatives to mitigate challenges and gaps in the sector. This holistic approach aims to foster a resilient and sustainable urban vegetable production system in Addis Ababa.

CHAPTER 5: THE ROLE OF URBAN VEGETABLE PRODUCTION TO THE LIVELIHOODS ENHANCEMENT OF PRODUCERS IN ADDIS ABABA: EXAMINATION OF INCOME, EMPLOYMENT AND MARKET EFFECTS⁴

Abstract

Background: *In order for urban agriculture to play a substantial role in development, especially in a city like Addis Ababa, Ethiopia, where chronic poverty is prevalent, it needs to offer viable and sustainable business opportunities alongside its recognized social advantages. The primary goal of this research is to examine the impact of vegetable production on supplementing income and generating employment for residents in the urban areas of the Addis Ababa metropolitan area.*

Methods: *A combination of qualitative and quantitative data was collected through focus group discussions, key informant interviews, survey questionnaires, and desk reviews. The analysis of household quantitative data involved the use of descriptive statistics to summarize and inferential statistics to draw conclusions and make predictions.*

Findings: *The study reveals that residents in Addis Ababa heavily depend on vegetable production to achieve food stability and ensure self-sufficiency. This agricultural activity has played a pivotal role in generating employment opportunities, allowing both the unemployed and those already employed to engage in this economic pursuit. Notably, there are no specific educational requirements, making it accessible to individuals with lower or no educational qualifications. An important finding is that 99.2 percent of respondents acknowledge the contribution of vegetable production to a fresh food supply for their households. Regarding income, 41.9 percent of respondents reported earning up to 10,000 birr, and the income generation period varied between 3 to 4 months based on the type of production. In terms of farm operations, 30.7 percent of vegetable producers hire up to ten employees. The study observed that inputs such as seeds and pesticides incur higher costs compared to other necessary items. The results from the linear regression analysis suggest*

⁴ Based on:

Habtamu Serbessa, Teferee Makonnen & Meskerem Abi (2023). The role of urban vegetable production to the livelihood's enhancement of producers in Addis Ababa: Examination of income, employment and market effects. *International Journal of African and Asian Studies*, Vol.82, ISSN 2409-6938

that individuals employed in urban farming and those with larger household family sizes tend to have higher total incomes per production.

Suggestions: *The surveys suggest that producing vegetables at home is seen as a significant source of extra income. However, households engaged in production tend to prioritize growing vegetables more for their own consumption rather than for profit.*

Keywords: *Urban economy; Food security; Urban employment; Addis Ababa*

5.1. Introduction

Urban authorities grapple with difficult challenges in delivering essential services like housing, infrastructure, facilities, and employment (UN-Habitat, 2017). This challenge is exacerbated as cities worldwide contend with the dual issues of escalating unemployment and poverty (Md. Abdul Kuddus *et al.*, 2020). In many regions of Sub-Saharan Africa, especially around major urban centers, food insecurity and unemployment persist as significant concerns (WB, 2023). In response to the rising problems of urban unemployment, poverty, and hunger, some cities have turned to urban agriculture as a viable solution.

Urban farmers' livelihood refers to the means by which individuals involved in urban agriculture sustain their lives and households through various agricultural activities within an urban setting. This concept encompasses the economic, social, and environmental aspects of urban farming that contribute to the overall well-being and survival of urban farmers and their families. The livelihood of urban farmers involves activities such as cultivating crops, raising livestock, or engaging in other forms of agricultural production within city limits. This can provide a source of income, food security, and other socio-economic benefits. The livelihood strategies may vary widely, and urban farmers often adapt to the unique challenges and opportunities presented by urban environments (Beach, 2013; Gonfa, 2019).

UA involves the cultivation, processing, and distribution of food within or in the vicinity of a town or city (Nzimande, 2013). Consequently, UA predominantly serves as a response by the urban poor to address inadequate, unreliable, and sporadic food access, coupled with a lack of purchasing power (Gonfa, 2019). Simultaneously, it plays a crucial role in ensuring children's access to food, improving their health, and contributing to the empowerment of women (Stewart *et al.*, 2013).

Grace *et al.* (2022) emphasize that despite its economic significance, UA has received limited attention thus far. The economic advantages of UA encompass employment generation, income generation, enterprise development, contributions to the national agriculture sector, and impacts on land-use economics (Belayneh and Addisu, 2021). The choice of urban farming as a business is observed among entrepreneurs with varying income levels. Given that food is a fundamental consumption item with a consistent and reliable demand, urban farmers can tailor their production to meet this demand, supplying high-value and perishable items due to their proximity to markets (Smit *et al.*, 2001).

Many cities, particularly in developing countries, struggle to generate sufficient income and employment to support their rapidly expanding populations, leading to food shortages (Zeeuw, 2004). According to Bryceson and Potts (2005) and Tewodros (2007), UA emerged in Africa as a response to the limited sources of urban economic sustenance, characterized by insufficient supplies of staple foods to cities coupled with a decline in the purchasing power of city dwellers. Thus, millions of African urban residents are encouraged to engage in farming, either to supplement their household income or because they cannot afford to meet their daily food needs. The development of UA is significantly influenced by the dynamics of urban social, economic, political, ecological, and spatial systems with which it is interconnected, adapting to new economic and geographic conditions (Fan *et al.*, 2022).

While vegetable farming is not a novel industry in Ethiopia and has been ongoing for decades, large state farms produce fruits and vegetables for both local consumption and export. Some private companies focus on vegetable production, primarily for the European market. Additionally, numerous small-scale producers cultivate a limited variety of vegetables for local and regional export markets (Kebede *et al.*, 2019). Commercial and small-scale farmers across different agro-ecological zones grow vegetable crops, considering them not only as a source of financial gain but also as a means of food production. However, the variety of crops is limited, and production is concentrated in specific areas (Nimona, 2017). Despite these variations, vegetable production ranges from cultivating a few plants in backyards for home consumption to large-scale production for domestic markets (Tadele and Derbew, 2015).

A study on livelihood dependence on UA in Addis Ababa, conducted by Tewodros (2007) and Mekuria and Messay (2018), highlighted that cultivating vegetable crops and rearing large cattle are the predominant agricultural activities among urban crop producers and livestock owners, respectively.

Leafy vegetables, known for their high beta-carotene content and greater food yield per unit area, contribute more to farm income compared to other crops. The cropping intensity in vegetable growing is notably high, allowing for the cultivation of three to four vegetable crops in a single year (Galhena *et al.*, 2013; Tadele and Derbew, 2015). Vegetables serve as a source of cash income for households, offering an opportunity for increased market participation by smallholder farmers (Gonfa, 2019). The majority of the vegetables produced are sold in local markets, with only a small portion consumed domestically. In

addition to the economic benefits, the study found that UA in Addis Ababa makes significant social contributions (Fufa, 2017).

These urban agricultural systems adapt to the dynamic local conditions of the city, with vegetable production taking on new roles (Eigenbrod and Gruda, 2015). While the primary function of UA remains food supply and income generation in cities, vegetable cultivation is increasingly contributing to environmental, landscape, and biodiversity management, as well as providing recreational services, among other roles. The long-term viability of production is likely to be determined by its flexibility and multi-functionality (Hubert *et al.*, 2010).

The growth of poverty, hunger, and the lack of formal employment opportunities, coupled with unique urban advantages such as rising food demand, proximity to markets, and the availability of inexpensive resources like urban organic wastes and wastewater, has driven the development of diverse agricultural production systems in and around cities (de Bruin *et al.*, 2021). These systems often specialize in perishable products such as green leafy vegetables, milk, eggs, and meat, utilizing vacant open spaces. This development holds significant potential and addresses some of the most pressing issues facing urban areas (FAO, 2007; Ababulgu *et al.*, 2022).

Poor farmers often lack the financial capacity to absorb "economic shocks," particularly when they receive minimal or no government assistance (Czekaj *et al.*, 2020). Unemployment poses a serious concern due to its potential impacts on economic welfare, production, human capital erosion, social exclusion, crime, and social instability. The Urban Employment Unemployment Survey by the Central Statistical Agency (CSA, 2018) revealed that 20 percent of the working-age population in Addis Ababa is unemployed, with 30 percent of the employed population being self-employed (Hirvonen *et al.*, 2021).

Within the UA sector, there is a growing interest, although the scale and motivations vary. Urban farming contributes to direct income through sales and employment, as well as indirect income through reduced food expenditure. UA, especially vegetable production, is considered an accessible industry to enter (Oekan *et al.*, 2023). Vegetable production holds significant economic importance and plays a central role in achieving food and nutrition security in Addis Ababa, Ethiopia. Diversifying and expanding vegetable production can address malnutrition and poverty by enhancing household consumption while creating new income and job opportunities in the production, trading, and processing sub-sectors

(Ibrahim *et al.*, 2021). Limited documentation exists regarding its effects on food security, job creation, and wealth generation (Kingdon and Knight, 2004).

Given the limited existing studies, the objective of this study is to enhance our understanding of how urban vegetable production contributes to the livelihoods of urban society. This research aims to investigate vegetable cultivation and its impact on employment generation, income, and the market chain in the study area.

5.2. Methods

5.2.1. Description of variables

In this study, the dependent variables are the income derived from vegetable production by producers and the total employment generated during the production seasons. The hypothesis posits that vegetable production in the study area contributes to both employment creation and income generation. Several explanatory variables are postulated to influence the status of vegetable producers. Through a review of relevant literature, six potential explanatory variables have been identified: land size, source of land, farming production costs, gender of the household head, educational status, and the distance from the market to the production area. These factors are supposed to explain the variations observed in vegetable production within the study area.

Table 5. 1 Dependent and Independent variables descriptions

<i>Dependent variable</i>	<i>Description</i>
income from vegetable production	1= up to 10,000, 2= up to 20,000, 3= up to 30,000, 4=> 30,001, 5= HH consumption
Newly hired employees	total new employment creation in the vegetable farming process
<i>Independent variable</i>	<i>Description</i>
land size in m ²	1=up to -300, 2= 301-600, 3=601-1000, 4= > 1001
distance of farms to market	How long do they travel by car to the market site?
gender of the house head	Dummy; 1 if head is male 0 if female
educational status	0= unable to read and writing, 1= non-formal education but reading and writing, 2= primary, 3= secondary, 4= diploma, 5= bachelors, 6= postgraduate and above
farming costs (input)	the amount of production cost in the farming systems

5.3. Results and Discussion

5.3.1. Socioeconomic Profile of Producers

Demographic characteristics, including age, gender, and family sizes, as well as socioeconomic factors such as marital and educational status, play crucial roles in vegetable production and marketing. According to the finding in Table 2.2, a majority of

households engaged in vegetable production (59.3%) were led by males, indicating a predominant male dominance in this sector. Age also emerged as a significant factor, with a substantial portion of respondents (56.8% of all working-age respondents) falling between the ages of 18 and 40, as indicated in Table 2.2. Moreover, the majority of vegetable producers (67.8%) were married, supporting the findings of Banchamlak and Akalu (2022) that male producers dominate the sector.

Educational background varied among respondents, with 30.9 percent having no formal education, 56.2 percent completing primary and secondary school, and 12.9 percent having higher education, as shown in Table 2.3. Family size was diverse, with 55.0 percent having 4-6 members, 34.4 percent having 1-3 members, and 17.8 percent having 7 or more members. Regarding occupation, vegetable production was the primary source of livelihood for 64.0 percent of households, but urban vegetable farming was also practiced by individuals not primarily engaged in farming (Table 2.3). The survey revealed that 73.9 percent of participants had five or fewer years of experience in vegetable production, suggesting a recent increase in the capacity for vegetable farming over the last five years. Engaging in the vegetable industry, as noted by Kebede *et al.* (2019), leads to improved food availability and access.

5.3.2. Vegetables production contribution to household well-being

As per the respondents, the production of vegetables is now widely acknowledged as a mechanism for enhancing community household welfare. On the other hand, the perception of producers, as depicted in Figure 3.1, shows that 99.2 percent of respondents agreed that vegetable production activities provide fresh food for their households, 84.5 percent contribute to food security, and 81.1 percent make it easily accessible. For 81.2 percent of households, urban vegetable production is crucial for generating income. According to studies by Joosten *et al.* (2015) and Habtamu and Adugnaw (2016), a significant variable influencing the proper utilization of consumed nutrients is the contribution of vegetable production to obtaining healthy and fresh food, thereby impacting an individual's health status. Present-day average dietary intakes are often unhealthy, failing to meet fundamental dietary requirements for health (Joosten *et al.*, 2015).

5.3.3. Urban vegetable production as an income-generating tool

The shortage of reliable economic data in the field of UA can be attributed to its status as a relatively recent area of study, presenting numerous methodological and practical

challenges. Estimating farmers' incomes is challenging due to the varied profiles of farmers, their reluctance to disclose income data, the seasonality of crops, continuous harvesting, and the dispersion of cultivation plots (FAO, 2007). Traditional vegetable farmers typically cultivate short-cycle crops for both personal consumption and local sale. They favor crops with regular cuttings (twice a month) to ensure a steady income and favorable returns.

According to Figure 5.1, 41.9 percent of respondents reported vegetable production income sales of up to 10,000 birr per single production season. However, this seasonality could vary, with some producers experiencing two to four seasons at most. Additionally, 27.1 percent of respondents consume their vegetable products at home, while those not profiting directly from vegetable production find it a means to save money for their families. A notable 17.7 percent of households earned more than 30,000 birr from vegetable production. The findings indicate that while income from vegetable production may not be sufficient to meet all the needs of producers, it provides significant relief in various aspects.

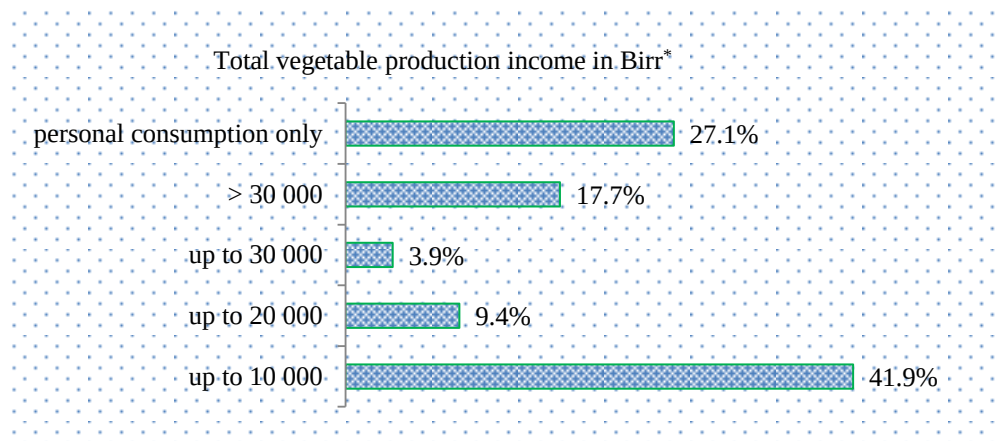


Figure 5.1 Sales income from vegetable production per household in a single production season

*Birr = Ethiopian currency

Illustrated in Figure 5.1, participants who own large farms of 600 m² or more engage in vegetable production primarily for profit. In a study conducted in Cameroon, Lucien *et al.* (2021) emphasized that, when comparing vegetable production incomes with the minimum monthly salary guarantee in Cameroon, vegetable production emerges as a worthwhile income-generating activity.

During the production period, farmers incur various costs associated with their agricultural activities. Figure 5.2 illustrates that seed and pesticide inputs tend to be more costly compared to other necessary items. In contrast, land and labor are relatively less expensive among the incurred costs, supporting the urban farming theory that the importance of land may be diminished or not considered a prominent concern. Typically, the land is either provided by the local government or owned by the respondent, and households utilize family labor as a cost-saving measure.

