

Urban Agriculture and Food Systems: A Tool for Sustainable Development

*Temitope Ruth Adeyemi, Henry Afolabi, Olorunjuwon David Adetayo and Olajide Isaac Oyedele

Department of Urban and Regional Planning, Obafemi Awolowo University, Ile-Ife, Nigeria

*Corresponding Author

DOI: <https://doi.org/10.51244/IJRSI.2025.12010013>

Received: 24 December 2024; Accepted: 02 January 2025; Published: 31 January 2025

ABSTRACT

Urban agriculture is the production, processing, distribution, and sale of food within urban, suburban, and peri-urban areas for commercial, non-commercial, hobby, educational, or nonprofit purposes. While the food system embraces all the entire range of actors and their interlinked value-adding activities. The activities are: production, processing, distribution, consumption, and disposal of food products, which originate from agriculture (including livestock), forestry, and food industries. Urban agriculture and food system are sufficiently connected as it serves different benefit such as; social, economic, community and health benefits. This serves as a key way to address food security challenges. Food system is hereby, said, to be secured when it is sustainable; delivers food security and nutrition for all. This is such in a way that the economic, social and environmental base to generate food security and nutrition for future generation is not compromised. Urban agriculture is one of the many tools of sustainable city development. It is certainly not a 'panacea for urban ills'. Policy makers are therefore, encouraged to map various types of urban agriculture initiatives in cities, as this could be used as a valuable planning tool to increase the contribution of urban agriculture for a sustainable city development.

Keyword: Urban, Agriculture, Food, Security, Sustainable Development

INTRODUCTION

The movement of people from one place to another is constant and increasing daily. Invariably, the population around the world is growing, reached nearly 8.2 billion mid-2024 and projected to increase to 2 billion over the next 60years (United Nation (UN) News, 2024), and especially becoming predominantly urban. This urban transition, while holding promises of prosperity and development, poses a series of formidable challenges that demand innovative and sustainable solutions. The most pressing challenges stemming from this urban shift are the issue of food security and sustainable development causing instability to the available food system (FAO et al., 2023; Raybould, 2021). A remedy that is increasingly being considered as a solution to ameliorate the stress on the existing food system is urban agriculture. Urban agriculture is described as a horticultural, agricultural, and farming activities carried out on small plots of land in and around urban centres, however some definitions also include animal husbandry (Chatterjee et al., 2020; Graefe et al., 2019).

A more explicit description of urban agriculture was given by Campbell & Rampold (2021) as the production, processing, distribution, and sale of food within urban, suburban, and peri-urban areas for commercial, non-commercial, hobby, educational, or nonprofit purposes. Examples of these activities include: (i) food-producing gardens (home, community, school, institutional, market, and rooftop), (ii) bee, poultry, aquaculture, and animal keeping (goats, pigs), (iii) edible landscaping. (iv) urban farms, including indoor and rooftop farming. (v) innovative food-production methods, such as vertical farming, hydroponics, aquaponics. (vi) farmers' markets, community-supported agriculture (CSA), and mobile produce trucks. As a practice, urban agriculture is growing food on rooftops, balconies, community gardens, and other vacant spaces usually those unsuitable for housing or other developments (Pradhan et al., 2023).

Beach sands of negligible inherent fertility and water holding capacity are used for high income and output, market-oriented (and even export) vegetable production (Drechsel & Dongus, 2010). This is a scenario along the West African coast, where several of Africa's capitals and/or mega cities are located. A typical example is sited on the Lasu-Iba expressway, in Lagos state, Nigeria, where an array of different variety of vegetable is cultivated on an open land along the edges of the expressway. For nutrition and watering purposes, water wells are dug within each plot of farmland to supply water to the vegetables. This serves the community, neighboring environs and even for export. Urban agriculture from its activity and gains provides social, economic, health, and environmental benefits within urban areas and it is considered a valuable part of urban food systems (Ning Yuan et al., 2022).

