International Journal of Agricultural Economics
2025, Vol. 10, No. 3, pp. 95-103
https://doi.org/10.11648/j.ijae.20251003.12

Review Article

Challenges and Opportunities of Urban Agriculture in Major Towns Practicing Urban Agriculture in Ethiopia: A Review

Etefa Tilahun Ashine*

Ethiopian Institute of Agricultural Research, Jimma Agricultural Research Center, Jimma, Ethiopia

Abstract

Ethiopia is experiencing a surge in urbanization as well as an increase in the cost of living and food. Consequently, urban agriculture will play a significant part in the nation's adoption of a sustainable urban development program. Ethiopia's government has also shown a great deal of interest in advancing urban agriculture, as seen by the establishment of the Farmers and Urban Agriculture Commission. However, as the sector is considered as a new initiative in most cities it has its own challenge and opportunity. This study reviewed the challenges and opportunities of urban agriculture in Ethiopia. Existing scholarly research that has been published as journal articles serves as the study's methodology. The resources (Scopus and Google customized search), eligibility and exclusion criteria, review process phases, data abstraction, and analysis are all part of the methods used. The review result shows that, in Ethiopia, there is diversity among the actors involved in urban agriculture and the tasks they carry out. There are four major performers of urban agriculture namely farm households, organized groups/cooperatives/enterprises, households and institutional practitioners. The commonly practiced forms of urban agriculture are dairy, poultry, animal fattening, bee keeping, fish farming, and vegetable production. The major challenges the urban agriculture facing are Challenges due to limitation of resources, economic and climate change factors. Farmers that are practicing urban agriculture are facing problems with resources such as access to available land, access to water supply for irrigation and livestock, high price of fertilizer and pesticides. Farmers and other organized bodies to implement urban agriculture are facing problems with access to financial institutions lending money. Variability of climatic factors such as rainfall and temperature affect yield in crops. The best opportunity for urban agriculture in Ethiopia is that creation of A better market for products (milk, chicken and eggs) with close users in towns, provides employment opportunities for jobless youths and women in the towns and generates additional income for urban agricultural producers. It needs stronger policy support and investment to enhance the contribution of urban agriculture expansion significantly.

Keywords

Urban Agriculture, Challenges, Opportunities, Urban Dwellers, Diary

1. Introduction

Urbanization in Ethiopia is rapidly increasing, with an annual urban growth rate of around 4.4%, leading to rising food demand, unemployment, and environmental pressures [1, 2]. In response, urban agriculture (UA) has emerged as a critical strategy to enhance food security, livelihoods, and urban sustainability. Major towns such as Addis Ababa, Ha-

*Corresponding author: etefatilahun@gmail.com (Etefa Tilahun Ashine)

Received: 8 February 2025; **Accepted:** 17 April 2025; **Published:** 14 May 2025

Copyright: © The Author(s), 2025. Published by Science Publishing Group. This is an **Open Access** article, distributed under the terms of the Creative Commons Attribution 4.0 License (http://creativecommons.org/licenses/by/4.0/), which permits unrestricted use, distribution and reproduction in any medium, provided the original work is properly cited.

wassa, Bahir Dar, and Mekelle have seen significant adoption of UA, including vegetable farming, poultry, dairy production, and backyard gardening. However, despite its contributions, UA in Ethiopia faces challenges such as land scarcity, inadequate policy support, water access issues, and market limitations.

Hunger and malnutrition will result from food being unaffordable, especially for urban dwellers with lower incomes, and affecting their daily diet [3]. One of the efforts to guarantee that everyone in the world has access to food is the urban garden, which is described as the cultivation of food inside cities [4, 5]. Participation in urban gardening practices guarantees that the food supplies are conveniently accessible and safe for human consumption [6]. By enhancing food security and public health, establishing urban green areas, fostering circular economies, and generating social capital, it could increase cities' ability to withstand a variety of stresses and shocks [7].

Furthermore, the activity of urban gardening has been shown to have other advantages, such as lowering stress and promoting mental health, as well as enabling individuals to grow safe food [8]. After participating in urban gardening, urban dwellers' calorie consumption and dietary diversity improve, according to a study conducted in 15 countries by [9]. Additionally, cities may experience food insecurity as a result of fluctuating food prices. According to [10], 50% of South African households now have to spend over half of their income on food, which has a negative impact on their ability to get other essential household necessities. Additionally, 15% of households required microlender loans, according to this study. An urban garden is therefore crucial to resolving this problem and other countries such as Ethiopia could get an information on the impact of urban agriculture.