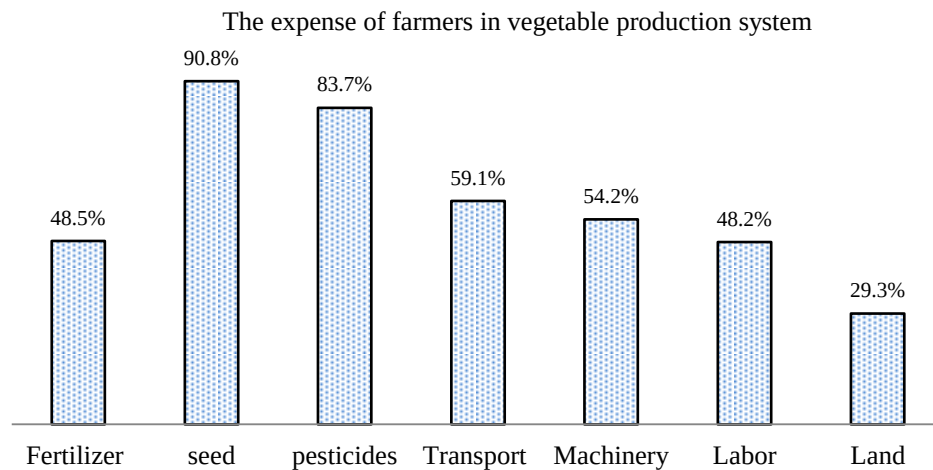


Figure 5.2 Producers' farming costs during vegetable production

5.3.4. Vegetable market and channels

From cultivation to the marketing of marketable surplus, vegetable production is a labor-intensive activity that involves numerous individuals (Banchamlak and Akalu, 2022). As indicated by Lisa *et al.* (2019), the marketable surplus undergoes transactions through various agencies and passes through multiple hands between the producer and the final consumption point. The marketable surplus refers to the portion of the product that remains after deducting the farmer's local needs and post-harvest losses. The quantity of marketable surplus varies depending on the vegetable. Producers typically trade their marketable surplus at locations where they can obtain the highest return for their produce.

The primary transaction points for marketable surplus include village traders, urban markets, and regulated markets. The marketable surplus follows diverse channels before reaching the final consumer, and the length of these channels may vary among different vegetables. A field survey has explored and identified various market channels for the transaction of marketable surpluses of vegetables.

The major producers' market channels are as follows:

- Producer → consumer (at farm gate)
- Producer → village trader → consumer
- Producer → regulated market (whole seller) → consumer

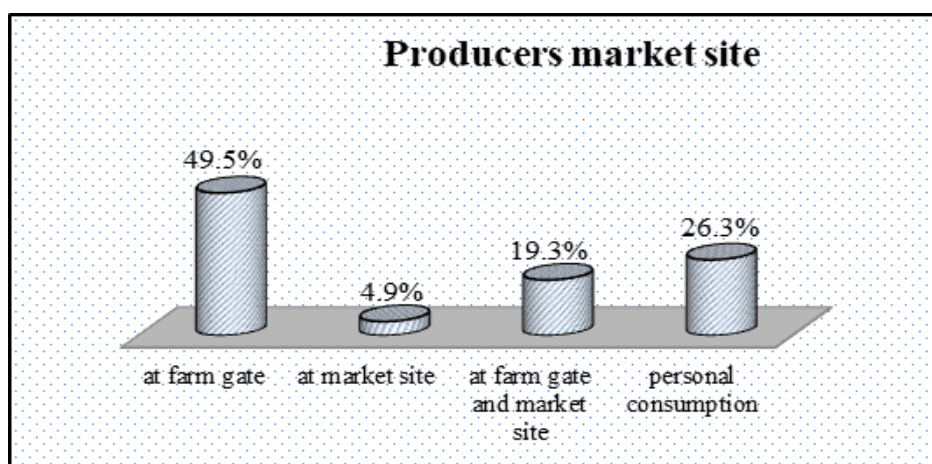


Figure 5.3 Respondents' marketplace chose to sell the product

The producers primarily consist of small and marginal farmers who are unable to generate a substantial, marketable surplus. Accordingly, they prefer selling their produce at a nearby point of sale. A significant portion of the produce (49.5%) is directly sold on the farm, while 19.3 percent sell at both the farm gate and the market. Additionally, only 4.9 percent of respondents sell exclusively at the marketplace, while 26.3 percent use the produce for household consumption (Figure 5.3).

Table 5. 2 Farmers' perception and practices on local market syetem

Items	Frequency	Percent
Deliver your vegetable product to the market?	279	71.9
Packing your product before reaching the market?	19	4.9
Access to a sufficient market?	104	26.8
Fair price for the product?	68	17.5
Hidden costs associated with vegetable farm	367	94.6

Table 5.2 indicates that 71.9 percent of respondents supply their products to the market. However, 26.8 percent of respondents believe that having access to a sufficient market is a challenge, while only 17.5 percent believe that getting a fair price for the product is a concern. On the other side, only 4.9 percent of respondents pack the product before reaching the market. The findings suggest that producers willing to sell their products must

travel to the nearest market, typically taking 30 minutes to an hour by transportation, mainly by car (Figure 5.4).

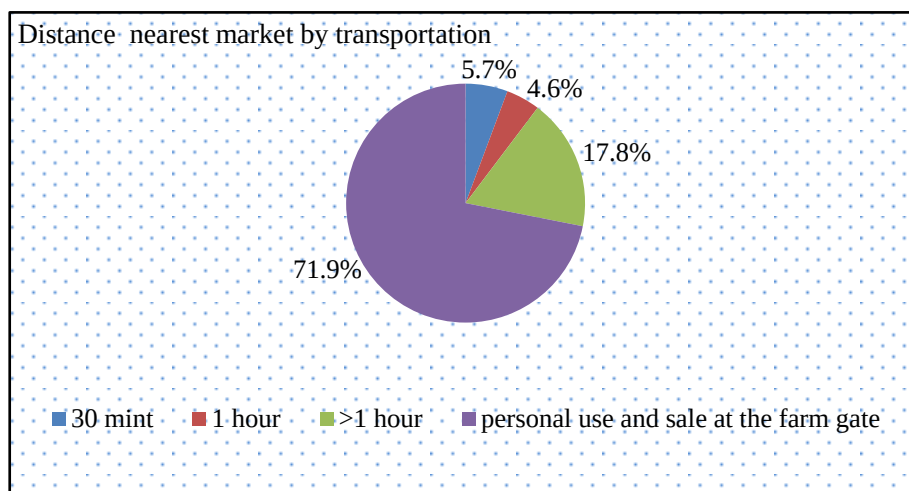


Figure 5.4 Distance by car to the nearest market area for producers

5.3.5. Impact of vegetable production on employment creations

Vegetable cultivation and marketing require a substantial amount of labor, involving various processes from production to the final sale. This practice has generated employment opportunities for individuals engaged in diverse tasks, offering a source of prompt income. Unlike some crops limited to specific seasons, vegetable cultivation occurs throughout the year, sustaining employment continuously (Nimona, 2017). Critical stages in the process, such as cultivation, harvesting, grading or packing, transportation, and marketing, contribute significantly to job creation.

As noted by Lencucha *et al.* (2020), vegetable production not only enhances the income of impoverished individuals but also functions as a catalyst for social and economic advancement, thereby contributing to the overall socioeconomic development of the study area. The field survey conducted in the selected study area, encompassing 388 households across 11 weredas, demonstrated that numerous individuals directly or indirectly benefited from the activities related to vegetable production.

Figure 5.5 illustrates that 30.7 percent of producers employ up to ten people for their production activities, while 7.3 percent hire up to 20, and 7.8 percent have more than 21 employees.

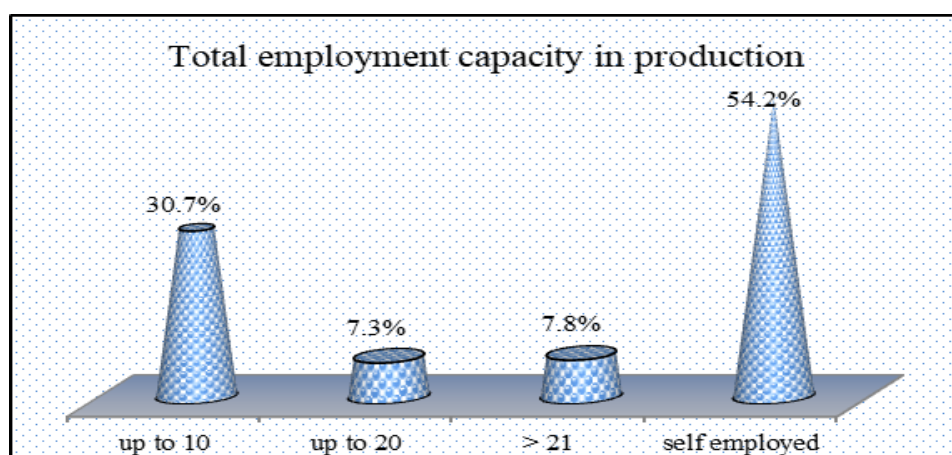


Figure 5.5 Total Employees in vegetable production system

Notably Figure 5.5, the majority of the share in vegetable production (54.2 %) belongs to self-employed individuals who cultivate for themselves, not hiring additional labor, and utilize the produce for personal consumption.

Table 5.3 shows that the variable "sex of the respondents" is statistically significant. Female respondents, compared to males, are associated with a significant decrease in total income. For each unit increase in the sex of the respondents (from male to female), the total income is expected to decrease by approximately 5,360.02.Birr. Employment status is statistically significant. Urban vegetable farming-employed respondents, compared to other types of employment-employed ones, are associated with a significant increase in total income. For each unit increase in employment status, the total income is expected to increase by approximately 1,991.93.Birr. Household family size is statistically significant. An increase in family size is associated with a positive impact on total income. For each unit increase in family size, the total income is expected to increase by approximately 2,277.29.Birr.

Urban vegetable farming employed individuals, and those with larger household family sizes tend to have higher total incomes. Age and academic qualification do not show significant associations with total income. Marital status has a marginally significant positive association, suggesting that being married may be associated with higher total income. The results provide insights into the relationships between the variables and total income in the given regression model.

Table 5. 3 Linear regression estimates for determinants of income from vegetable production

Correlations								
		total income	sex	age	academic	marital status	employment	family size
Pearson Correlation	total income	1.000						.
	sex	-.204	1.000					.
	age	.049	-.168	1.000				
	academic	.089	-.207	-.072	1.000			
	marital status	.005	.311	-.168	-.122	1.000		
	employment	.152	.014	.081	-.009	-.003	1.000	
	family size	.101	-.049	.330	-.046	-.143	-.051	1.000
Sig. (1-tailed)	total income	.	.000	.173	.044	.462	.002	.025
	sex	.000	.	.001	.000	.000	.393	.175
	age	.173	.001	.	.083	.001	.059	.000
	academic	.044	.000	.083	.	.009	.430	.188
	marital status	.462	.000	.001	.009	.	.479	.003
	employment	.002	.393	.059	.430	.479	.	.163
	family size	.025	.175	.000	.188	.003	.163	.
Coefficients ^a								
		Unstandardized Coefficients		Standardized Coefficients				
Model		B	Std. Error	Beta	t	Sig.		
1	(Constant)	6448.160	3809.936		1.692	.091		
	sex of the respondents	-5360.015	1311.909	-.221	-4.086	.000		
	age of the respondents	-249.094	630.952	-.022	-.395	.693		
	current academic qualification	524.901	451.329	.060	1.163	.246		
	marital status	1651.309	926.267	.095	1.783	.075		
	employment status	1991.933	611.749	.164	3.256	.001		
	house hold family size	2277.291	994.007	.122	2.291	.023		

a. Dependent Variable: what is the total income of your production in one season?

5.4. Conclusions and recommendations

This findings highlights the key role of agriculture, particularly vegetable cultivation, in increasing food availability, improving human nutrition, and contributing to economic development. It emphasizes the dual perspective of vegetable production, considering both socially-oriented urban farming, which includes leisure, recreation, and community-based

aspects, and economically-oriented urban farming, which focuses on market orientation and entrepreneurship.

The paper acknowledges the challenges faced by vegetable producers, including limited production resources, economic factors affecting job opportunities, and low land productivity due to a lack of technological intervention and poor working cultures. To address these challenges, the government is urged to encourage cultivators and promote a comprehensive approach to vegetable cultivation that is both socially and economically sustainable.

The mention of rivers in urban areas as potential resources for improving agricultural productivity emphasizes the need for protection and efficient utilization of these natural assets. Additionally, the study stresses the importance of developing an efficient vegetable marketing chain that connects local markets with regional and national markets, ensuring that vegetable production yields the highest possible return for producers.

Urban agriculture is deemed crucial in a labor-rich but capital-poor city like Addis Ababa, and the implementation of an urban agricultural policy at both national and local levels is recommended to stimulate this sector. The potential influence of consumers' shopping habits on purchasing locally-produced foods is highlighted, with a focus on the benefits of consuming unprocessed vegetables and the positive environmental impact of reducing energy usage associated with the consumption of heavily processed foods.

In general, the study highlights the multifaceted benefits of vegetable cultivation, calls for a strategic and sustainable approach to address challenges, and advocates for the integration of urban agriculture into urban planning and development policies.

CHAPTER 6: SYNTHESIS OF MAIN FINDINGS, CONCLUSIONS AND RECOMMENDATION

This chapter culminated in a synthesis of the dissertation's findings. This paper presented a detailed account of the significant results related to each research objective, culminating in concluding remarks and their potential impact on future interventions. The synthesis explored the path forward for urban vegetable farming in Ethiopia, including discussions on policy considerations and recommendations. Finally, the chapter depicted the study's contribution to both science and society while forwarding recommendations for future research endeavors in this context.

6.1. Main findings of the research

6.1.1. Factors Influencing Vegetable Production Systems and Producer Characteristics

This study highlighted the multifaceted role of urban vegetable production in Addis Ababa, Ethiopia, particularly within the study community. It strengthened household resilience, provided income generation opportunities, and served as a means of both self-consumption and potential employment. In the study area, vegetable production is integrated into a mixed farming system where different types of crops are grown on the same plot of land or in sequence with other crops in rotation. Notably, more than 70% of the participants had limited experience (five years or less) in vegetable cultivation. This suggests a recent and significant increase in urban vegetable farming capacity within the study area. This growth could contribute to a greener environment with more vegetation. The focus on urban agriculture and Green Legacy by the Federal Democratic Republic of Ethiopia and Addis Ababa City governments potentially aligns with this observed trend.

This study revealed a strong correlation between urban vegetable farming practices and private homeownership, likely due to the provision of permanent and additional space for cultivation. While more than 60% of participants who engaged in urban vegetable production within the study area resided in their own homes, it was noteworthy that land holdings tended to be modest. In fact, approximately 80% of the participants possessed plots smaller than 300 square meters. The findings revealed a high frequency of cultivation, with most participants engaging in vegetable production more than twice a year. This suggested an intensification of urban agricultural practices within the community. Interestingly, riverside areas served as a vital resource for more than 60% of

the farmers, who leveraged the river for irrigation. Production, however, extended beyond these riverside plots, with activity observed in diverse locations such as private residences, damp areas, parks, and even condominiums.

The study also sheds light on the profile of producers and their motivations. Aligning with the growing trend of urban agriculture for self-sufficiency, a significant portion (over 95%) of the producers were civil servants. Their goals extended beyond personal consumption, with many aiming to generate income alongside growing vegetables for their own tables. This highlighted the potential of urban agriculture to contribute to livelihoods within the community. While diversity was evident, with most producers cultivating multiple vegetables, leafy greens such as kale, chard, and lettuce dominated production, with over 91% of participants growing these varieties. Socio-demographic factors such as sex, age, educational attainment, and marital status significantly influenced vegetable production capacity among participants. Compared with their female counterparts, male producers demonstrate greater activity and engage in more frequent cultivation cycles annually. Additionally, the production capacity tended to increase with advancing age. Participants with primary or secondary education reported engaging in multiple yearly production cycles more often than those with lower educational levels. Furthermore, the study revealed that compared with single or divorced individuals, married producers participated in more frequent cultivation cycles. Water sources also play a statistically significant role in vegetable production. The study identified river water, tap water, groundwater, and recycled water as all having positive and statistically significant impacts on production outcomes. Urban vegetable farming demonstrably contributed to knowledge sharing, job creation, household well-being, and enhanced food security stability within the community.