A food system governs what we eat, serves as a key way to address food security challenges and according to Food and Agricultural Organisation (FAO) (2018), it embraces the entire range of actors and their interlinked value-adding activities. The activities are production, processing, distribution, consumption, and disposal (loss or waste) of food products, which originate from agriculture (including livestock), forestry, and food industries. These also include the broader economic, societal, and physical environments, in which they are embedded. According to Herrero et al. (2020) the range of actors includes science, technology, data, and innovation actors. Though there have been increasing concerns at all levels of governance and in different policy sectors about the food system, according to Mustafa et al. (2021), the food system places intense pressure on both renewable and non-renewable natural resources and currently accounts for about 70% of water use and 30% of global energy consumption. The question then arises on how secured is the food system but for the purpose of this article, the focus is on urban agriculture and food system as a tool for sustainable development.

Urban Agriculture and Food Systems: The Nexus

The link between urban agriculture and food systems is multi-faceted, with various aspects that can be explored in terms of benefits:

1. **Social Benefits:** Localised urban food systems can provide multiple integrated services, such as access to high-quality, fresh produce, food and agriculture education, social connections, and civic engagement. In a study conducted on farms in New York documented by Ning Yuan (2022) found a wide range of shared goals exhibited by the local farmers. Significantly, it outlined the numerous ways in which practitioners contributed to social, political, economic, and environmental problems external to food production. Some such activities included educational programs and workshops on health and nutrition, environmental restoration, and political activism within the realm of UA. Different types of local food system activities, like urban agricultural production and direct marketing, have distinct impacts on participants (Pradhan et al., 2023; Diekmann, Gray & Thai, 2020). In addition, Akter et al. (2022) & Boossabong (2019) documented in terms of policies of urban agriculture in Thailand, it has focused on network building and community cohesion a key components of social capital. Creating a participatory and inclusive system of governance between stakeholders horizontally and between policy implementers vertically.
2. **Economic Benefits:** It increases food security through improved access to food and potential income (Sharma, Suman & Trivedi, 2022), and reduce transportation costs. It can also contribute to local economic development, poverty alleviation, and the social inclusion of the urban poor and women (Gunalan, 2021).
3. **Community and Health Benefits:** Urban agriculture can improve food and nutrition security by increasing the availability of fresh, healthy and culturally appropriate foods. Participation in home and community gardens can support cost savings on groceries and supplement access to otherwise unaffordable foods. Helps reduce runoff associated with heavy rainfall, and lead to better air quality (USDA, 2022).
4. **Ecological and Social Approaches:** Urban agriculture (UA) can contribute to sustainable development goals, including reducing urban poverty, improving health and well-being, creating sustainable cities and communities, mitigating climate change, and promoting life on land. In modern discourses however, UA has greatly evolved as an effective tool and commonly cited solution to many contemporary challenges.

As cited by Ning Yuan (2022), the Sustainable Development Goals (SDGs) set out by the United Nations for the year 2030 is a reality of the types of initiatives in which UA can be employed for developed and developing countries alike. This will also help address challenges such as air and soil contamination, availability of green areas, and layout of urban infrastructure (Benedetti, 2023). Carolan, (2016) suggests urban agriculture efforts can educate urban dwellers about food while encouraging civic engagement and increasing social involvement, all of which contribute to overall societal health and well-being.

Linking Food Security and Sustainability

Food system is said to be secured when it is sustainable; delivers food security and nutrition for all in such a way that the economic, social and environmental bases to generate food security and nutrition for future generation is not compromised (FAO, 2024). In history, the concept of food security has evolved and more recently it has been suggested that sustainability be added as a fifth dimension to encompass the long-term time dimension (Clapp et al., 2022; Berry et al., 2015). The implication of this is to consolidate a more holistic operational framework at each level – regional, national, household and individual. It also brings together, in a comprehensive manner, other important notions such as: sustainable agriculture (FAO, 2013), sustainable economy, sustainable food production (Smith & Gregory, 2013) and sustainable diets (Clapp et al., 2022). Indicators for global food security must be reliable, repeatable and available for the majority of countries of the world. Sustainability can be considered a pre-condition for long term food security.