Despite the fact that urban gardens can help ensure food security and offer urban farmers numerous advantages, they need be prepared for a number of obstacles, including weather variations that could negatively affect food supplies. Floods are the most common natural hazard affecting the agricultural crop sector, according to the [11]. A study by [12] demonstrates that floods in Kelantan affected nearly all of the crops, livestock, and agricultural assets. The next factor is soil dryness, which lowers soil fertility, inhibits root development, and leads to organic matter breakdown [13]. Food insecurity occurs globally as a result of inadequate rainfall and temperature [14, 15]. The results of [16], which demonstrate a direct relationship between variations in rainfall temperature and agricultural product productivity, are consistent with this. In order to respond to rainfall unpredictability, farmers produce in regions with a high-water table, change fertilizer levels, and choose crops and planting dates [17].

A research by [18] found that the biggest obstacles to urban farming in Tehran were the high startup costs and the ignorance of urban managers and authorities. Because urban gardens demand a significant investment in infrastructure, electricity, management, and operating costs, urban farmers typically require loans or subsidies to establish them [19]. Additionally, farmers must budget for the expense of buying tools, insecticides, and fertilizers [20]. According to a study by [17], farmers' lack of capital is the root cause of their pesticide deficit. Furthermore, fewer credit options will have a greater influence on farming operations, particularly for small urban farmers in Africa, Asia, and Latin America who are trying to scale up their output [21]. One of the problems with urban farming is the high expense of irrigation [22, 23].

Developing nations, like those in Africa, have a faster pace of urbanization even though their populations are not very densely populated. Africa will become 56% urban by 2050 due to its rapid urbanization [24]. Ethiopia is experiencing a surge in urbanization [25], as well as an increase in the cost of living and food [26]. Consequently, urban agriculture will play a significant part in the nation's adoption of a sustainable urban development program. Ethiopia's government has also shown a great deal of interest in advancing urban agriculture, as seen by the establishment of the Farmers and Urban Agriculture Commission and the Prime Minister's remarks underscoring the significance of doing so in the modern era. Considering this initiative, it was implemented in different cities of the country in the urban and pre-urban dwellers. Hence different cities are practicing the urban agriculture in Ethiopia for securing the food and the lively hood improvement of the farmers and to get economic benefit. As it is looks like a new initiative facing an accomplishment task from the limited land availability, environmental pollution, input constraints and probability from the limited policy intervention for its practicability at full potential and its sustainability.

This review examines the challenges and opportunities of urban agriculture in Ethiopia’s major towns, synthesizing existing studies to assess its socio-economic, environmental impacts and the contribution of irrigation for urban agriculture as an input. By analyzing successful cases and policy gaps, this manuscript aims to provide insights for policymakers, urban planners, and practitioners to optimize UA’s potential in fostering resilient and sustainable urban food systems. The findings will contribute to discussions on integrating UA into Ethiopia’s urban development strategies, ensuring food security, job creation, and climate-smart urbanization.

2. Methodology Followed for Reviewing

Existing scholarly research that has been published as journal articles serves as the study's methodology. Following the PRISMA statement, systematic literature review using PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) [27, 28] was conducted. The resources (Scopus and Google customized search), eligibility and exclusion criteria, review process phases (identification, screening, and eligibility), data abstraction, and analysis are all part of the methods used. One of the biggest databases for peer-reviewed publications, Scopus, serves as the primary foundation for the review. Furthermore, we performed a tai-

lored Google search and considered a few non-peer-reviewed papers that were extremely pertinent to our goals. In terms of document type, only Articles published between 2010 and 2024 in the English-language fields of biological research, social science, agricultural, and environmental science were taken into consideration.

3. Over View of Urban Agriculture in Ethiopia

3.1. Modes of Implementing Urban Agriculture

Prior to 2011, animal husbandry was a major component of urban agriculture, which was governed by the Ministry of Urban Development and Construction. The task was transferred to the Ministry of Agriculture in 2011, and the Ministry established the Urban Agriculture Desk within the Urban and Commercial Agriculture Investment Support Executive in 2014 [29]. The Desk's specialists are in the management of natural resources, livestock, and crops and horticulture because it concentrates on three areas. [29] recommended that the ministry of agriculture may be responsible for the following duties. In order to make urban farming effective and set up mechanisms for its implementation, it develops policies, strategies, and implementation manuals in coordination with the relevant organs; it keeps an eye on how policy documents and practices are being implemented; and it offers material and technical assistance to practitioners of urban agriculture, particularly vertical farming.

In Ethiopia, there is diversity among the actors involved in urban agriculture and the tasks they carry out. They can be categorized into four major performers of urban agriculture. They are farm households, organized groups /cooperatives/enterprises, households and institutional practitioners. Farmhouse households are those whose primary source of income is still farming. The majority of farmers received their land as inheritances from their relatives. On their property, they raise animals and raise chickens. For farm households, they view urban agriculture as an additional source of revenue. In organized groups or cooperatives or enterprises urban agriculture includes a diverse range of individuals. It may include farmers whose land was acquired for development, youths, women, disabled peoples, and people infected with HIV disease. They may be engaged in animal production, and vegetable production. The government supports them by providing shades. Unlike the farm household, urban agriculture serves as main source of income for the organized groups. Households are city dwellers who cultivate urban agriculture on their homesteads or backyards. Vegetables are grown by thousands of locals, mostly for domestic use, though some also sell their product. Some of them also produce dairy products and poultry in addition to vegetables. Urban agriculture serves as an additional revenue stream. Institutional practitioners it is the practice of urban agriculture in the compounds of different governmental institutions. They are involved in vegetable and dairy production.