6.1.2. Benefits and Barriers of Urban Vegetable Production

Urban vegetable production practiced by urban farmers in Addis Ababa, Ethiopia. They primarily cultivate vegetables that ensure access to fresh and healthy food, lower household expenses, contribute to food security, provide low-cost food, and allow households to generate income. However, despite its potential benefits, the sector struggles with ongoing drawbacks. This study conducted a SWOT analysis and revealed several benefits and barriers to urban vegetable production. Starting from strengths, which contributed to the success of urban vegetable production in the area, these strengths created a favorable environment for producers. One key advantage was access to a nearby river, which provided a reliable source of irrigation water. Additionally, producers often rely on

manual weeding methods, potentially keeping costs lower than those associated with the use of herbicides. Selling their produce was facilitated by the availability of a nearby market, ensuring a potential source of income. Furthermore, utilizing their own labor for production reduced the costs associated with hired workers. The analysis also identified positive social aspects, highlighting the presence of social motivation among producers. This sense of community and shared goals could have created a supportive environment that encouraged participation. Additionally, growing awareness of the benefits of urban agriculture could have led to increased participation from the community. Supportive government initiatives and the involvement of younger people in vegetable production further strengthened the future prospects of this practice. Overall, these identified strengths painted a picture of a well-established system that benefited from readily available resources, a supportive social environment, and potential government backing.

The SWOT analysis revealed exciting opportunities to amplify the impact of urban vegetable production. Poverty reduction can be enhanced through increased production, valuable crops, and dedicated markets. Existing markets can be expanded via partnerships with restaurants, schools, and delivery services. Waste reduction efforts can be maximized through composting initiatives and waste management partnerships. Job creation can be boosted by encouraging larger-scale production and processing facilities. Social interaction can be nurtured through community gardens, workshops, and social events. Farmer awareness can be further developed through educational programs. Finally, the accessibility of fresh produce can be increased through mobile markets, subsidies, and educational campaigns. These opportunities position urban vegetable production as a powerful driver of positive change.

The SWOT analysis revealed not only positive aspects but also challenges faced by urban vegetable production in the area. Weaknesses, which are internal limitations, hinder efficiency and effectiveness. Unclear policies, infertile soil, and difficulty obtaining essential supplies such as seeds and tools can restrict production. Additionally, a lack of shade at markets, limited training and technical expertise, and insufficient support from extension services can all lead to lower yields and marketability. Transportation challenges and limited public awareness about the benefits of urban agriculture further restrict the sector's growth.

Threats, on the other hand, are external factors that pose risks to the future of this practice. Rising land prices due to development, uncontrolled livestock movement, and seasonal

flooding threaten the availability of suitable land and the security of existing production areas. Urban planning decisions that unintentionally restrict urban agriculture, difficulty accessing or sharing knowledge about best practices, and unreliable water sources all pose significant challenges. The analyses even identified repeated weaknesses as threats, highlighting the critical importance of ensuring a steady supply of inputs and secure land tenure for producers. Finally, fear of eviction and limited public awareness further discourage investment and participation in urban vegetable production. Addressing these weaknesses and mitigating the threats are crucial for ensuring the sustainability and positive impact of urban agriculture in the area.

This study identified the key drivers and constraints affecting urban vegetable production in the research area. The findings revealed a range of factors influencing the current state of production. Several key drivers were identified. Food security initiatives first involved raising awareness, potentially providing resources, and encouraging production. A readily available workforce within households or the community facilitates the process. Easy access to markets creates a viable means to sell produce, while farmer motivation, driven by personal or community goals, is another crucial factor. The potential to generate additional income and perceived environmental benefits, such as a reduced carbon footprint, further incentivize household participation. Supportive government policies and infrastructure development can create a favorable environment for urban agriculture to flourish.

However, the study also revealed hindering forces. Limited access to modern farm equipment and inadequate training programs offered by extension services can hinder production efficiency and knowledge among producers. Negative attitudes from residents or competition for land use from growing industries and services in cities can pose challenges. Land scarcity, concerns about temporary land tenure, and potential public health risks associated with water contamination or waste management further restrict this practice. Finally, a lack of knowledge or expertise among producers regarding planting techniques, pest control, or resource management can hinder productivity. Understanding these driving and hindering forces is crucial for policymakers and development agencies to create targeted interventions that promote sustainable and productive urban vegetable production.

6.1.3. The Role of Urban Vegetable Production in Household Food Security

A critical situation of food insecurity grips Ethiopia, with Addis Ababa bearing the brunt. A disturbingly high number of residents in the city, estimated at over half, experience food insecurity. Urban agriculture is emerging as a promising approach for achieving sustainable food systems and food security for city residents. This strategy has recently gained traction from policymakers around the world and has been applied in both developing and developed countries. Notably, the Ethiopian federal government and Addis Ababa's city administration in particular have embraced this strategy. Its potential to contribute to urban food security and alleviate poverty is a key driver of this growing interest.

This analysis of the household food insecurity status of the participants revealed a troubling situation. Over 60% of the surveyed households expressed worry about having enough food, indicating general anxiety about food availability. Furthermore, limitations in resources restricted food variety for more than 70% of households, suggesting difficulty acquiring a diverse and nutritious diet. The situation becomes even more concerning when considering that nearly two-thirds (66%) reported having to eat smaller meals than desired due to lack of food, and over 60% had to reduce the number of meals eaten per day. Although the least frequent indicator (approximately 19%) was the consumption of unwanted food, this still highlights the prioritization of avoiding hunger over palatability when resources are scarce. Taken together, these findings paint a clear picture of a community facing significant challenges in accessing both the quality and quantity of food needed for a healthy diet.

This study assessed the types and average number of foods consumed by study households over the last seven days and provided insights into household food consumption patterns, including the prevalence of different food groups in diets and the average consumption rates. Cereals, roots and tubers are consumed by all households, likely reflecting their role as dietary staples. These food groups also contributed a significant portion (over 14%) to the average diet. Fruits and vegetables are also present in most households, but their average intake (approximately 14% and 13%, respectively) suggests room for improvement in terms of dietary balance.

There is a clear disparity in animal protein sources. Meat consumption is prevalent in only approximately two-thirds of households, with a relatively low average intake (approximately 16%). Eggs have a similar consumption pattern. Fish and seafood

consumption is even lower (approximately 31% of households), with a minimal contribution to the average diet (under 8%). Interestingly, pulses, legumes and nuts, milk and milk products, oil/fats, and sugar/honey/sweets are consumed by a majority of households (over 60%). Oil/fats and sugar/honey/sweets had the highest average consumption (over 18%). Based on these findings, the study suggested a potential need to encourage increased consumption of fruits, vegetables, and animal protein sources for a more balanced diet for the population.

According to the findings of Household Food Insecurity Access Prevalence, the majority of households (66.5%) experienced moderate food insecurity, indicating that they had difficulty consistently accessing enough affordable, nutritious food. An additional 13.9% faced mild food insecurity, suggesting occasional struggles with food access. Only 14.9% of households are considered food secure, implying consistent access to a nutritious diet. Severe food insecurity, affecting 4.6% of households, represents the most critical situation, with significant limitations on food availability. Regarding food consumption state, nearly a quarter (26.5%) of the households in this study reported borderline food consumption, suggesting some limitations in dietary quality or quantity. Another 7.5% fell under the "poor" consumption category, indicating significant dietary inadequacies. Fortunately, the largest proportion (66%) of households exhibit acceptable food consumption, suggesting that they can meet their basic dietary needs.

This study identified several factors as having a statistically significant positive impact on a household's ability to access enough food. These factors include having proper housing, being led by a male figure, having employed members within the household, and being a married couple. Secure housing allows households to focus resources on food rather than temporary or emergency shelter. Interestingly, the study revealed that male-headed households tend to have greater food security. While cultural norms around breadwinning roles might be a factor, further investigation is needed to fully understand this association. Household employment provides a more stable income source, enabling more consistent food purchases. Finally, married households exhibited increased food security, potentially due to combined incomes, improved resource management within a couple, or a more stable family structure overall. It is important to remember that these factors may not directly cause food security but rather co-occur with it due to underlying influences such as education level. Further research is needed to explore these potential causal relationships.

This study investigated the impact of increased vegetable production on household food security. The findings showed that growing more vegetables not only provided households with fresh, healthy food but also lowered their grocery bills and offered income-generating opportunities. These improvements ultimately led to better food security and dietary intake. However, a separate analysis revealed a concerning reality within the study area. A significant portion of the population struggles with food insecurity and may not be consuming a balanced diet. While the majority achieve an acceptable level of food consumption, there is a need to address the challenges faced by those experiencing borderline or poor dietary intake.

To improve food security and dietary intake in this area, a multipronged approach is recommended. First, promoting vegetable production programs through training, seed distribution, or community gardens empowers households with fresh, low-cost food sources and potential income generation. Second, further research into the root causes of food insecurity, such as unemployment or lack of affordable housing, can inform targeted interventions such as job training or social safety net improvements. Third, educational programs on healthy eating, budgeting for groceries, and preparing nutritious meals can support informed dietary choices. Finally, targeted support through food assistance, nutrition counselling, or social service referrals can directly address the needs of households struggling with borderline or poor food consumption. By combining these strategies, the study area can create a more secure and healthy food environment for all residents.

6.1.4. The Role of Urban Vegetable Production in Urban Livelihoods

The rapid population growth in many developing countries outpaces the ability of their cities to generate sufficient income and employment opportunities. In response to rising unemployment, poverty, and hunger, Ethiopian cities, particularly the Addis Ababa city government, have increasingly embraced urban agriculture as a potential solution. Urban agriculture offers a multitude of benefits. It increases access to fresh, nutritious food (food security), creates jobs, and generates income for various disadvantaged groups within the city, such as poor people, women, people with disabilities, older adults, and unemployed youth.

This study revealed that nearly all vegetable farmers (94.6%) identified hidden costs as a major concern, suggesting that unexpected expenses significantly influence their profits.

Delivering their produce to the market (71.9%) and washing it beforehand (33.1%) were also frequently mentioned, highlighting the importance of getting their products to customers in a clean and saleable condition. Interestingly, packaging produce before the market seems less common (4.9%), suggesting that it might be incorporated into the delivery process for some or not a typical practice for all. Overall, the study painted a picture of farmers grappling with hidden expenses while working to deliver a high-quality product to the market. The study suggested that hidden costs are a major concern for vegetable farmers. Delivering products to the market and washing produce before selling are also important aspects of vegetable farming for many respondents. Packing products before reaching the market appears to be less common.

Vegetable farming offers a steady stream of jobs throughout the production process, from planting and harvesting to obtaining the produce to market. Although income may not be immediate, it provides a livelihood for many people. Vegetable farming is often seasonal, with peak employment coinciding with harvests. Key job areas include cultivating the crops, harvesting them, sorting or packing the produce, transporting it, and marketing it.

Vegetable farming acts as a powerful driver of social and economic progress, especially for those facing poverty. This study highlights its contribution to the overall well-being of the area. The survey results show that vegetable production creates significant employment opportunities. Over one-third (38.8%) of producers hire workers, with some employing up to 20 or more people. Interestingly, more than half (54.2%) of vegetable producers are self-employed growers who likely consume some of their harvest themselves. This finding suggests both commercial and personal benefits from vegetable cultivation.

This study identified hidden costs as the greatest hurdle for vegetable farmers, followed by the logistics of delivering and washing their produce. While ensuring a clean and saleable product remains crucial, the overwhelming concern for hidden costs suggests a need for intervention. To create a more sustainable agricultural system, a two-pronged approach is recommended. First, workshops or resources can empower farmers to identify and reduce hidden costs through strategies such as equipment cost sharing, water conservation, or alternative pest control. Second, advocating for fair market access, such as supporting local farmers' markets or fair pricing policies, can ensure that farmers receive a fair return on their investment. By addressing both hidden cost burdens and market access limitations, we can create a system that benefits both farmers and consumers.

6.2. On the path to future urban vegetable farming in Ethiopia

Urban vegetable cultivation, while offering potential benefits such as food security, income generation, and employment opportunities (particularly for successful producers), also faces significant challenges. A key hurdle identified in this academic analysis is low land productivity. This is attributed primarily to a lack of modern technological interventions, such as advanced machinery or irrigation techniques. Additionally, the passage suggests that inefficient practices and a potential knowledge gap regarding best practices ("poor working cultures") contribute to these low yields. The authors acknowledge that limited resources and economic factors currently restrict widespread wage-earning jobs in this sector. However, they do find a positive correlation between higher producer income and increased job creation within these farms, suggesting that improvements in overall productivity could lead to a more robust job market within urban vegetable production.

To establish a more effective urban vegetable production system, the authors propose a multifaceted approach with both social and economic benefits, all while prioritizing environmental sustainability. This approach centers on a "dualistic" urban agricultural system that involves socially oriented urban farming and economically oriented urban farming. Socially oriented urban farming encourages community gardens, leisure activities, and subsistence farming. Subsidies could be implemented to increase accessibility and promote the growth of a wider variety of vegetables. Economically oriented urban farming focuses on market-driven production, fostering entrepreneurship through family-based or microenterprises. These farms would likely specialize in maximizing the profitability of a single, dominant vegetable crop.

Beyond the dualistic approach, the authors emphasize the need to better utilize existing resources. They point to the underutilized potential of urban rivers for irrigation and advocate for improved infrastructure to enhance agricultural productivity. Additionally, they highlight the importance of developing a more efficient marketing chain that connects local producers with regional and national markets, ultimately maximizing returns for cultivators.

In essence, the authors call for a comprehensive approach to urban vegetable production that considers both social and economic goals while promoting environmentally sustainable practices. They outline specific policy interventions, such as support for the

dualistic farming system and improved resource utilization and market access, to achieve this vision.

This dissertation underscores the potential of urban agriculture, particularly in labor-abundant but capital-scarce cities such as Addis Ababa. The authors argue for its encouragement, strengthening, and formal recognition within urban planning and development strategies. They identify the implementation of a comprehensive urban agricultural policy at both the national and local levels as a critical first step in stimulating this sector.

While acknowledging the need for further research on consumer behavior and local food preferences, the passage cites existing evidence suggesting a potential positive influence on shopping habits when consumers purchase locally produced food. The inherent advantage of vegetables as unprocessed goods makes them particularly well suited for direct marketing, potentially increasing the consumption of these healthy and currently underutilized items within local communities. A dietary shift toward unprocessed vegetables, facilitated by a robust urban agriculture system, could also yield environmental benefits through reduced energy consumption associated with food processing. In essence, this study advocates for urban agriculture as a key component of urban development in Addis Ababa. This study emphasizes the need for supportive policies and highlights the potential benefits for both consumer health and environmental sustainability.

6.3. Policy considerations and recommendations

This study identified several policy recommendations to bolster urban vegetable production across Ethiopia, with specific considerations for the area under investigation. To create a flourishing urban vegetable production system, several policy recommendations have emerged. First, a dualistic urban agriculture framework is needed. This would encourage both socially and economically oriented initiatives in this sector. The first focuses on social aspects, encouraging community gardens, leisure activities, and subsistence farming. This could involve allocating land for community gardens in urban planning, providing grant programs or tax breaks for relevant non-profit organizations, and offering educational programs on sustainable gardening practices for residents. The second prong targets the economic side by fostering market-driven production through entrepreneurship. This might include microloan programmes for establishing or expanding family farms or microenterprises, along with technical assistance and training on efficient and profitable farming methods. Finally, streamlining regulations and permitting processes

for urban farms would further support this economic focus. Policy tools could include land allocation for community gardens, microloans for farm businesses, and educational programs on sustainable practices.

Second, focusing on resource utilization and market access is crucial. To optimize resource use and market access for urban vegetable production, a multifaceted approach is recommended. First, feasibility studies should assess the potential of utilizing urban rivers for irrigation, considering water quality and necessary infrastructure upgrades. Additionally, promoting water conservation techniques specifically suited to urban agriculture can significantly improve resource efficiency. Encouraging composting programs could provide a sustainable source of organic fertilizer for urban farms. Second, enhancing market access for producers requires a two-pronged strategy. Investing in infrastructure development will improve transportation networks between urban farms and regional/national markets. Facilitating the creation of farmers' markets and partnerships with local food retailers creates a direct link between producers and consumers. Finally, exploring innovative marketing strategies such as online platforms or community-supported agriculture (CSA) models can further promote local vegetable consumption and strengthen urban vegetable production systems.

Finally, creating an enabling environment is essential. This could be achieved through a comprehensive national and local urban agriculture policy that recognizes this practice in urban planning, streamlines regulations, and allocates resources for research and development. A comprehensive national and local urban agricultural policy should establish urban agriculture as legitimate land use within city planning, ensuring its place in the urban landscape. Additionally, clear regulations and streamlined permitting processes for urban farms are essential to reduce bureaucratic hurdles. Furthermore, allocating resources for research and development in urban agriculture technologies and best practices can lead to more efficient and productive farming methods. To empower urban farmers, the policy should also provide financial and technical assistance for capacity building. Finally, investing in research on consumer preferences for local produce allows for targeted campaigns promoting local food consumption, creating a stronger market for urban-grown vegetables. By implementing these measures, the policy can foster a supportive environment for urban agriculture to flourish.

By implementing these recommendations, policymakers can create an enabling environment that fosters a thriving urban vegetable production sector. This will contribute

to a more sustainable food system, increased access to fresh produce for urban residents, and economic opportunities within the city.

6.4. Contribution to science and society

The contribution of urban vegetable production to science and society is significant. From a scientific perspective, research into urban agriculture, particularly vegetable production, provides valuable insights into sustainable food production in urban environments. This study contributes to the understanding of how agricultural practices can be adapted to meet the food needs of rapidly growing urban populations. This research also sheds light on the economic, environmental, and social impacts of urban vegetable production, which are important considerations for urban planners, policymakers, and agricultural scientists.

In terms of society, urban vegetable production plays a crucial role in enhancing food security, particularly in areas with chronic poverty. By providing fresh, locally grown produce, urban vegetable production contributes to improved nutrition and access to affordable food for urban dwellers. Additionally, it creates employment opportunities, particularly for those who may not have formal education or employment prospects in other sectors. This has positive implications for poverty alleviation and economic empowerment within urban communities.

Furthermore, urban vegetable production has been found to have social contributions, such as fostering community engagement and providing recreational services. It also has the potential to address environmental and biodiversity management issues, highlighting its multifunctionality and relevance to broader societal and environmental concerns.

Overall, the research and practice of urban vegetable production contribute to addressing critical scientific challenges related to sustainable food systems while providing tangible benefits to society in terms of food security, economic opportunities, and environmental sustainability.

6.5. Recommendation for future research

The following recommendations aim to build upon the existing research and address critical gaps in the understanding of vegetable production, urban agriculture, and food security in Ethiopia and other African contexts. Understanding how much farmers produce and earn from vegetables is a complex task. The wide variety of farmer profiles, seasonal nature of vegetable crops, and continuous harvesting make it challenging to accurately

measure productivity and income. Due to time and resource constraints, this study used a cross-sectional approach. However, to gain a deeper understanding, future research should consider two key approaches. First, longitudinal studies could track farmers over time, revealing overall vegetable output, obstacles they face, and fluctuations in their income. Second, comparative analyses could be conducted to understand similarities and differences between various farming systems. This could involve comparing farmers located in urban, peri-urban, and rural areas or even exploring variations within a single city based on ecological zones or sub city levels. By employing these strategies, future research can provide a more comprehensive picture of vegetable production and farmer income.

Furthermore, future studies could explore the role of urban agriculture in economic, social, and environmental sustainability. This study highlights the significance of urban vegetable production in contributing to food security and income. Future research could further explore the broader implications of urban agriculture, including its role in enhancing economic, social, and environmental sustainability in other cities in Ethiopia or African countries. This could involve assessing the environmental impact of urban agriculture, its contribution to employment generation, and its potential to alleviate food insecurity in urban areas. Future studies could also evaluate policy interventions for healthy agricultural commodities. Given the scoping review on government policy and agricultural production, future research could focus on evaluating the effectiveness of policy interventions aimed at promoting the production and consumption of healthy agricultural commodities. This could involve assessing the impact of agricultural policies on food availability, dietary diversity, and nutritional outcomes.

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APPENDIXES

Questionnaires

Checklist used for the field work/data collection

Addis Ababa University

College of Development Studies Center for Food Security

Questioner ID_____

I am a PhD candidate in Food Security studies program in College of Development Studies, Addis Ababa University. Currently, I am undertaking a research entitled “*Urban Agriculture and Food Security: The Case of Vegetable production, Addis Ababa, Ethiopia*”. The study aims to investigate the role of UA on food security of Addis Ababa.

To this end, I am approaching and interviewing individuals who have knowhow in this area. You are one of the respondents selected to participate on the study. I would like to promise you that the whole information given by the respondent is used for academic purpose only and will be kept confidential. Hence, considering the purpose of the questionnaire respondents are kindly requested to cooperate with the researcher in giving the necessary information. I would like to thank you in advance for your cooperation.

N.B.

In this questionnaire urban agriculture components refer to urban vegetable production (VP) only.

UA- Urban Agriculture

VP- Vegetable Production

Identification

Name of enumerator: _____ Signature: _____

Woreda: _____ Village: _____

Date questionnaire is filled: _____

Name of Supervisor: _____ Signature _____

Appendix: I Questionnaires for the Field work/data Collection for Urban Vegetable Farmers

Instruction: For the following personal question give your answer in the provided place.

1. Your sub city ----- and Wereda -----
2. When did you start to participate on urban agriculture? (In yrs.) -----
3. Your Background:

No	Questions	Option	
1	Sex	Male	0
		Female	0
2	Age	18- 30	0
		31- 40	0
		41- 50	0
		Above 50	0
		Unable to read and writing	0
3	Current Academic Qualification	Non formal education but reading and writing	0
		Primary (1 to 8)	0
		Secondary (9- 12)	0
		Diploma	0
		Bachelor's	0
		Postgraduate and above	0
4	Marital Status	Married	0
		Single	0
		Divorce	0
5	Employment Status	Civil servant	0
		Private business	0
		Self- employed/ own farm	0
		Home maker	0
		Student	0
		Retired	0
		Others (specify) -----	0
6	Where do you live	Own house	0
		Private rented house	0
		Kebele rented house	0
		Others (Specify) -----	0

4. House Hold Family Size -----
5. Region of origin?
 - a) In Addis Ababa
 - b) Outside Addis Ababa

6. If your answer for question # 5 is outside Addis Ababa, length of time living in Addis Ababa? ----- Year/s.
7. The land area you have for the vegetable production activity_____ hectares?
8. What is your primary urban farming production most used by you?

Categories

Vegetable.....	0
Dairy.....	0
Poultry.....	0
Cattle fettering.....	0
Bee	0
Livestock and vegetable	0
Others (Specify) -----	0

9. If your answer to question n_o 8 is vegetable production, Why vegetable production chosen by you?
- a) Simple b) more products per year c) others (Specify) -----
10. If your answer to question n_o 8 is vegetable production, which vegetable do you produce the most?

Options

Leafy vegetables...	0	Carrot.....	0
Cabbage.....	0	Pepper.....	0
Potato.....	0	Broccoli	0
Onion.....	0	Pumpkin.....	0
Tomato.....	0	Beet-root.....	0
Others, Specify --	0		

11. How many times do you produce vegetable Product per year?
- a) 1x [] b) 2x [] c) 3x [] d) more than 3x []

12. What are the purposes for your engagement in vegetable Production?

No 1=strongly disagree 2=disagree 3=neutral 4= agree 5= strongly agree

1	Self-consumption only	1	2	3	4	5
2	For family income only	1	2	3	4	5
3	Self-consumption and income	1	2	3	4	5
4	Employment opportunity	1	2	3	4	5
5	I've other Job it's just for hobbies	1	2	3	4	5
6	other (specify) -----					

13. If you have vegetable production sales income, what is the total vegetable sales income per year ----- (ETH birr)?

14. Do you have knowledge sharing one another between vegetable producers?

a) Yes [] b) No []

15. Do you get any support from development agents?

a) Yes [] b) No []

16. If yes for question # 15, who gives you support and what kind?

Supporter	Technical	Credit	Market	Counselling
Government	0	0	0	0
NGO	0	0	0	0
Privet	0	0	0	0
Other (specify)----				

17. Do you create job opportunities for others in the time of vegetable production?

a) Yes [] b) No []

18. If yes for question No 17, how many people work for you?

Full time ----- Part time -----

19. What do you think the most important benefit/usage of urban agriculture for your community/city?

No 1=strongly disagree 2=disagree 3=neutral 4= agree 5= strongly agree

- | | | | | | | |
|---|---|---|---|---|---|---|
| 1 | Create income source | 1 | 2 | 3 | 4 | 5 |
| 2 | Contribute to food security | 1 | 2 | 3 | 4 | 5 |
| 3 | Create job opportunities | 1 | 2 | 3 | 4 | 5 |
| 4 | Beneficial for the environment | 1 | 2 | 3 | 4 | 5 |
| 5 | Reduce household expense/save money & time | 1 | 2 | 3 | 4 | 5 |
| 6 | Recreational/ relaxation opportunities for citizens | 1 | 2 | 3 | 4 | 5 |
| 7 | Others, if any benefits specify----- | | | | | |

20. In what sense for you urban vegetable farming can improve livelihoods food enhancement?

No 1=strongly disagree 2=disagree 3=neutral 4= agree 5= strongly agree

- | | | | | | | |
|---|-----------------------------|---|---|---|---|---|
| 1 | Providing fresh food | 1 | 2 | 3 | 4 | 5 |
| 2 | Giving healthy food | 1 | 2 | 3 | 4 | 5 |
| 3 | Low cost food price | 1 | 2 | 3 | 4 | 5 |
| 4 | Easily available | 1 | 2 | 3 | 4 | 5 |
| 5 | Others, if any specify----- | 1 | 2 | 3 | 4 | 5 |

21. How do you observe the condition of your land fertility now?

a) good b) bad

22. Select your agreement on the factors that affects vegetable production in the time of your activity?

No	List of constraints / Challenges	1= not affect 2= less affect 3= affect		
1	limited land access	1	2	3
2	limited access to seed	1	2	3
3	lack of fertilizer	1	2	3
4	limited extension services	1	2	3
5	lack of farm credit	1	2	3
6	watering of crops/limited irrigation access	1	2	3
7	droughts	1	2	3
8	lack of awareness	1	2	3
9	limited access to transportation	1	2	3
10	lack of road between farms	1	2	3
11	lack of market information and linkage	1	2	3
12	unregulated movement of livestock in city	1	2	3
13	shortage of manpower	1	2	3
14	Theft	1	2	3
15	Pests and diseases	1	2	3
16	Fear of eviction (to force to move other place)	1	2	3
17	Other, specify-----			

23. Have you ever encountered flooding on your vegetable and other property?

a) Yes [] b) No []

24. What are the main reasons that you start farming urban vegetable product?

No	1=strongly disagree 2=Disagree 3=Neutral 4= Agree 5= Strongly Agree					
1	For provide fresh vegetables for household consumption	1	2	3	4	5
2	For reducing the household cost of food	1	2	3	4	5
3	Main source of food for the household	1	2	3	4	5
4	As a source of income for the household	1	2	3	4	5
5	For using their area to be beneficial	1	2	3	4	5
6	For relaxation, recreation	1	2	3	4	5
7	Others, if any specify-----					

25. Do your children go to school?

- a) Yes b) No

26. What does it mean to be food insecure for you?

27. How have you witnessed or experienced food insecurity in your community?

28. What are other factors or situations that affect the well-being of your family?

29. What types of things do you do in your family that others in your community don't do to cope with food insecurity?

30. Do you think your vegetable access help you for more intakes/uses for the family?

- a) Yes b) No

31. Your vegetable production utilization helps to increase your family wellbeing?

- a) Yes b) No

32. Your vegetable product availability is very important in your family food security states?

- a) Yes b) No

33. Do you think your vegetable Production helps your food security stability in your household?

- a) Yes b) No

34. Suppose that you had an opportunity to speak with the city urban agriculture officials about food security in your family. What would you say?

35. Do you agree urban agriculture has positive impact on city environment?

- a) Yes b) No

36. If yes for question # 35, what do you think about your vegetable production practices importance on your city environmental protection?

No	Importance of urban vegetable production for environmental protection	1= not important 2= less important 3= undecided 4= important				
1	Minimizing air pollution	1	2	3	4	5
2	Recycling city wastes	1	2	3	4	5

3	Green environment	1	2	3	4	5
4	Protecting soil	1	2	3	4	5
5	Clean city	1	2	3	4	5
6	Growing greener cities	1	2	3	4	5
7	Healthier ecosystems	1	2	3	4	5
8	Other, specify.....	1	2	3	4	5

37. What type of location/area do you own to practise vegetable production?

Type of options	
Roadside	0
Riverside	0
Park	0
Other public land (by cleaning free space/dumped areas)	0
Private residential	0
Industrial	0
Rail-side	0
Other specify.....	0

38. Some people argue that UA could bring undesirable impact on city environment? For e.g. health hazards like urban livestock diseases, toxic polluted vegetables, poultry and dairies odour, noise and various social conflicts so, according to your knowledge do you agree with it?

a) Yes b) No

39. Which methods do you use for planting urban vegetable farm?

a) Seedling b) Transplants c) Both

40. If you said transplants for question # 39, from where do get?

a) Seedling my own b) from the market c) other, specify-----

41. What happens to the unharvested vegetable crop/product?

a) Ploughed back in b) buried as green manure c) remove from the farm

42. Do you practise vegetable/crop rotation?

a) Yes b) No

43. Do pests and diseases are attack your vegetable crops?

a) Yes b) No

44. If yes for question # 43, at what time of year and what kind of diseases?

45. Do you perform a soil analysis to identify soil pH and also to determine the best amount of fertiliser to apply?

- a) Yes b) No

46. If yes for question # 45, how often the testing is conducted?

47. Do you use any animal manure to assist reduction in use of other fertiliser?

48. Please list the sources of water for vegetable production you get?

Type of options	
river water	0
town water	0
underground water	0
harvested rainwater	0
recycled water	0
Other specify.....	0

49. If harvesting rainwater, what sort of catchment is used?

- a) dam b) tank c) other -----

50. Do you use irrigation system for your vegetable farming?

- a) Yes b) No

51. If yes for question # 50, what kind of irrigation system do you use?

- a) overhead sprinklers b) drip c) furrow d) other -----

52. Do you wash your vegetable production before get into market?

- a) Yes b) No

53. Do you want to continue in the near future practices urban vegetable production activity?

- a) Yes b) No

54. Do you want to continue the vegetable production activity at you present site or relocate to other sites?

- a) At present site b) new site where there is more access to land

55. Do you provide your vegetable product for market?

- a) Yes b) No

56. If yes for question # 55, where do you sell your farm products?

- a) At farm gate b) At market site

57. If your answer for question # 56 at market site, do you pack your vegetable product before reach the market?

- a) Yes b) No

58. If you sell at a market, and how long it takes to the nearest market in ----- minutes/hours?

59. If your answer for question # 56 at farm gate, what are the reasons that you cannot take it into the market and sell it?

60. Did you get enough market for your vegetable product?

- a) Yes b) No c) yes/no depend on the condition

61. Do you get reasonable price for your vegetable produce?

- a) Yes b) No c) yes/no depend on the condition

62. Do you have any expense for your vegetable farm activities?

- a) Yes b) No

63. If yes your answer for question # 62, how much do you spent until the vegetable product reach at the market?

Farm implements	Option	Total costs in Birr
Fertilizer	0	
Improved seed	0	
Pesticides	0	
Transport	0	
Machinery	0	
Labor	0	
Land	0	
Other specify.....		