3.2. Benefits of Urban Agriculture

Ethiopia could not feed the ever-increasing population through the conventional way of farming and agricultural products from the rural community. The use of modern technologies such as irrigation practice, the adoption and use of agricultural technologies and inputs, and urban agriculture could be practiced. Urban agriculture is one of the recent initiatives in a highly populated country like Ethiopia. Even though it is the recently practiced agricultural activity, it has an advantage of producing food, waste management through recycling, creation of job for the local community [30]. It has gained prominence in Ethiopia as a sustainable strategy to address food insecurity, poverty, and environmental degradation. It involves growing crops and raising livestock within and around cities, providing economic, social, and ecological benefits.

Urban agriculture improves access to fresh and nutritious food, particularly for low-income households. In cities like Addis Ababa and Hawassa, UA contributes to dietary diversity by supplying vegetables, fruits, and animal products [9]. A study by [31] found that urban farming households in Ethiopia consume more vegetables and dairy products than non-farming households, reducing malnutrition risks. Urban agriculture could also serve as a vital livelihood source for many urban poor, especially women and unemployed youth. By selling surplus produce, households supplement their incomes [32]. In Addis Ababa, urban farmers generate significant earnings from vegetable sales, helping them cope with rising living costs [33].

Recently job opportunity is less in Ethiopia and urban agriculture has got its contribution in creating job opportunity in production, processing, and marketing. A report by the Food and Agriculture Organization [34] highlights that UA employs thousands in Ethiopian cities, reducing urban unemployment. Youth engagement in peri-urban poultry and horticulture has been particularly impactful [35]. The input used as a fertilizer in most urban agriculture in Ethiopia was composting organic waste and this practice minimizes land fill use and lowers green gas emissions [36]. Additionally, they harvest water from the roof top and this also improve air quality in congested cities. By uniting locals for communal farming, community gardens promote social cohesion [37]. Initiatives from UA in Addis Ababa have improved community relations and offered sustainable agricultural instruction [38]. Urban agriculture also reduces reliance on lengthy supply chains that are susceptible to interruptions and encourages local food production, which helps lessen the effects of climate change [39]. According to [40], Ethiopian cities that use UA are more resilient to shocks to food prices brought on by droughts or delays in transportation.

3.3. Commonly Implemented Urban Agriculture in Ethiopia

In view of securing the food deficiency and income generation, in Ethiopia the commonly practiced forms of urban agriculture are dairy, poultry, animal fattening, bee keeping, fish farming, and vegetable production [29, 41-43]. The major one are discussed as shown below.

3.3.1. Dairy Production

Dairy is one of the major livestock sectors practiced in the urban areas of Ethiopian city, such as Addis Ababa, Jimma, Hawassa and Bahirdar (e.g Figure 1). The milk produced in the cities has a significant contribution in securing nutrition for the urban population in addition to imported and milk production from rural areas. It comprised small (dairy cows < 20) and large-scale commercial (dairy cows > 20) producers [41]. According to the study conducted by [44], about 31 percent of the urban fluid milk was supplied from the 29,000 dairy cows in Addis Ababa in addition to creating job opportunity for the youths, male and female producers. The basic inputs for the successful production of dairy farm were land, feed, water, artificial insemination (AI), labor, capital and vet drugs and services. A rapid rise of feed price is not a big concern rather quality of feeds has a pivotal role as it affects the production and productivity of their animals [41].

a b

Figure 1. *Dairy farm (a) in Addis Ababa city at Kolfe Qeraniyo [Source: 41] and (b) in Jimma city [source: own data].*

3.3.2. Poultry Farming

Poultry farming contributes significantly to the nation's economic growth and provides a substantial source of nutrition, food security, and livelihood. Ethiopian society is firmly anchored in poultry farming, which is practiced in practically every household, from impoverished rural communities to prosperous urban populations. However, the country's poultry productivity is below the global average due to challenges such as high disease prevalence, inadequate veterinary services, limited access to quality and affordable feeds, and suboptimal genetic performance of indigenous chickens. This resulted in a significant gap between the demand and supply of poultry products in the countrdy. However, due to the commencement of 'Yelemat trufat' in the cities, the poultry business has enhanced. It is a four-year development program that aims to boost productivity and production of dairy, eggs, chicken meet and honey. The project expected and could achieve food self-sufficiency and ensure balanced nutrition at the family and national levels in addition to creating job opportunity. According to [45], it was planned to increase from 3.2 to 9.1 billion and 90 000 metric tons to 240000 metric tons both egg and chicken meat production, respectively from the base year 2022 in 2026. In Ethiopia the production of poultry farming can be classified in to small, medium and large-scale farming based on the size of the flocks.

Small-scale farms are usually established and controlled by households or families. They usually own 5 to 200 chickens and are managed by elder women, young women, and sometimes men which are managed in cages in the compound and constructed separate homes. The educational level of the poultry farmers are between 4-8 years of formal education, non-educated and a few are above grade 10 diploma, showing that their educational level is low [41]. Poultry farming is considered as an extra-income-generating activity for family farms. Medium scale poultry farms are entrepreneurial commercial poultry farms that are established for commercial purposes by individuals, enterprises, and investors which can own 200 to 999 chickens. They are established by the government and individual entrepreneurs and their educational level is higher and can include up to first degree. The farm is considered as the only source of income for the farmers engaged in medium scale poultry farming. Large scale poultry farms are farms established for commercial purpose by investors and it owns 1000- 30000 chickens and has the capacity of producing up to 25000 eggs per day [41]. The farm is managed by scholars that have secondary up to first degree educational level and some have their own food processing

and some hire veterinary technicians and poultry experts.

Figure 2. *Poultry farming in Jimma town [Source: own data].*

3.3.3. Animal Fattening

Fattening of cattle and small ruminants is part of the livestock activities in Urban Agriculture that contribute 10% to 40% to household income and livelihood [30]. Fattening of animals for slaughter usually takes place at well-organized commercial feedlots or simply in the backyard of smallholder farmers. Ethiopia is the only country with an abundance of livestock and meat resources and with the lowest per capita meat consumption (9.2kg in 2018). This is mainly because of the low productivity and availability of meat in Ethiopia. The estimated average live weight of cattle is 250 kg with 14 % offtake rates and carcass weight is 110 kg with 44 % dressing percentage due to diverse and related challenges to production, husbandry, and marketing [46]. Studies on the other hand show that domestic meat demand is believed to increase with increasing literacy and family income [47]. It is one of the urban agricultures that get low attention in most cities. Hence there is a deficit between the demand and the supply through identifying the challenges. Commonly there are three way of fattening system namely the traditional system, the product-based method and the Hararge fattening system. Cattle, sheep and goat fattening are the major animal fattening in urban agriculture.

3.3.4. Beekeeping

Beekeeping is one of an important urban agricultural activity in most cities in Ethiopia, due to its favorable climate, diverse flora and growing interest of the urban dwellers. The climatic conditions that have cool temperature and rainy and dry seasons in most cities signifies the best place for bee keeping and make a good environment for honeybees which provides abundant nectar and pollen for the bees foraging activities. The bee keeping farming has a great contribution in sustainability and economy of the local urban community. It plays a pivotal role in preserving the ecological balance of the city in addition to benefiting the bee keepers [41]. Generally, urban bee keeping can contribute to pollination service, biodiversity conservation, and honey and wax production. Its advantageous by creating further indirect employment opportunities which contributes to the overall economic growth and development of the beekeeping industry.

3.3.5. Fish Farming

In Ethiopia's urban agriculture (UA), fish production is becoming more and more significant as it supports sustainable urban growth, revenue generation, and food security. Aquaculture integration into city and peri-urban farming systems has emerged as a feasible approach to address dietary and financial demands as urbanization increases. It can be practiced through capturing fishery from natural water bodies and aquaculture is one of the urban agricultural practices carried out in most cities in Ethiopia. However, the production of fish through aquaculture has been increasing when compared with the natural water bodies. Nevertheless, fish production using ponds has great potential to ensure food and nutrition security in urban areas. The fish farming has an advantage of producing fish, for income generation, and employment opportunity. It can be practiced at individual households and also in urban city administration and schools.

Urban fish farming helps fight hunger in Ethiopian cities by offering a vital source of animal protein, important fatty acids, and vitamins. Urban aquaculture in Addis Ababa and Hawassa provides fresh fish to local markets, increasing dietary diversity among low-income people [48]. The most popular species, catfish and tilapia, are inexpensive and high in nutrients, making them available to urban consumers [49]. Small-scale urban fish farming provides income for women's groups, households, and young people. According to a study by [50], peri-urban fish farmers in Bahir Dar make extra money by selling fish to local markets and hotels. Integrated systems (such as fish-poultry-vegetable farming) further increase profitability [51]. Similar to other urban agriculture practices, fish farming has also created a job opportunity. According to [52], urban aquaculture in places like Adama and Dire Dawa employs thousands of people, especially women and young people. Urban aquaculture promotes circular economy practices by utilizing organic waste (e.g., poultry manure) for fish feed and wastewater for irrigation [53]. Integrated aquaculture-agriculture systems in Addis Ababa increase output while lowering waste disposal expenses [54].