64. Vegetable production and income

No	Vegetable Production	Do you produce	If your answer is yes		how much do you get from sale of vegetables per year	Remark
			How many kilos of vegetable do you produce	How much you produce per meter square by kilo		
1.	Chard/ቆስጣ	Yes ☐				
		No ☐				
2.	Lettuce/ሰላጣ	Yes ☐				
		No ☐				
3.	Kale (local ones)/ጎመን	Yes ☐				
		No ☐				
4.	Cabbage/ጥቅል ጎመን	Yes ☐				
		No ☐				
5.	Beetroot/ቀይ ስር	Yes ☐				

No	Vegetable Production	Do you produce	If your answer is yes		how much do you get from sale of vegetables per year	Remark
			How many kilos of vegetable do you produce	How much you produce per meter square by kilo		
		No ☐				
6.	Potato/ደንች	Yes ☐				
		No ☐				
7.	Onion/ሸንኩርት	Yes ☐				
		No ☐				
8.	Tomato/ቴማቲም	Yes ☐				
		No ☐				
9.	Carrot/ካሮት	Yes ☐				
		No ☐				
10.	Pepper/ቃሬያ	Yes ☐				
		No ☐				
11.	Broccoli/ብሮኮሊ	Yes ☐				
		No ☐				
12.	Pumpkin/ዱባ	Yes ☐				
		No ☐				
13.	Zucchini/ዙከኒ	Yes ☐				
		No ☐				
14.	Cucumber/ኪያር	Yes ☐				
		No ☐				
15.	Total					

65. Household Dietary Diversity Score (HDDS)

Food groups consumed by a household over the **previous 24 hours**

Household Dietary Diversity Score (HDDS)			
No	Food Groups	Food Items	Yes-1/weight
1	Cereals	Bread, noodles, biscuits, cookies, any other food made from millet, sorghum, Maize, rice, any local foods.....etc.	1
2	Roots and tubers	Potatoes, cassava, beet, carrot, sweet potatoes, yams, food made from roots etc.	1
3	Vegetables	Leafy Vegetables, Tomato, Pepper, Onions, Pumpkin, Zucchini, Broccoli, Cucumber etc.	1
4	Fruits	Oranges etc.	1

5	Meat, poultry, offal	Beef, goat, chicken, duck, liver, kidney etc.	2
6	Eggs		1
7	Fish and seafood		1
8	Pulses, legumes, nuts	Beans, peas, nuts, seeds etc.	3
9	Milk and milk products		4
10	Oil/fats	Oil, fats and butter added into food or used for cooking	0.5
11	Sugar/honey/sweets	Sweetened soda, sugar food (chocolates, candies) etc.	0.5
12	Miscellaneous	Spices, salt, tea, coffee, alcoholic drink or local drinks	0

HDDS (1-12)

Total number of food groups consumed by members of the household. Values for 1-12 will be either “0” or “1”, Sum (1+2+3+4+5+6+7+8+9+10+11+12)

The average HDDS indicator = sum (HDDS)/Total number of households

66. Household Food Insecurity Access Scale (HFIAS) Measurement

No	Question	Response Options	CODE
1	In the past four weeks, did you worry that your household would not have enough food?	0 = No (skip to Q2) 1=Yes	 __
1a	How often did this happen?	1 = Rarely (once or twice in the past four weeks) 2 = Sometimes (three to ten times in the past four weeks) 3 = Often (more than ten times in the past	 __
2	In the past four weeks, were you or any household member not able to eat the kinds of foods you preferred because of a lack of resources?	0 = No (skip to Q3) 1=Yes	 __
2a	How often did this happen?	1 = Rarely (once or twice in the past four weeks) 2 = Sometimes (three to ten times in the past four weeks) 3 = Often (more than ten times in the past	 __
3	In the past four weeks, did you or any household member have to eat a limited variety of foods due to a lack of resources?	0 = No (skip to Q4) 1 = Yes	 __
3a	How often did this happen?	1 = Rarely (once or twice in the past four weeks) 2 = Sometimes (three to ten times in the past four weeks) 3 = Often (more than ten times in the past four weeks)	 __

No	Question	Response Options	CODE
4	In the past four weeks, did you or any household member have to eat some foods that you really did not want to eat because of a lack of resources to obtain other types of food?	0 = No (skip to Q5) 1 = Yes	 _
4a	How often did this happen?	1 = Rarely (once or twice in the past four weeks) 2 = Sometimes (three to ten times in the past four weeks) 3 = Often (more than ten times in the past four weeks)	 _
5	In the past four weeks, did you or any household member have to eat a smaller meal than you felt you needed because there was not enough food?	0 = No (skip to Q6) 1 = Yes	 _
5a	How often did this happen?	1 = Rarely (once or twice in the past four weeks) 2 = Sometimes (three to ten times in the past four weeks) 3 = Often (more than ten times in the past four weeks)	 _
6	In the past four weeks, did you or any other household member have to eat fewer meals in a day because there was not enough food?	0 = No (skip to Q7) 1 = Yes	 _
6a	How often did this happen?	1 = Rarely (once or twice in the past four weeks) 2 = Sometimes (three to ten times in the past four weeks) 3 = Often (more than ten times in the past four weeks)	 _
7	In the past four weeks, was there ever no food to eat of any kind in your household because of lack of resources to get food?	0 = No (skip to Q8) 1 = Yes	 _
7a	How often did this happen?	1 = Rarely (once or twice in the past four weeks) 2 = Sometimes (three to ten times in the past four weeks) 3 = Often (more than ten times in the past four weeks)	 _
8	In the past four weeks, did you or any household member go to sleep at night hungry because there was not enough food?	0 = No (skip to Q9) 1 = Yes	 _

N_o	Question	Response Options	CODE
8a	How often did this happen?	1 = Rarely (once or twice in the past four weeks) 2 = Sometimes (three to ten times in the past four weeks)	 _
9	In the past four weeks, did you or any household member go a whole day and night without eating anything because there was not enough food?	0 = No (questionnaire is finished) 1 = Yes	 _
9a	How often did this happen?	1 = Rarely (once or twice in the past four weeks) 2 = Sometimes (three to ten times in the past four weeks) 3 = Often (more than ten times in the past	 _

Appendix: II Interview guide for key vegetable producers

1. የከተማ ግብርና በተለይ የጓሮ አትግልት በማምረት ሂደት ውስጥ የሚያጋጥሙ ችግሮችን/ተግዳሮቶችን ይግለፁ?
 - የመሬት እጥረት/የዘር እጥረት/የማዳበሪያ እጥረት/የክትትልና ድጋፍ ማነስ/የብድር ማጣት/የወሃ እጥረት/የግንዛቤ እጥረት/የገበያ ትስስር/መደበኛ ያልሆነ የእንሰሳት እንቅስቃሴ/የሰው ሃይል እጥረት/ሌብነት/ተባይና በሽታ/ካለሁበት ቦታ የመፈናቀል ፍራቻና ሌሎችም.....
2. የከተማ ግብርና በተለይ የጓሮ አትግልት በማምረት ሂደት ውስጥ ያሉ መልካም አጋጣሚዎችን እንዴት ይገልጻሉ?
 - የመሬት አቅርቦት/የዘር አቅርቦት/የማዳበሪያ አቅርቦት/የክትትልና ድጋፍ መኖር/የብድር አቅርቦት/ወሃ መኖር/ግንዛቤ መኖር/የገበያ ትስስር መኖር/የሰው ሃይል መኖር/መድሃኒት አቅርቦት መኖር ሌሎችም...
3. የከተማ ግብርና በተለይ የጓሮ አትክልት ማምረት ለቤተሰብ ምግብ በአቅራቢያዎ እንዲገኝ (availability) አድርጓል?
4. የከተማ ግብርና በተለይ የጓሮ አትክልት ማምረት ለቤተሰብ የምግብ ተደራሽነትን (access)ጨምሯል?
5. የከተማ ግብርና በተለይ የጓሮ አትክልት ማምረት የቤተሰቡን የምግብ አጠቃቀምን (utilization)ጨምሯል?
6. የከተማ ግብርና በተለይ የጓሮ አትክልት ማምረት የቤተሰቡን የምግብ ዋስትና ለማረጋገጥ(stability) ጥቅም አለው?
7. የከተማ ግብርና በተለይ የጓሮ አትክልት በማምረት ሂደት ውስጥ ለእርሶ፣ለቤተሰብ ወይም ለአካባቢዎ ማህበረሰብ የሰራ እድል ፈጥረዋል?
8. የከተማ ግብርና በተለይ የጓሮ አትክልት በማምረት ሂደት ውስጥ ለእርሶም ሆነ ለቤተሰብ ተጨማሪ የገቢ ምንጭ አግኝተዋል?

Appendix: III Focus Group Discussions (FGD)

Welcoming

- ☐ Reason for coming
- ☐ Declaration of group consent
- ☐ Open expression of opinions
- ☐ Tape recorder

1. How do you see the availability of vegetable production in your locality?

በእርሶ እይታ በአካባቢዎ በመመረት ላይ የሚገኘውን የአትክልት ምርት እንዴት ይገልፁታል?

2. What was the pushing factor to start urban agriculture especially vegetable production in your community?

የከተማ ግብርናን በተለይ የአትክልት ማምረት ስራን ለመጀመር ያነሳሱት ዋና ምክንያት ምንድነው ይግለፁት?

3. What do you think about the usage of existing vegetable production?

በማምረት ላይ የሚገኙትን የአትክልት ማምረት ስራን ጥቅም እንዴት ይገልፁታል?

4. How do you see the attitude of the local community regarding urban agriculture practices?

በአትክልት ማምረት/በከተማ ግብርና ዙሪያ የሰዎች አመለካከት/አስተሳሰብ ምን ይመስላል?

5. What are the most important practices of urban farming in the area and why?

በአካባቢው በስፋት የሚመረተው የከተማ ግብርና ምንድነው? ለምን?

6. የከተማ ግብርና በተለይ የጓሮ አትግልት በማምረት ሂደት ውስጥ **ጠንካራ ጎን፣ በክፍተት ሚታይ፣ መልካም እድሎች እና ስጋቶችን** ይግለፁ?

- **ጠንካራ ጎን (Strengths)**

- የአካባቢ ጥበቃ፣ የመሬት አቅርቦት፣ የዘር አቅርቦት፣ የማዳበሪያ አቅርቦት፣ የተቋማት የክትትልና ድጋፍ ፣ የብድር አቅርቦት፣ ወሃ መኖር፣ ግንዛቤ መኖር፣ የገበያ ትስስር ፣ ማህበራዊ ትስስር፣ የእወቀት ሽግግር፣ የራስን ጉልበት ለስራው መጠቀም፣ ተነሳሽነት፣ የሰው ሃይል መኖር፣ ገበያ መኖር፣ የመድሃኒት አቅርቦት መኖርና ሌሎችም ካሉ ይግለፁ.....

- **በክፍተት ሚታይ(ችግሮችን/ተግዳሮቶችን) (Weakness)**

- ፖሊሲ፣ የአፈር ጥበቃ፣ የመሬት እጥረት፣ የግብአት እጥረት (የዘር፣ የማዳበሪያ ወዘተ)፣ ስልጠና፣ ኢኮኖሚ፣ የክትትልና ድጋፍ ፣ የብድር ማጣት፣ የወሃ እጥረት፣ የግንዛቤ እጥረት፣ የገበያ ትስስር፣ መደበኛ ያልሆነ የእንስሳት እንቅስቃሴ፣ ሌብነት/ተባይና በሽታና ሌሎችም ካሉ ይግለፁ.....

- **መልካም አጋጣሚዎች (Opportunities)**

- አካባቢ ጥበቃ፣ ድህነት ቅነሳ፣ የምግብ ዋስትና፣ አላስፈላጊ ቆሻሻን ማስወገድ፣ የወጣቶች ተሳትፎ፣ ኢኮኖሚ፣ የብድር አቅርቦት፣ ግንዛቤ መኖር፣ የገበያ ትስስር መኖር፣ የሰው ሃይል መኖር፣ ማህበራዊ ትስስር፣ ሌሎችም ካሉ ይግለፁ.....

- **ስጋቶች (Threats)**

- አካባቢ ጥበቃ፣ የመሬት ሽያጭ፣ ጎርፍ፣ ኢኮኖሚ፣ የከተማ ማስተር ፕላን፣ የመሬት ባለቤትነት (ካለሁበት የመፈናቀል ፍራቻ)፣ የመሬት አቅርቦት ሌሎችም.....

7. Knowledge/skill gaps of extension works, if any in your community?
በእውቀት ዙሪያ ያለውን ክፍተት በተለይ ከትኩልና ድጋፍ አድራጊዎች ካሉ ይግለፁ?
8. Market chains of vegetable production and its challenges and solutions?
በአትክልት ማምረት ሂደት ውስጥ ያለውን የገበያ ሰንሰለት ችግሩና መፍትሄው?
9. How do you evaluate the usage of urban agriculture/ vegetable production in your community in terms of city sustainability/Addis Ababa/?
በአካባቢዎ በመካሄድ ላይ ያለውን አትክልት ማምረት ስራ ለከተማዉ ለአካባቢ ጥበቃ ወይም ዘላቂነት ያለውን መልካም የአካባቢ ምህዳር ለመፍጠር ያለውን ጠቀሜታ ያስረዱ?
10. Urban agriculture/vegetable production health impact encountered if any?
በአካባቢዉ በስፋት የሚመረተዉ የከተማ ግብርና በተለይ አትክልት በማምረት ሂደት ውስጥ ለጤና ጠንቅ የሚሆኑ ጉዳዮች ካሉ ይግለፁ?
11. Urban agriculture/vegetable production can improve the wellbeing of your family especially in food security?
በአካባቢዎ በመካሄድ ላይ ያለውን አትክልት ማምረት ስራ የቤተሰብን የምግብ ዋስትና በማረጋገጥ ሂደት ውስጥ ያለውን ሚና ያስረዱ ?