3.3.6. Vegetables and Cereal Crops

Vegetable production has been one of the important components of urban agriculture in most cities of Jimma and Addis Ababa. Some farms grew different vegetables on a wider area of land greater than 1 ha while majority of the participants grew vegetables either on small plots of land or on pots. Growers accessed land either through inheritance from their parents or from the city administration or institutions which have unutilized land; those who accessed land from the latter were unemployed inhabitants organized as small-scale enterprises. The most dominant vegetable crops in the urban dwellers are swiss chard, lettuce, cabbage, carrot, beet roots, cauliflowers, garlic, potatoes, onion and gomen'. These crops were dominantly cultivated based on their short life cycle, ease of cultivation and disease incidence. The mode of production in most cities is traditional which employ less technologies, shortage of resources and inputs; and due to this productivity and profitability of most farms are very low. Hence it needs an improvement from the concerned farmers and other responsible organization such as the city administration. Cereal production in most cities is a vital component of urban agriculture which has a great contribution to the cities income and creating job opportunity. The commonly grown cereal crops are teff, maize, barley, and wheat, which can provide income for households. The dominantly mode of production in the urban agricultural crop production was through the use of irrigation and it is advantageous for adapting and mitigation of the climate change problem.

3.4. The Contribution of Irrigation to Urban Agriculture in Ethiopia

Urban agriculture (UA) in Ethiopia plays a crucial role in food security, income generation, and environmental sustainability. However, erratic rainfall and limited water access constrain year-round production. Irrigation has become a key enabler for urban farming, allowing continuous cultivation, higher yields, and diversified crops. Irrigation enables urban farmers to grow crops year-round, reducing dependence on seasonal rains. Studies show that irrigated urban farms in Addis Ababa, Hawassa, and Bahir Dar produce leafy greens, tomatoes, onions, and fruits even in dry seasons [55]. This improves household nutrition and stabilizes local food supplies. It is advantageous in Increasing Productivity and Incomes of the urban dwellers basically through Higher yields, Multiple harvests, and Employment. Farmers practicing urban agriculture obtain 30-50% higher productivity than rain-fed systems [56], grow 3-4 cycles per year which boosting incomes [57] and Supports women and youth in small-scale commercial farming [58].

Additionally, the key contribution of irrigation in urban agriculture is that in Wastewater Recycling and Efficient Water Use. In cities such as Addis Ababa drip irrigation and hydroponics are emerging to save water [59], and treated waste water were used in informal irrigation through with health risks [60]. It can also keep Climate Resilience and Urban Sustainability by reducing drought risks and urban cooling. Despite climate variability stable production could be ensured [61] and heat effects from the island effects could be lowered [62] by urban irrigation. Despite its benefits, urban irrigation faces water scarcity due to Competing demands from industry and households [63], pollution risks by contamination from untreated wastewater [64], and high costs of small-scale farmers struggle with pump and drip system expenses [65]. Hence it needs policy recommendations and intervention to expand low-cost irrigation such as rainwater harvesting, solar pumps, regulating wastewater use to ensure food safety, and Integrate UA into urban planning. Generally, Irrigation is vital for urban agriculture in Ethiopia, enhancing food security, incomes, and climate resilience. However, sustainable water management and policy support are needed to maximize benefits while minimizing risks.

3.5. Challenges of the Urban Agriculture

3.5.1. Challenges Due to Limitation of Resources

For agricultural production land, water and nutrients are the basic. Farmers that are practicing urban agriculture are facing problems with resources such as access to available land, access to water supply for irrigation and livestock, high price of fertilizer and pesticides. The constraint due to access to suitable land for urban agriculture could be resolved through cooperating with the local city's land administration and leasing a free land for urban agriculture, and focusing and selecting on the nearby areas to the town which can be considered as a pre-urban agriculture. Additionally, effective management of the irrigation water is essential through the use of drip irrigation techniques, rain water harvesting and recycling of waste water from the household by using locally available filter materials.

3.5.2. Challenges Due to Economic Factor

Basically, the financial problem was the main issue in implementing and managing the urban garden, in addition to easy access to financial resources from the government and lack of marketing skills. Farmers and other organized bodies to implement urban agriculture are facing problems with access to financial institutions lending money. The other problem is that the price of produce being too low, hard to get regular customers, and a lack of cold storage.

3.5.3. Challenges Due to Climate Change Factor

Variability of climatic factors such as rainfall and temperature affect yield in crops. According to a study conducted by [66], lack of rain will reduce soil fertility and the availability of water for their uses.

3.6. Opportunities of Urban Agriculture in Ethiopia

Even though the urban agriculture has a challenge, it has different best opportunities for the existed and newly interested to establish the agriculture activities in the cities. In most cities of Ethiopia, the urban agriculture has the following expected opportunities for the farmers, women, men and youths and generally for those who have an interest to work and capitalize on the sector.