ተያያዥ/ተጨማሪ ጉዳዮች

ለመስክ ስራ/መረጃ አሰባሰብ የሚያገለግሉ መጠይቆች እና የማረጋገጫ ዝርዝር ሰነዶች

አዲስ አበባ ዩኒቨርሲቲ

የሃገር ልማት ጥናት ኮሌጅ የምግብ ዋስትና ጥናት ማዕከል

የመጠይቅ መለያ ቁጥር _____

እኔ በአዲስ አበባ ዩኒቨርሲቲ የልማት ጥናት ኮሌጅ በምግብ ዋስትና ጥናት ፕሮግራም የዶክትሬት እጩ ተማሪ ነኝ። በአሁኑ ወቅት “የከተማ ግብርና፣ የምግብ ዋስትና እና የአትክልት ማምረት በአዲስ አበባ ከተማ በተመረጡ አካባቢዎች የምርት ሂደትና እንቅስቃሴ” በሚል ርዕስ ጥናት እያካሄድኩ ነው። ጥናቱ አላማ ያደረገው የከተማ ግብርና በአዲስ አበባ ከተማ በምግብ ዋስትና በገቢ ና ስራ ፈጠራ ላይ ያለውን ሚና ለማየት ነው።

ስለሆነም በዚህ አካባቢ በሞያዉ እውቀት ያላቸውን ግለሰቦች ቀርቤ ቃለ መጠይቅ እያደረግኩ ነው። በመሆኑም በጥናቱ ላይ ለመሳተፍ ከተመረጡት ምላሽ ሰጪዎችም እርሶ አንዱ ነዎት። በመሆኑም የሚሰጡት ሙሉ መረጃ ለምርምር አገልግሎት ብቻ የሚውልና በሚሰጥር የሚጠበቅ መሆኑን ቃል እገባለሁ። ስለዚህ የጠያቂውን ዓላማ ግምት ውስጥ በማስገባት አስፈላጊውን መረጃ በመስጠት እንዲተባበሩ በትህትና እጠይቃለሁ። ለሚያደርጉት ትብብር አስቀድሜ ላመሰግኖት እወዳለሁ።

ማስታወሻ

በዚህ መጠይቅ የከተማ ግብርና ማለት የከተማ አትክልት ማምረት ስራን ብቻ ያመለክታል።

መግለጫ

መጠይቁን የሞላዉ ባለሞያ ስም: _____ ፊርማ: _____

ክ/ከተማ : _____ ወረዳ: _____ መንደር: _____

መጠይቁ የተሞላበት ቀን: _____

የተቆጣጣሪዉ ስም: _____ ፊርማ _____

አባሪ I: ለከተማ ግብርና አትክልት አምራች ገበሬዎች የተዘጋጀ መጠይቅ

ትእዛዝ: ለሚከተሉት ጥያቄዎች ተገቢውን ምልስ እንደ አስፈላጊነቱ ስጡ፡፡

1. የሚኖሩበት ክፍለ ከተማ ----- ወረዳ -----
2. ከመቼ ጀምሮ የከተማ ግብርና ስራን መስራት ጀመሩ፣ አመት ምህረቱን ይጥቀሱ-----
3. ግላዊ መጠይቆች፤

ተ.ቁ	ጥያቄዎች	አማራጮች	
1	ዶታ	ወንድ	0
		ሴት	0
2	እድሜ	18- 30	0
		31- 40	0
		41- 50	0
		50 በላይ	0
3	አሁን ያሉበት የትምህርት ደረጃ	ማንበብና መጻፍ አልችልም	0
		የመሰረተ ትምህርት	0
		የመጀመሪያ ደረጃ	0
		ሁለተኛ ደረጃ	0
		ዲፕሎማ	0
		የመጀመሪያ ዲግሪ	0
		ሁለተኛ ዲግሪና በላይ	0
4	የጋብቻ ሁኔታ	ባለትዳር	0
		ያላገባ	0
		የፈታ	0
5	የስራ ሁኔታ	የመንግስት ሰራተኛ	0
		የግል ስራ/ድርጅት	0
		በግብራና ስራ የተሰማራ	0
		የቤት አመቤት	0
		ተማሪ	0
		ጡረተኛ	0
		ሌላ ይግለፁ -----	0
6	የት ይኖራሉ	በግል ቤት	0
		በግል ኪራይ ቤት	0
		በቀበሌ ቤት	0
		ሌላ ይግለፁ -----	0

4. አጠቃላይ የቤተሰብ ብዛት -----
5. የትውልድ ቦታ?
 a) አዲስ አበባ b) ከአዲስ አበባ ዉጪ
6. በመጠይቅ ተራ ቁጥር 5 ላይ ከአዲስ አበባ ዉጪ ብለዉ ከመለሱ፣አዲስ አበባ ዉስጥ ስንት አመት ኖሩ? -----
7. በአትክልት ልማት የተያዘ/የለማ የመሬት ይዞታ ስፋት----- በካሬ ሜትር
8. ከሚከተሉት የከተማ ግብርና ስራዎች ዉስጥ እርሶ በይበልጥ የሚያመርቱት/የሚሳተፉበት ስራ ዘርፍ?

መዘርዘር	
አትክልት ማምረት	0
የወት ምርት	0
የዶሮ ምርት	0
ከብት ማደለብ	0
ንብ ማኑብ	0
የእንስሳት እራባታ	0
ሌላ ይግለፁ -----	0

9. በመጠይቅ ተራ ቁጥር 8 ላይ በአትክልት ማምረት ብለዉ ከመለሱ፣ለምን የአትክልት ማምረት ስራን በተለየ መረጡ?
 a) ቀላል ስለሆነ b) በአመት ዉስጥ በድግግሞሽ ማምረት ስለሚቻል c) ሌላ ይግለፁ -----

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10. በመጠይቅ ተራ ቁጥር 8 ላይ የአትክልት ማምረት ብለዉ ከመለሱ፣የትኛዉን የአትክልት አይነት በይበልጥ ያመርታሉ?

አማራጮች			
ቆስጣ፣ሰላጣ፣ጎመን	0	ካሮት	0
ጥቅል ጎመን	0	ቃሪያ	0
ድንች	0	አበባ ጎመን	0
ሽንኩርት	0	ዱባ	0
ቲማቲም	0	ቀይ ስር	0
ሌላ ይግለፁ -----	0		

11. በአመት ስንት ጊዜ አትክልት ያመርታሉ?
 a) 1 ጊዜ [] b) 2 ጊዜ [] c) 3 ጊዜ [] d) 3 ጊዜና በላይ []

12. አትክልትን ለማምረት ያነሳሱት ምክንያት ምንድነዉ?

No	1=በጣም አልስማማም 2=አልስማማም 3=መካከለኛ 4= እስማማለሁ 5= በጣም እስማማለሁ					
1	ለቤት ፍጆታ ለመጠቀም	1	2	3	4	5
2	ለቤተሰብ ገቢ ማግኛ	1	2	3	4	5
3	ለቤት ፍጆታና ለቤተሰብ ገቢ ማግኛ	1	2	3	4	5
4	ለስራ ፈጠራ	1	2	3	4	5
5	ሌላ ስራ አለኝ ለመዝናኛ ያህል ነዉ	1	2	3	4	5
6	ሌላ ይግለፁ -----					

13. በአትክልት ምርት ገቢ የሚያገኙ ከሆነ፤ በአመት ስንት ብር ያገኛሉ-----?
14. በአትክልት የማምረት ስራ ሂደት ውስጥ እርስ በርስ ስለ ስራ ሃሳብ የመለዋወጥ ነገር አለ?

a) አለ [] b) የለም []

15. የድጋፍና ክትትል አገልግሎት ከልማት አጋር ድርጅቶች ያገኛሉ?

a) አገኛለሁ [] b) አላገኝም []

16. በመጠይቅ ተራ ቁጥር 15 ላይ አገኛለሁ ከሆነ መልሶ፣ማን ነዉ ድጋፍ ሚስጦት እንዲሁም ምን ዓይነት ድጋፍ?

ድጋፍ ሰጪ አካላት	የእዉቀት	የብድር	የገበያ	የምክር
ከመንግስት	0	0	0	0
መንግስታዊ ካልሆኑ ድርጅቶች	0	0	0	0
ከግለሰቦች	0	0	0	0
ሌላ ይግለፁ -----				

17. በአትክልት ማምረት ስራ ሂደት ውስጥ ለሌሎች የስራ እድል ፈጥረዋል?

a) አዎ [] b) አልፈጠርኩም []

18. በመጠይቅ ተራ ቁጥር 17 ላይ አዎ ከሆነ መልሶ፣ምን ያህል የሰዉ ሃይል ያሰማራሉ?

ቋሚ ሰራተኛ ----- ኮንትራት ሰራተኛ -----

19. የከተማ ግብርና ዋና ጠቀሚታዉ ምን ይመስሎታል ለሚኖሩበት አካባቢ ወይንም ከተማ?

No	1=በጣም አልስማማም 2=አልስማማም 3=መካከለኛ 4= እስማማለሁ 5= በጣም እስማማለሁ					
1	የገቢ ምንጭ ይፈጥራል	1	2	3	4	5
2	የምግብ ዋስትናኝ ለማረጋገጥ	1	2	3	4	5
3	የስራ እድል ይፈጥራል	1	2	3	4	5
4	ለአካባቢ ምህዳር ጠቀሜታን ይሰጣል	1	2	3	4	5
5	የቤት ወጪን በመቀነስ ገንዘብና ጊዜን ይቆጥባል	1	2	3	4	5
6	የመዝናናት እድልን ይፈጥራል	1	2	3	4	5
7	ሌላ ይግለፁ -----					

20. ለርሶ በምን መልኩ አትክልት የማምረት ስራ የቤተሰብን የምግብ ዋስትና ያሻሽላል?

No	1=በጣም አልስማማም 2=አልስማማም 3=መካከለኛ 4= እስማማለሁ 5= በጣም እስማማለሁ					
1	ትኩስ ምርትን/ምግብን/ በማቅረብ	1	2	3	4	5
2	ለጤና ተስማሚ የሆነ ምግብን በማቅረብ	1	2	3	4	5
3	በተመጣጣኝ ዋጋ በመገኘቱ	1	2	3	4	5
4	በቅርበት በመገኘቱ	1	2	3	4	5
5	ሌላ ይግለፁ -----	1	2	3	4	5

21. የመሬቶን የአፈር ለምነት በአሁን ሰዓት በምን ይገልፁታል?

b) በጥሩ ሁኔታ b) መጥፎ መልኩ

22. አትክልት በማምረት ሂደት ውስጥ ለማምረት እንቅፋ የሚሆኑትን ችግሮች/ማነቆዎች እንዴት ይገልፁታል?

ተ.ቁ	ችግር ይሆናሉ ተብለው የተለዩ	1= ችግር አይደለም 2= በመጠኑ ችግር ነው 3= ችግር ነው			
1	የመሬት እጥረት	1	2	3	
2	የዘር እጥረት	1	2	3	
3	የማዳበሪያ እጥረት	1	2	3	
4	የክትትልና ድጋፍ ማነስ	1	2	3	
5	የብድር ማጣት	1	2	3	
6	አትክልቶችን ለማጠጣት የመስኖና መሰል የዉሃ እጥረት	1	2	3	
7	የድርቅ መከሰት	1	2	3	
8	ያለኝ እዉቀት ክፍተት	1	2	3	
10	የትራንስፖርት እጥረት	1	2	3	
11	በእርሻዎች መካከል የመንገድ አለመኖር	1	2	3	
12	ወቅታዊ የገበያ ሁኔታን አለማወቅና የገበያ ትስስር አለመፈጠር	1	2	3	
13	መደበኛ ያልሆነ የእንሰሳት እንቅስቃሴ በከተማዉ ውስጥ	1	2	3	
14	የሰው ሃይል እጥረት	1	2	3	
15	የደረሰ ምርትን የሚሰርቁ ሰዎች /ሌብነት/	1	2	3	
16	ተባይና በሽታ	1	2	3	
17	ካለሁበት ቦታ የመፈናቀል ፍራቻ	1	2	3	
18	ሌላ ይግለፁ -----				

23. በአትክልት ማሳዎ ላይ ጎርፍ አጋጥሞት ያዉቃል ?

a) አዎ [] b) አይደለም []

24. ለርሶ ዋናዉ የአትክልት ልማት ስራን ለመጀመር ያነሳሳዎት ምክንያት ምንድነዉ?

No	1=በጣም አልስማማም 2=አልስማማም 3=መካከለኛ 4= እስማማለሁ 5= በጣም እስማማለሁ					
1	ለቤት ፍጆታ የሚሆን ትኩስ አትክልት ለማግኘት	1	2	3	4	5
2	ለምግብ የሚወጣ የቤት ወጪን ለመቀነስ	1	2	3	4	5
3	ለቤተሰቤ ዋና የምግብ ምንጭ ለማድረግ	1	2	3	4	5
4	ለቤተሰቤ የገቢ ምንጭ እንዲሆን	1	2	3	4	5
5	ያለኝን ቦታ ለመጠቀም	1	2	3	4	5
6	ለምዝናኛነት እንዲሆነኝ	1	2	3	4	5
7	ሌላ ይግለፁ -----					

25. ልጆቻዎ ትምህርት ቤት ይሄዳሉ?

- a) አዎ [] b) አይደለም []

26. በምግብ እራስን አለመቻል ማለት ለርሶ ምን ማለት ነው?

27. በግሎ ወይም በአካባቢዎ የምግብ እጥረት ተከስቶ ያዉቃል?

28. በምግብ ዙሪያ የቤተሰብን ምችት የሚነሱ ጉዳዮችን ይግለጹ?

29. የቤተሰብን የምግብ ዋስትና ለማረጋገጥ ሌሎች በአካባቢዎ የማያደርጉትን እርሶ የሚያደርጉት ነገር ካለ ይግለጹ?

30. አትክልት በማምረት ስራ ላይ በመስማራቶ ቤተሰብ በቂ አትክልት ለመመገብ እድል አግኝተዋል ብለው ያምናሉ?

- a) አዎ [] b) አይደለም []

31. አትክልት በማምረት ስራ ላይ በመስማራቶ የቤተሰብ የኑሮ ሁኔታ ተሻሽሏል ብለው ያስባሉ?

- a) አዎ [] b) አይደለም []

32. አትክልት በማምረቱ ለቤተሰብ የምግብ ዋስትና በጣም ጠቃሚ ነው ብለው ያምናሉ?

- a) አዎ [] b) አይደለም []

33. የእርሶ አትክልት ማምረት ስራ ቀጣይ በሆነ መልኩ የቤተሰብን የምግብ ዋስትና አረጋግጧል ብለው ያምናሉ?

- a) አዎ [] b) አይደለም []

34. እንደዉ ባጋጣሚ እርሶ የአዲስ አበባ የከተማ ግብርና ሃላፊ ቢያገኙት/ኗት እና ስለ ቤተሰብ የምግብ ዋስትና ጠይቁ ቢባሉ ምን ብለው መጠየቅ ይፈልጋሉ?

35. በእርሶ አስተያየት የከተማ ግብርና ስራ ለከተማዉ የአየር ንብረት ለዉጥ ጠቃሚ ነው ይላሉ?

- a) አዎ [] b) አይደለም []

36. በጥያቄ ተራ ቁጥር 35 ላይ አዎ ከሆነ መልሱ፣ የእርሶ የአትክልት ማምረት ስራ ለአየር ንብረት ለዉጥ በምን መልኩ ለከተማዎ/አካባቢዎ ጠቃሚ መሆኑን ይግለጹ?

ተ.ቁ	የአትክልት ማምረት ስራ ለአየር ንብረት ለዉጥ ያለዉ ፋይዳ	1= ጠቃሚ አይደለም 2= በመጠኑ ይጠቅማል 3= አልወሰንኩም 4= ይጠቅማል				
1	የአየር ብክለትን በመቀነስ	1	2	3	4	5
2	የከተማዉን ቆሻሻ ዳግም ጥቅም ላይ በማዋል	1	2	3	4	5
3	አርንጓዳዊ አካባቢን በመፍጠር	1	2	3	4	5
4	የአፈር ደህንነትን በመጠበቅ	1	2	3	4	5
5	ንፁህ ከተማን በመፍጠር	1	2	3	4	5
6	አርንጓዳዊ ከተማዎችን ለማብዛት	1	2	3	4	5
7	ጤናማ አካባቢን ለመፍጠር	1	2	3	4	5
8	ሌላ ይግለጹ -----	1	2	3	4	5

37. የአትክልት ምርት ለማምረት የሚጠቀሙበት የመሬት ቦታ ወይም አካባቢ ምንድነው?

አማራጮች	
መንገድ ዳር	0
ወንዝ ዳር	0
ፓርክ	0
የህዝብ ቦታዎችን በተለይ ቆሻሻ የሚጣልባቸውን ቦታዎች በማጽዳት	0
በግል መኖሪያ	0
እንዲሁም መንደሮች	0
ባቡር መሄጃ አካባቢ	0
ሌላ ይግለፁ -----	0

38. አንዳንድ ሰዎች የከተማ ግብርናን ለአካባቢ ደህንነት መጥፎ ነው ብለው ይከራከራሉ፤ ለምሳሌ ከሚያነሱት መካከል የእንሰሳት በሽታን፣ የተበከሉ ወይም መርዛማ የሆኑ አትክልቶች፣ የዶሮና እንሰሳት ሽታ እና ጨከኝ የመሳሰሉት ነገሮች በከተማው ይሰፋፋል ብለው ይጠቅሳሉ እርስዎ በዚህ ጉዳይ ይስማማሉ?

- a) አዎ [] b) አልስማማም []

39. ከሚከተሉት ለዘር ግብአትነት ይትኛውን ዘዴ ይጠቀማሉ?

- a) ዘርን በመበተን b) የፈላ ዘርን c) ሁለቱንም

40. ለጥያቄ ተራ ቁጥር 39 መልሶ የፈላ ዘርን የሚጠቀሙ ከሆነ የፈላ ዘር ከይት ያመጣሉ?

- a) የራሴን አራባለሁ/አዘጋጃለሁ b) ከገበያ አገዛለሁ c) ሌላ ይግለፁ -----

41. ማሳዎ ላይ የሚቀረው የማሳዎ ተረፈ ምርትን ምን ያደርጉታል?