1) A better market for products (milk, chicken and eggs) with close users in towns.
2) It provides employment opportunities for jobless youths and women in the towns.
3) Generates additional income for urban agricultural producers.
4) Good weather conditions (favorable environment for urban agriculture).
5) The Ethiopian government has recently emphasized and supported urban agriculture.
6) In most pre-urban areas of Ethiopia, there is an opportunity of getting suitable land for the urban agriculture.

4. Conclusion

This study tries to review the challenges and opportunities of the urban agriculture practices in Ethiopia. As the urban agriculture is a new initiative in most parts of Ethiopian towns challenges are expected to implement it. The most basic challenges are problems with resources such as access to available land, access to water supply for irrigation and livestock, high price of fertilizer and pesticides. The other challenge is financial problem in implementing and managing the urban garden, in addition to easy access to financial resources from the government and lack of marketing skills. The other challenge is the spatiotemporal variability of climatic condition. The best opportunity of the urban agriculture in Ethiopian cities is the concern it got from the government bodies was high and imperative. It will create a job opportunity and additional income for the urban dwellers.

Abbreviations

UA	Urban Agriculture
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
AI	Artificial Insemination

Author Contributions

Etefa Tilahun Ashine is the sole author. The author read and approved the final manuscript.

Funding

The author received no financial support for the research, authorship, and/or publication of this article.

Conflicts of Interest

The author declares no conflicts of interest.

References

[1] World Bank (2022) *Ethiopia Urbanization Review: Urban growth and spatial transformation*. Washington, DC: World Bank. Available at: https://www.worldbank.org/en/country/ethiopia/publication/ethiopia-urbanization-review (Accessed: 16 April 2025).

[2] Central Statistical Agency (CSA) (2023). *Ethiopia demographic and health survey: Key indicators report*. Addis Ababa: CSA. Available at: https://www.statsethiopia.gov.et/surveys/ (Accessed: 15 April 2025).

[3] Othman, N., Mohamad, M., Latip, R. A. and Ariffin, M. H., 2018, February. Urban farming activity towards sustainable wellbeing of urban dwellers. In *IOP Conference Series: Earth and Environmental Science* (Vol. 117, No. 1, p. 012007). IOP Publishing.

[4] Ackerman, K., 2012. *The potential for urban agriculture in New York City: Growing capacity, food security, & green infrastructure*. Urban Design Lab at the Earth Institute Columbia University.

[5] Mok, H. F., Williamson, V. G., Grove, J. R., Burry, K., Barker, S. F. and Hamilton, A. J., 2014. Strawberry fields forever? Urban agriculture in developed countries: a review. *Agronomy for sustainable development*, *34*, pp. 21-43.

[6] Alaimo, K., Packnett, E., Miles, R. A. and Kruger, D. J., 2008. Fruit and vegetable intake among urban community gardeners. *Journal of nutrition education and behavior*, *40*(2), pp. 94-101.

[7] Gulyas, B. Z. and Edmondson, J. L., 2021. Increasing city resilience through urban agriculture: Challenges and solutions in the Global North. *Sustainability*, *13*(3), p. 1465.

[8] Teig, E., Amulya, J., Bardwell, L., Buchenau, M., Marshall, J. A. and Litt, J. S., 2009. Collective efficacy in Denver, Colorado: Strengthening neighborhoods and health through community gardens. *Health & place*, *15*(4), pp. 1115-1122.

[9] Zezza, A. and Tasciotti, L., 2010. Urban agriculture, poverty, and food security: Empirical evidence from a sample of developing countries. *Food policy*, *35*(4), pp. 265-273.

[10] Mkhawani, K., Motadi, S. A., Mabapa, N. S., Mbhenyane, X. G. and Blaauw, R., 2016. Effects of rising food prices on household food security on femaleheaded households in Runnymede Village, Mopani District, South Africa. South African journal of clinical nutrition, 29(2), pp. 69-74.

[11] FAO (Food and Agriculture Organization), 2015. Impact of natural hazards and disasters on agriculture and food security and nutrition. Food and Agriculture Organization of the United Nations.

[12] Jega, A. A., Man, N., Latiff, A. I. and Seng, K. W. K., 2018. Assessing agricultural losses of 2014/2015 flood disaster in Kelantan, Malaysia. Journal of Agricultural Economics and Rural Development, 4(1), pp. 407-415.

[13] Ogwuche, J. A., Christopher, O. and Muhammed, D. K., 2018. Environmental issues and food insecurity in Africa. *International Journal of Environmental Sciences & Natural Resources*, *12*(5), pp. 140-147.

[14] Milan, A. and Ruano, S., 2014. Rainfall variability, food insecurity and migration in Cabricán, Guatemala. *Climate and Development*, *6*(1), pp. 61-68.

[15] Generoso, R., 2015. How do rainfall variability, food security and remittances interact? The case of rural Mali. *Ecological Economics*, *114*, pp. 188-198.

[16] Solaymani, S., 2018. Impacts of climate change on food security and agriculture sector in Malaysia. Environment, Development and Sustainability, 20(4), pp. 1575-1596.

[17] Makuvaro, V., Walker, S., Munodawafa, A., Chagonda, I., Murewi, C. and Mubaya, C., 2017. Constraints to crop production and adaptation strategies of smallholder farmers in semi-arid central and western Zimbabwe. African Crop Science Journal, 25(2), pp. 221-235.

[18] Pourjavid S., Sadighi H., Shabanali Fami H., 2013. Analysis of constrains facing urban agriculture development in Tehran, Iran. International Journal of Agricultural Management & Development 3(1): 43-51.

[19] Valk V. V. D., 2012. Food planning and landscape in the "gastropolis" of New York. In: Paper presented at the Presentation WUR Conference Multifunctional Agriculture and Urban-Rural Relations. April 1st, 2012.

[20] Dimitri, C., Oberholtzer, L. and Pressman, A., 2016. Urban agriculture: connecting producers with consumers. *British Food Journal*, *118*(3), pp. 603-617.

[21] Cabannes, Y., 2012. Financing urban agriculture. *Environment and Urbanization*, *24*(2), pp. 665-683.

[22] Kutiwa, S., Boon, E. and Devuyst, D., 2010. Urban agriculture in low income households of Harare: an adaptive response to economic crisis. *Journal of Human Ecology*, *32*(2), pp. 85-96.

[23] Adedayo, A. and Tunde, A. M., 2013. Challenges of women in urban agriculture in Kwara State, Nigeria. *Sustainable Agriculture Research*, *2*(3).

[24] UNDESA [United Nations Department of Economic and Social Affairs]. (2018). *World Urbanization Prospects: The 2014 Revision* [online]. Available at: https://population.un.org/wup/publications/files/wup2014-report.pdf Accessed 15 April 2025.

[25] Amegnaglo, C. J. (2018) 'Urban agriculture and food security in West Africa: Evidence from Ghana', *Journal of Agricultural Economics*, 12(3), pp. 45-60.

[26] Nicholls, E., Ely, A., Birkin, L., Basu, P. and Goulson, D. (2020). The contribution of small-scale food production in urban areas to the sustainable development goals: A review and case study, *Sustainability Science*, 15(6), pp. 1585-1599. https://doi.org/10.1007/s11625-020-00792-z

[27] Moher, D., Liberati, A., Tetzlaff, J., Altman, D. G. and PRISMA Group*, T., 2009. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *Annals of internal medicine*, *151*(4), pp. 264-269.

[28] Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E. and Chou, R., 2021. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *bmj*, *372*.

[29] Ahmed, J., Woubishet, D. and Semereab, E., 2024. The role and potential of urban agriculture: Exploratory research.

[30] Yalew, A. W., 2020. Urban agriculture in Ethiopia: An overview. Regional Economic Development Research, pp. 85-92.

[31] Mekonnen, D., Gerber, N. and Matz, J. A. (2021) 'Effects of urban agriculture on dietary diversity in Ethiopia', *Agriculture & Food Security*, 10(1), pp. 1-12.

[32] Dubbeling, M., Zeeuw, H. and Veenhuizen, R. (2016) Cities, poverty and food: Multi-stakeholder policy and planning in urban agriculture. Rugby, UK: Practical Action Publishing.

[33] Wubneh, M. (2020) 'Urban farming and income generation in Ethiopia', *African Development Review*, 32(2), pp. 234-247. https://doi.org/10.1111/1467-8268.12432

[34] Food and Agriculture Organization of the United Nations (FAO) (2014) *Growing greener cities in Africa: First status report on urban and peri-urban horticulture in Africa*. Rome: FAO. Available at: http://www.fao.org/3/i3277e/i3277e.pdf (Accessed: 15 April 2025).

[35] FAO. (2019). *Urban Agriculture in Ethiopia: Practices and Prospects*. Food and Agriculture Organization.

[36] Assefa, S. (2018) 'Urban agriculture as a climate resilience strategy in Ethiopia', *Journal of Environmental Management*, 220, pp. 183-191. https://doi.org/10.1016/j.jenvman.2018.05.027

[37] Cofie, O., Drechsel, P. and Veenhuizen, R. (2016). *Cities and agriculture: Developing resilient urban food systems*. London: Routledge.

[38] Tiwari, S. (2021) *The role of urban farming in Ethiopian cities*. Addis Ababa: Ethiopian Urban Development Institute. Available at: http://www.exampleurl.org (Accessed: 15 April 2025).