- a) ባለበት መልሽ አርሰዋለሁ b) ማሳዎ ላይ ለማዳበሪያነት አቃጥለዋለሁ c) ከማሳዎ አስወግደዋለሁ

42. በማሳዎ አትክልትን በማፈራረቅ የማምረት ዘዴን ይጠቀማሉ?

- a) አዎ [] b) አልጠቀምም []

43. ተባይና በሽታ ማሳዎን /አትክልቶን/ ያጠቁታል?

- a) አዎ [] b) አይደለም []

44. ለጥያቄ ተራ ቁጥር 43 መልሶ አዎ ከሆነ, በምን ወቅትና ምን አይነት በሽታ ማሳዎን ያጠቃዋል?

45. የማሳዎን የአፈር አይነት (ጨዋማነት) ለመለየት እንዲሁም ምን አይነትና መጠን ማዳበሪያ እንዲጠቀሙ የሚረዳዎትን የአፈር ምርመራ ተደርጎሎት ያወቃል?

- a) አዎ [] b) አይደለም []

46. ለጥያቄ ተራ ቁጥር 45 መልሶ አዎ ከሆነ, በየሰዓት ጊዜው ምርመራው ይደረግሎታል?

47. የከብቶችን ፍግ ለማዳበሪያነት ይጠቀማሉ የማዳበሪያ ወጪዎን ከመቀነስ አንፃር?

48. ለስራዎ/ለምርቶ የሚሆን የዉሃ ምንጮን ይምረጡ?

አማራጮች	
የወንዝ ወሃ	0
የቧንቧ ወሃ	0
ከጥልቅ ጉርጓድ ወሃ	0
የተጠራቀመ የዝናብ ወሃ	0
መልሶ የመጠቀም ወሃ /recycled water/	0
ሌላ ይግለፁ -----	0

49. በተራ ቁጥር 48 ላይ መልሶ የተጠራቀመ የዝናብ ወሃ ካሉ፣በከረምት ወቅት ወሃ የማቆር ዘዴዎ በምንድ ነዉ?

- a) ግድብ/ጉርጓድ b) ታንከር c) ሌላ ይግለፁ -----

50. መስኖን ለአትክልት ልማቶ ይጠቀማሉ?

- a) አዎ [] b) አይደለም []

51. በተራ ቁጥር 50 ላይ አዎ ከሆነ መልሶ , ምን አይነት መንገር/ዘዴ ይጠቀማሉ?

- a)በማሳ ላይ በመርጭጨት ዘዴ b) ጠብታ ዘዴ c) በቦይ በመልቀቅ d) ሌላ ይግለፁ -----

52. ምርቶን ወደ ገበያ ከማቅረብ በፊት እንዲታጠብ ያደርጉታል?

- a) አዎ [] b) አይደለም []

53. ወደፊት በከተማ ግብርና በተለይ በአትክልት ማምረት ስራ መቀጠል ይፈልጋሉ?

- a) አዎ [] b) አልፈልግም []

54. የአትክልት ማምረት ስራዎን ወደ ተሻለ ቦታ መዘዋወር ወይም መቀየር ቢችሉ ይህንን ቦታ ለቀዉ ለመሄድ ፍቃደኛ ኖት?

- a) አይ ባለሁበት መቀጠል እፈልጋለሁ b) ምርታማ ወደ ሆነ ወደ ተሻለ ቦታ መዘዋወር እፈልጋለሁ

55. የአትክልት ምርቶን ለገበያ ያቀርባሉ?

- a) አዎ [] b) አይደለም []

56. በተራ ቁጥር 55 ላይ አዎ ከሆነ መልሶ, የት ነዉ ምርቶን የሚሼጡት?

- a) ማሳዉ ላይ እንዳለ b) ገበያ በመዉሰድ

57. በተራ ቁጥር 56 ላይ ገበያ በመዉሰድ ከሆነ መልሶ፣ምርቶን ያሸጉታል ወደ ገበያ ከመዉሰድ በፊት?

- a) አዎ [] b) አይደለም []

58. የሚሼጡት ወደ ገበያ በመዉሰድ ከሆነ ወደ አቅራቢያዎ የገበያ ማእከል ለመድረስ ምን ያህል ደቂቃ/ሰአት ይወስድቦታል---

59. በተራ ቁጥር 56 ላይ ማሳዉ ላይ እንዳለ ከሆነ መልሶ ፣ወደ ገበያ ወስወደዉ የማይሼጡበት ምክንያት ምንድ ነዉ?

60. ለምርቶ በቂ ገበያ ያገኛሉ?

- a) አዎ [] b) አይደለም [] c) አዎ/አላገኝም ገበያዉ ቋሚ አይደለም

61. ለምርቶ ጥሩ ዋጋ ያገኛሉ?

- a) አዎ [] b) አይደለም [] c) አዎ/አላገኝም ገበያዉ ቋሚ አይደለም

62. የአትክልት ምርቶን ሲያመርቱ ወጪ አሎት?

- a) አዎ [] b) አይደለም []

63. አዎ ከሆነ መልሱ ለተራ ቁጥር 62፣ ምን ያህል ወጪ ያወጣሉ ምርቶች ገበያ እስኪደርስ ድረስ?

የግብርና ግብአቶች	ምርጫዎች	ጠቅላላ ወጪ በብር
ማዳበሪያ	0	
ምርጥ ዘር	0	
መድኃኒት	0	
ትራንስፖርት	0	
ማምረቻ መሳሪያዎች	0	
የሰው ሃይል	0	
መሬት	0	
ሌላ ይግለፁ -----		

64. የአትክልት ምርትና አጠቃላይ ገቢ.

ተ.ቁ	የአትክልት አይነቶች	አትክልት ያመርታሉ?	የሚያመርቱ ከሆነ		በአመት ከአትክልት ሽያጭ ምን ያህል ገቢ ያገኛሉ (በብር)?	አስተያየት
			በአጠቃላይ በኪ.ግራም ምን ያህል ምርት ያመርታሉ?	በአንድ ካራ ሜትር ውስጥ ምን ያህል ምርት ያገኛሉ (በኪሎ ግራም)?		
	ቆስጣ/Chard	አዎ ☐ አይደለም ☐				
	ሰላጣ /Lettuce	አዎ ☐ አይደለም ☐				
	ጎመን ያገር ወስጥ/Kale	አዎ ☐ አይደለም ☐				
	ጥቅል ጎመን/ Cabbage	አዎ ☐ አይደለም ☐				
	ቀይ ስር/Beetroot	አዎ ☐ አይደለም ☐				
	ድንች/Potato	አዎ ☐ አይደለም ☐				
	ሽንኩርት/Onion	አዎ ☐ አይደለም ☐				
	ቲማቲም/Tomato	አዎ ☐ አይደለም ☐				
	ካሮት/Carrot	አዎ ☐ አይደለም ☐				
	ቃሪያ/Pepper	አዎ ☐ አይደለም ☐				
	ብሮኮሊ/Broccoli	አዎ ☐ አይደለም ☐				
	ዱባ/Pumpkin	አዎ ☐ አይደለም ☐				
	ዙክኒ/Zucchini	አዎ ☐ አይደለም ☐				

ተ.ቁ	የአትክልት አይነቶች	አትክልት ያመርታሉ?	የሚያመርቱ ከሆነ		በአመት ከአትክልት ሽያጭ ምን ያህል ገቢ ያገኛሉ (ብብር)?	አስተያየት
			በአጠቃላይ በኪ.ግራም ምን ያህል ምርት ያመርታሉ?	በአንድ ካሬ ሜትር ጫባ ምን ያህል ምርት ያገኛሉ (በኪሎ ግራም)?		
	ኪያር/Cucumber	አዎ ☐				
		አይደለም ☐				
	አጠቃላይ					

የቤት ውስጥ የተመጣጠነ ምግብ የአመጋገብ ደረጃ መለኪያ ነጥብ			
ተ.ቁ	የምግብ ዝርያዎች	የምግብ መዘርዘሮች	አዎ -1 አይደለም- 0
1	የአዝኦርት ምግቦች	ዳቦ, ብስኩት, ኩኪሶች, ማንኛውም ከማሽላ፣ከቦቆሎ፣ከሩዝ፣ስንዴ፣ገብስ፡ መሰል የጥራጥሬ ምርቶችን ከተመገቡ ወዘተ	
2	የስራስር ዝርያ ያላቸዉ ምግቦች	ድንች፣ ካሳሻ፣ ስኳር ድንች፣ቆጮ፣ካሮት ወዘተ ከመሬት ስር የሚገኙ የምግብ አይነቶች ከተመገቡ ወዘተ	
3	የአትክልት ዝርያዎች	ቆስጣ፣ ሰላጣ፣ ጎመን፣ ጥቅል ጎመን፣ ቲማቲም፣ ቃሪያ፣ ብሮኩሊ፣ ዱባ፣ ዙክኒ፣ ከ ያር ወዘተ	
4	ፍራፍሬ	ብርትኳን ወዘተ	
5	ስጋ፣ ዶሮ መሰሎችን	በሬ፣ ፍየል፣ በግ፣ ዶሮና የዶሮ ዝርያዎች ወዘተ	
6	እንቆላል		
7	አሳና የባህር ዉስጥ ምግቦች	አሳ ወዘተ	
8	ጥራጥሬ	ባቄላ፣ አተር፣ሸንብራ፣ጓያ ወዘተ	
9	ወተትና የወተት ዉጤቶች	ቅቤ፣ አይብ፣ አንት ወዘተ	
10	ዘይትና ቅባት መሰል	ዘይትና ቅቤ መሰል በምግብ ዉስጥ መጠቀም ከነበረ	
11	ስኳር፣ማርና ጣፋጭ ነገሮች	ለስላሳ መጠጦች፣ ጣፋጭ ምግቦች (ቸኮሊት፣ ከረሜላ ና መሰል ጣፋጭ ምግቦችን ከተመገቡ ወዘተ	
12	ተጨማሪ	ቅመማቅመም፣ ጨዉ፣ ሻይ፣ ቡና፣ አልኮል መጠጦች ወዘተ	

የሚከተሉት ጥቅል ጥያቄዎች የቤተሰብ የምግብ ዋስትና አለመረጋገጥ ተደራሽነት መለኪያ መሣሪያዎችን መሰረት በማድረግ የአንድን ቤተሰብ ወይም ግለሰብ የምግብ ተደራሽነትን ለመለካት ተዘጋጅተው የቀረቡ ናቸው፡

፡ ቀጥሎ ባለው ሠንጠረዥ የቀረቡት እያንዳንዱ ጥያቄዎች የሚጠየቁት ያለፉትን አራት ሳምንታት በማስታወስ ይሆናል፡፡ ስለዚህ እያንዳንዱን ጥያቄ በጥሞና ካነበቡ በኋላ ባለፉት አራት ሳምንታት ድርጊቱ መኖሩን ወይም አለመኖሩን “አዎ” ወይም “አይደለም” በማለት የ(✓) ምልክት ያስቀምጡ፡፡ ምላሽዎ “አዎ” ከሆነ የድግግሞሹን ሁኔታ ቀጥሎ ባለው የመመዘኛ ነጥብ የ(✓) ምልክት በመጠቀም ያሳዩ፡፡

3 = ብዙ ጊዜ/often (ባለፉት አራት ሳምንታት ከአሥር ጊዜ በላይ)

ተ.ቁ	ጥያቄዎች	የመሆን ዕድል		ድግግሞሽ		
		አዎ	አይደለም	በጣም አልፎ አልፎ (1)	አልፎ አልፎ (2)	ብዙ ጊዜ (3)
1	ባለፉት አራት ሳምንታት:- ለቤተሰብዎ በቂ ምግብ ባለመኖሩ እርስዎ ተቸግረውና ተጨንቀው ነበር?					
2	ባለፉት አራት ሳምንታት:- እርስዎ ወይም ማንኛውም የቤተሰብዎ አባል በሀብት ወይም ገንዘብ እጦት ምክንያት የሚመርጡትን ምግብ መመገብ ሳይችሉ ቀርቷል?					
3	ባለፉት አራት ሳምንታት:- እርስዎ ወይም ማንኛውም የቤተሰብዎ አባል በሀብት ወይም ገንዘብ እጦት ምክንያት ውስን የሆኑ የምግብ ዓይነቶችን ብቻ ተመግቧል ወይ?					
4	ባለፉት አራት ሳምንታት:- እርስዎ ወይም ማንኛውም የቤተሰብዎ አባል በሀብት ወይም ገንዘብ እጦት ምክንያት ሌላ ዓይነት ምግብ መመገብ ስለማይቻል የማይፈልጉትን ምግቦች ተመግቧል ወይ?					
5	ባለፉት አራት ሳምንታት:- እርስዎ ወይም ማንኛውም የቤተሰብዎ አባል በቂ ምግብ ባለመኖሩ ምክንያት በእያንዳንዱ የመመገቢያ ሰዓት መመገብ ከሚፈልጉት መጠን በታች ተመግቧል ወይ?					
6	ባለፉት አራት ሳምንታት:- እርስዎ ወይም ማንኛውም የቤተሰብዎ አባል በቂ ምግብ ባለመኖሩ ምክንያት በቀን ውስጥ የተወሰነ ጊዜ ብቻ ተመግቧል ወይ?					
7	ባለፉት አራት ሳምንታት:- በቤተሰብዎ ውስጥ ምግብ ለማግኘት በሀብት ወይም ገንዘብ እጦት ምክንያት ለመመገብ ምንም ዓይነት ምግብ አልነበረም ወይ?					
8	ባለፉት አራት ሳምንታት:- በቤትዎ በቂ ምግብ ባለመኖሩ ምክንያት እርስዎ ወይም ማንኛውም የቤተሰብዎ አባል እየራባቸው ወደ መኝታቸው ሄዷል ወይ?					
9	ባለፉት አራት ሳምንታት:- በቤትዎ እርስዎ ወይም ማንኛውም የቤተሰብዎ አባል በቂ ምግብ ባለመኖሩ ምክንያት ሙሉ ቀንና ሌሊት ምንም ምግብ ሳይመገቡ አሳልፏል ወይ?					

አባሪ 2 መጠይቅ ለአትክልት አምራቾች

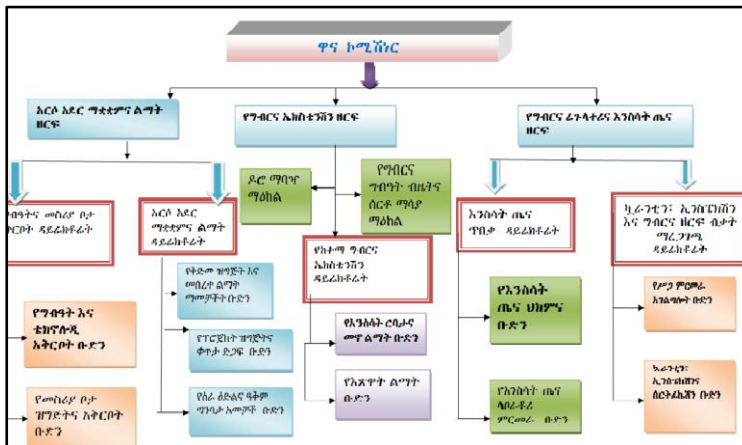
1. የከተማ ግብርና በተለይ የጓሮ አትክልት በማምረት ሂደት ውስጥ የሚያጋጥሙ ችግሮችን/ተግዳሮቶችን ይግለፁ?
 - የመሬት እጥረት/የዘር እጥረት/የማዳበሪያ እጥረት/የክትትልና ድጋፍ ማነስ/የብድር ማጣት/የወሃ እጥረት/የግንዛቤ እጥረት/የገበያ ትስስር/መደበኛ ያልሆነ የእንሰሳት እንቅስቃሴ/የሰው ሃይል እጥረት/ሌብነት/ተባይና በሽታ/ካለሁበት ቦታ የመፈናቀል ፍራቻና ሌሎችም.....
2. የከተማ ግብርና በተለይ የጓሮ አትክልት በማምረት ሂደት ውስጥ ያሉ መልካም አጋጣሚዎችን እንዴት ይገልፃሉ?
 - የመሬት አቅርቦት/የዘር አቅርቦት/የማዳበሪያ አቅርቦት/የክትትልና ድጋፍ መኖር/የብድር አቅርቦት/ወሃ መኖር/ግንዛቤ መኖር/የገበያ ትስስር መኖር/የሰው ሃይል መኖር/መድሃኒት አቅርቦት መኖር ሌሎችም...
3. የከተማ ግብርና በተለይ የጓሮ አትክልት ማምረት ለቤተሰብ ምግብ በአቅራቢያዎ እንዲገኝ (availability) አድርጓል?
4. የከተማ ግብርና በተለይ የጓሮ አትክልት ማምረት ለቤተሰብ የምግብ ተደራሽነትን (access)ጨምሯል?
5. የከተማ ግብርና በተለይ የጓሮ አትክልት ማምረት የቤተሰብን የምግብ አጠቃቀምን (utilization)ጨምሯል?
6. የከተማ ግብርና በተለይ የጓሮ አትክልት ማምረት የቤተሰብን የምግብ ዋስትና ለማረጋገጥ(stability) ጥቅም አለው?
7. የከተማ ግብርና በተለይ የጓሮ አትክልት በማምረት ሂደት ውስጥ ለእርሶ፣ለቤተሰብ ወይም ለአካባቢዎ ማህበረሰብ የስራ እድል ፈጥረዋል?
8. የከተማ ግብርና በተለይ የጓሮ አትክልት በማምረት ሂደት ውስጥ ለእርሶም ሆነ ለቤተሰብ ተጨማሪ የገቢ ምንጭ አግኝተዋል?

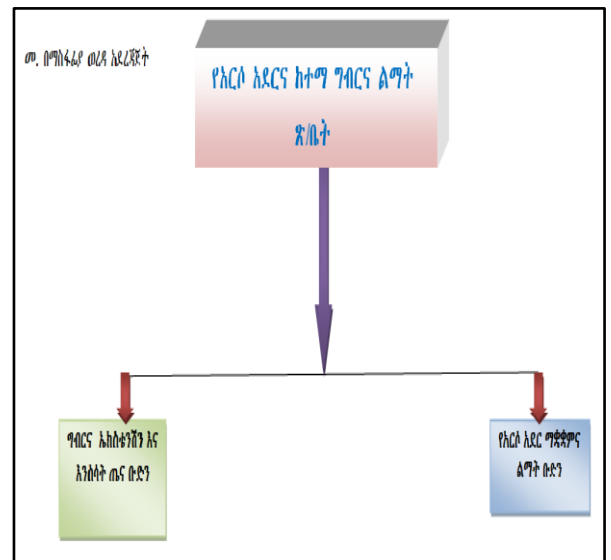
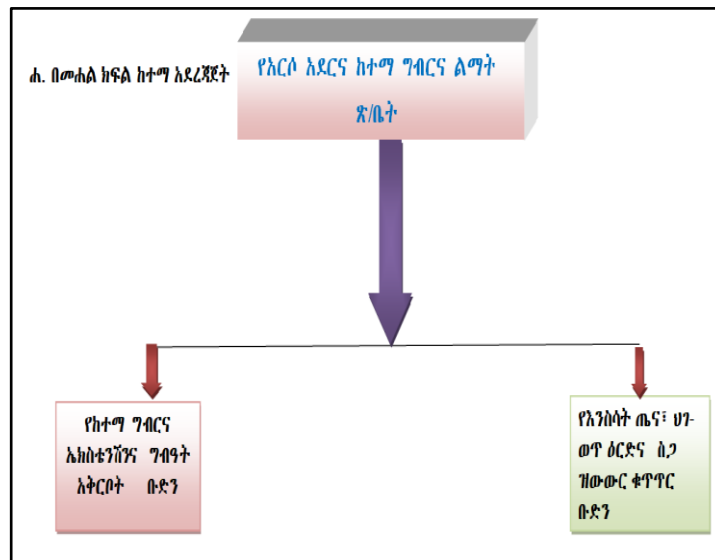
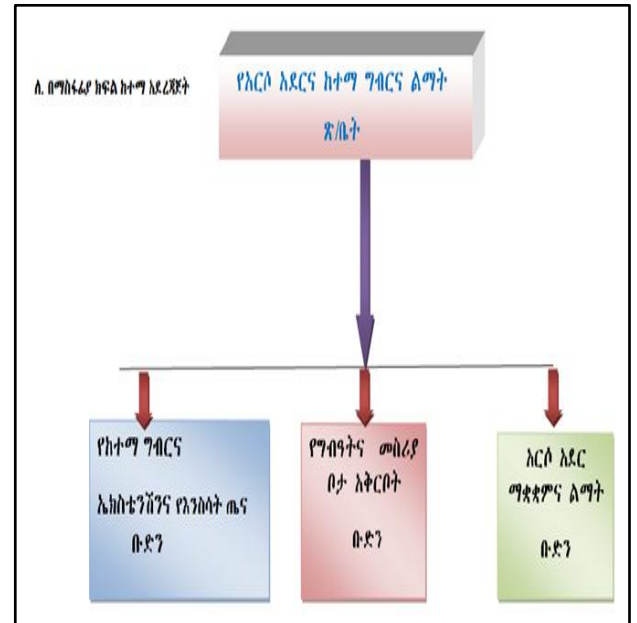
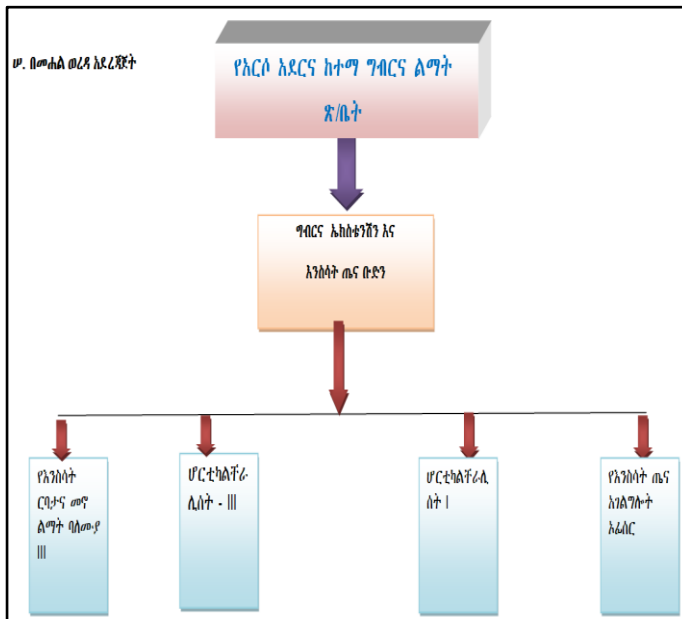
አባሪ 3 የአትኩሮት ቡድን ውይይት መጠይቆች (FGD)

1. የከተማ ግብርናን በተለይ የአትኩሮት ማምረት ስራን ለመጀመር ያነሳሱት ዋና ምክንያት ምንድነው ይግለፁት?
 2. በአትኩሮት ማምረት/በከተማ ግብርና ዙሪያ የሰዎች አመለካከት/አስተሳሰብ ምን ይመስላል?
 3. በአካባቢ በስፋት የሚመረተው የከተማ ግብርና ምንድነው? ለምን?
 4. የከተማ ግብርና በተለይ የጓሮ አትኩሮት በማምረት ሂደት ዉስጥ **ጠንካራ ጎን፣ በከፍተኛ ሚታይ፣ መልካም እድሎች እና ስጋቶችን** ይግለፁ?
- **ጠንካራ ጎን (Strengths)**
 - የአካባቢ ጥበቃ፣ የመሬት አቅርቦት፣ የዘር አቅርቦት፣ የማዳበሪያ አቅርቦት፣ የተቋማት የክትትልና ድጋፍ ፣ የብድር አቅርቦት፣ ወሃ መኖር፣ ግንዛቤ መኖር፣ የገበያ ትስስር ፣ ማህበራዊ ትስስር፣ የእውቀት ሽግግር፣ የራስን ጉልበት ለስራው መጠቀም፣ ተነሳሽነት፣ የሰው ሃይል መኖር፣ ገበያ መኖር፣ የመድሃኒት አቅርቦት መኖርና ሌሎችም ካሉ ይግለፁ.....
 - **በከፍተኛ ሚታይ(ችግሮችን/ተግዳሮቶችን) (Weakness)**
 - ፖሊሲ፣ የአፈር ጥበቃ፣ የመሬት እጥረት፣ የግብአት እጥረት (የዘር፣ የማዳበሪያ ወዘተ)፣ ስልጠና፣ ኢኮኖሚ፣ የክትትልና ድጋፍ ፣ የብድር ማጣት፣ የወሃ እጥረት፣ የግንዛቤ እጥረት፣ የገበያ ትስስር፣ መደበኛ ያልሆነ የእንሰሳት እንቅስቃሴ፣ ሌብነት/ተባይና በሽታና ሌሎችም ካሉ ይግለፁ.....
 - **መልካም አጋጣሚዎች (Opportunities)**
 - አካባቢ ጥበቃ፣ ድህነት ቅነሳ፣ የምግብ ዋስትና፣ አላስፈላጊ ቆሻሻን ማስወገድ፣ የወጣቶች ተሳትፎ፣ ኢኮኖሚ፣ የብድር አቅርቦት፣ ግንዛቤ መኖር፣ የገበያ ትስስር መኖር፣ የሰው ሃይል መኖር፣ ማህበራዊ ትስስር፣ ሌሎችም ካሉ ይግለፁ.....
 - **ስጋቶች (Threats)**
 - አካባቢ ጥበቃ፣ የመሬት ሽያጭ፣ ጎርፍ፣ ኢኮኖሚ፣ የከተማ ማስተር ፕላን፣ የመሬት ባለቤትነት (ካለሁበት የመፈናቀል ፍራቻ)፣ የመሬት አቅርቦት ሌሎችም.....

የአርሶ አደርና ከተማ ግብርና ልማት በማዕከል መዋቅራዊ አደረጃጀት

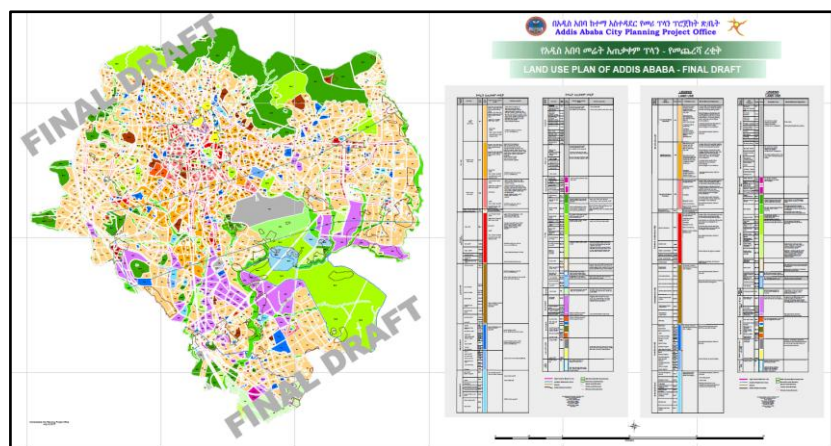
ሀ. የአርሶ አደርና ከተማ ግብርና ልማት በማዕከል መዋቅራዊ አደረጃጀት





Sources: AAFUAC, 2021

Addis Ababa urban agriculture planning map (A)



Existing land use for UPA Addis Ababa (B)

Table 7 Land use proportion of the Structure Plan

Major Category	Area	Percent
Administration	5560102.69	1.07
Commerce and Business	7658738.77	1.47
Environment	158557678.21	30.47
Historical Buildings and Sites	188865.85	0.04
Manufacturing and Storage	30564058.19	5.87
Mixed Residence	219072034.68	42.11
Municipal Services	6156429.60	1.18
Religious Institutions	3699328.77	0.71
Social Services	14555278.28	2.80
Special Projects	7510338.19	1.44
Special Use	3313898.72	0.64
Sport Field	191757.07	0.04
Street Network	36307891.30	6.98
Transport	11527835.78	2.22
Urban Agriculture	9239017.57	1.78
Utility and Infrastructure	6193381.33	1.19

.....Continued C

Table 6 Estimated expenditure and financing strategy to implement the Structure Plan in Millions (b)						
Project Type	Sources of Financing					% Share from Total
	Local Tax & Non Tax	Community contribution	External Loan & Assistance	Local borrowing	Total	
1. Land Development						
Housing Development				90,846.50	90,846.50	81.0
Main projects		0.0	0.0	207.00	207.00	0.2
Construction of city centre				21,112.00	21,112.00	18.8
Sub total				112,165.50	112,165.50	24.8
2. Projects						
Housing construction				223,675.2	223,675.2	65.6
MSE institute				1,503.4	1,503.4	0.4
Road Construction	15,237.38		15,237.4		30,474.8	
Communication & Transport projects	500.0	0.0	0.0	18,860.0	19,360.0	5.7
Municipality services	3,209.8	0.0	15,167.0	0.0	18,376.7	5.4
Fire and Accident prevention	999.5	0.0	0.0	0.0	999.5	0.3
Abattoir services	0.0	0.0	1,956.6	0.0	1,956.6	0.6
Potable water	2,210.3	0.0	13,210.4	0.0	15,420.6	4.5
Other projects	500	0.0	0.0	500.0	1000.0	0.3
Environmental protection project	10,512.7	612.8	19,089.5	15,398.1	45,613.1	13.4
Tourism Development project	69.0	0.0	0.0	0.0	69.0	0.0
Urban Agriculture	668.0	96.0	0.0	0.0	764.0	0.2
Sub Total	30,696.8	708.8	49,493.8	259,936.7	340,836.2	75
Grand Total	30,696.8	708.8	49,493.8	372,102.2	453,001.7	
% Share from total Expenditure	6.8	0.2	10.9	82.1		

Sources: Ababa City Government Plan and Development Commission (2021) (A-C)

Pictures from

Vegetable farm in the PM Office (2021)

observed areaa



Urban vegetable production in the Yeka sub-city administration compound (2021)



Yohana vegetable farm in Addis Ababa (2021)



Vertical farming



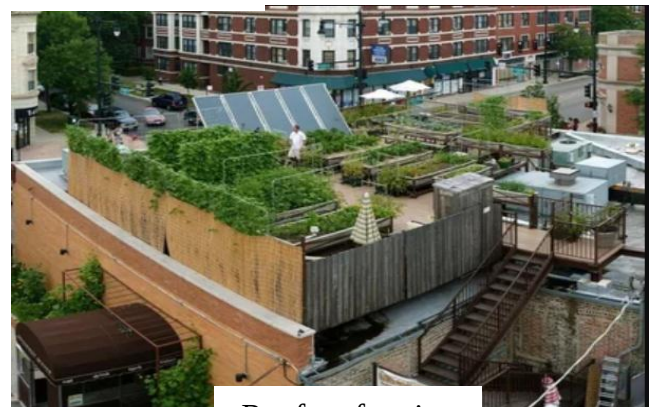
Vertical farming



Foreign countries experiences



Hydroponic farming



Rooftop farming



Vertical farming

Biography

I'm Habtamu Serbessa Gadissa. I am from the southern part of Ethiopia, specifically Hawassa, where I completed my primary and secondary education. I spent eight years in the United States, taking college courses and working various manual jobs in Jacksonville, Florida.

I also had the opportunity to reside in Prague, Czech Republic, where I earned my first and second degrees from the Czech Life Science University. During my time in Czech, I collaborated with several organizations alongside my studies.

Since returning to Ethiopia, I've been engaged with different organizations and currently hold the position of a senior consultant at the Addis Ababa Technical Vocational Training and Technology Development Bureau.

My life philosophy, rooted in personal principles, instills in me courage and strength, guiding me towards a promising future. Currently pursuing a Ph.D. at Addis Ababa University, I am dedicated to academic advancement.

I find joy in sports, particularly running, and completing a marathon has taught me valuable lessons about endurance.

On a personal note, I am blessed with a marriage and have four incredible children – three daughters and one son – for whom I am eternally grateful.

Thank you for taking the time to get to know a bit about me.

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