[39] Smit, J., Ratta, A. and Nasr, J. (2001) 'Urban agriculture: Food, jobs, and sustainable cities', *Journal of Urban Planning and Development*, 127(1), pp. 1-15. https://doi.org/10.1061/(ASCE)0733-9488(2001)127:1(1)

[40] Halle, M., Admassie, A. and Hoddinott, J. (2020). Urban agriculture and household food security in Ethiopia', *Food Policy*, 95, 101938. https://doi.org/10.1016/j.foodpol.2020.101938

[41] Alemu, T., Teshome, D., Mebratu, T., Demelash, M., Tadele, M., Tabor, G., Wendatir, Z. and Diro, S., 2024. Assessment of urban agriculture in addis ababa potentials, practices, challenges, and intervention options.

[42] Nigus, G., Ketema, M., Haji, J. and Sileshi, M., 2024. Determinants of urban agriculture market participation decision and intensity in eastern Ethiopia. *Discover Food*, *4*(1), p. 41.

[43] TAYE, H., 2014. *A socio-economic impact of urban agriculture the case of Addis Ababa* (Doctoral dissertation, St. Mary's University).

[44] Minten, B., Habte, Y., Tamru, S. and Tesfaye, A., 2020. The transforming dairy sector in Ethiopia. *Plos one*, *15*(8), p. e0237456.

[45] Dessie, T., Zewdie, Y., Yilma, Z., Ayalew, W. and Haile, A., 2023. Yelemat Tirufat: An Overview of the initiative and lessons of experience from selected livestock development interventions in Ethiopia.

[46] Belachew, M. M., 2019. Beef cattle fattening practices, constraints and future potentials in Ethiopia: a review. Animal Research International, 16(2), pp. 3401-3411.

[47] Tekeba Eshetie, K. H. a. A. M. 2018. Meat production, consumption and marketing tradeoffs and potentials in Ethiopia and its effect on GDP growth: a review. Journal of Nutritional Health & Food Engineering, 8(3).

[48] Tesfaye, G. and Wolff, M. (2014) 'Urban aquaculture for food security in Ethiopia', *Food Policy*, 45, 36-44.

[49] Abera, L., Hailu, Y. and Getahun, A. (2020) 'Role of urban aquaculture in food security: Evidence from Addis Ababa', *Aquaculture Reports*, 18, 100456.

[50] Kassahun, A., Bogale, A. and Melaku, S. (2019) 'Economic analysis of urban fish farming in Bahir Dar', *Aquaculture Economics & Management*, 23(4), 412-430.

[51] FAO (2018) *Urban and peri-urban aquaculture development in Ethiopia*. Rome: FAO.

[52] *Ethiopian Urban Agriculture Association (EUAA)* (2021) *Employment trends in urban aquaculture: A case study of Adama and Dire Dawa*. Addis Ababa: EUAA.

[53] *Degen, P., van der Werf, H. and Lemma, B. (2021). Circular economy in urban fish farming,* Journal of Cleaner Production*, 320, 128803.*

[54] Lemma, B., Hussen, A. and Desta, A. (2022) 'Integrated aquaculture-agriculture in Addis Ababa', Agricultural Systems, 198, 103389.

[55] Drechsel, P., & Keraita, B. (2014). *Irrigated Urban Vegetable Production in Ghana: Characteristics, Benefits, and Risks*. IWMI.

[56] Haileslassie, A. et al. (2016). *Urban and Peri-urban Agriculture in Ethiopia: A Socio-Economic Study*. ILRI.

[57] Food and Agriculture Organization of the United Nations (FAO) (2019) *Growing greener cities in Africa: Status and trends of urban and peri-urban horticulture*. Rome: FAO.

[58] Mengistie, D., et al. (2020). "Urban Irrigation and Poverty Reduction in Ethiopia." *Agricultural Water Management, 237*, 106-118.

[59] Keraita, B., et al. (2015). *On-Farm Treatment Options for Wastewater Use in Urban Agriculture*. IWMI.

[60] WHO. (2016). *Guidelines for Safe Use of Wastewater in Agriculture*. World Health Organization.

[61] World Bank. (2021). *Ethiopia Climate-Smart Agriculture Report.*

[62] UNEP. (2020). *Green Cities Initiative: Urban Agriculture in Africa*.

[63] Awulachew, S. (2021). *Water Resources and Irrigation Development in Ethiopia*. IWMI.

[64] Ambelu, A., et al. (2018). Heavy Metals in Urban Irrigation Water: A Case Study in Addis Ababa. *Environmental Monitoring and Assessment, 190*(5).

[65] FAO. (2020). Affordable Irrigation Technologies for Urban Farmers.

[66] Ishak, N., Abdullah, R., Rosli, N. S. M., Majid, H., Halim, N. S. A. A. and Ariffin, F., 2022. Challenges of urban garden initiatives for food security in Kuala Lumpur, Malaysia. *Quaestiones Geographicae*, *41*(4), pp. 57-72.