Measuring Food Security

Universal indicators for measuring food security are challenging. They need to be widely accepted as correct and reasonably objective and to be homogeneous across time and space. Different indicators may be applied to different levels of food security. Suitable indicators for global food security must be reliable, repeatable and available for the majority of countries of the world. There is, however, no accepted agreement as to what are the optimal ones for food security (Berry et al., 2015). The measurement of food security over the years by FAO was mostly based on energy deprivation and protein deficiency. Proposed originally by Sukhatme, FAO used the parametric indicator –prevalence of undernourishment to monitor the food security in the world. The annual “The State of Food Insecurity in the World” report from FAO is considered the official release of the food insecurity worldwide. As concluded also by the International Scientific Symposium on Measuring Food and Nutrition Security, held in January 2012 at FAO, given the existing data, the prevalence of undernourishment remains one of the few indicators available with wide coverage and comparability across time and space. At the same time, it is well recognized that as a standalone indicator, prevalence of undernourishment is not able to capture the complexity of all the dimensions of food security and that a more comprehensive approach to the measurement is required (Berry et al., 2015). FAO, the International Fund for Agricultural Development and the World Food Programme (FAO, WFP & IFAD, 2012, 2013) have proposed a suite of food security indicators, in which each food security dimension is described by a number of indicators. Efforts are also underway to summarize these indicators into aggregated indices.

Linking Food System with Sustainability

A sustainable food system “is a food system that ensures Food Security and Nutrition (FSN) for all in such a way that the economic, social and environmental bases to generate FSN for future generations are not compromised” (HLPE, 2017). It has been internationally agreed that climate change is a threat to the sustainability of food system. However, the activities involved in food systems, account for some 20%–30% of all human-associated greenhouse gas (GHG) emissions, and, as such, contribute to climate change (Mustafa et al., 2021). There might be a trade-off relationship between decreasing human associated GHG and guaranteeing food security under current prevailing food system. Therefore, a systematic and integrated approach is needed, to meeting the short- and long-term requirements of FSN, meanwhile, to mitigating the negative environmental impact due to GHG from the activities involved in food system itself. Food system is therefore at the heart of the 2030 Agenda for Sustainable Development though it varies significantly from country to country in terms of actors, technology and type of resources used.

Urban agriculture therefore, has many potential benefits, but its impact and sustainability are constrained by a number of issues. Such as; urbanisation-induced displacement of prime agricultural land in urban areas, due to rapid and uncontrolled population growth, and extensive land-use changes (Mustafa et al., 2021; Ayambire et al., 2019). This is evident in the findings of Awoniran, Olugbamila & Omisore (2020) study on urban agriculture in Lagos Metropolis which gives an indication that food security is under threat as the land available to urban farmers continue to shrink. Hence, Veenhuizen (2006) and Awoniran, Olugbamila & Omisore (2020) submitted that, currently, the challenge of UA could be solved by its integration into city planning and facilitation of its multiple benefits for urban inhabitants.

CONCLUSION

In this paper, UA was explored in terms of definitions and its relationship with the food system. It could be used to foster social, economic, and environmental aspects of sustainable city development. However, just like sustainable development in general, in practice it will be difficult to balance the various pillars of sustainable city development by means of UA. Therefore, it makes sense to invest in UA to counter the most urgent challenges in the city (e.g. fighting hunger, upgrading old industries, or social integration). At the same time, UA is just one of the many tools of sustainable city development. It is certainly not a 'remedy for urban ills' from that perspective, cities should invest in the right type of UA at the right place and for the right reasons, while being realistic about its potential. Therefore, policy makers are encouraged to map various types of UA initiatives in their cities. Such database could be used as a valuable planning tool to increase the contribution of UA for sustainable city development.

REFERENCES

1. Akter, Sonia & Gupta, Bhavya. (2022). Case Studies in Urban Agriculture. 10.13140/RG.2.2.20684.90241.
2. Awoniran, D.R., Olugbamila, O.B. & Omisore, E.O. (2020). Spatio-Temporal Analysis of the Practice of Urban Agriculture in Lagos Metropolis and the Implications for Urban Planning. *Analele Universității din Oradea, Seria Geografie*, 30(1), 76-87. <https://doi.org/10.30892/auog.301109-819>
3. Ayambire, A. R., Amponsah, O., Peprah, C. & Takyi, S. A (2019). A review of practices for sustaining urban and peri-urban agriculture: Implications for land use planning in rapidly urbanising Ghanaian cities, *Land Use Policy*, Vol. 84(260-277), ISSN 0264-8377, <https://doi.org/10.1016/j.landusepol.2019.03.004>.
4. Bennedetti, L.V., De Almeida Sinisgalli, P.A., Ferreira, M.L., & Lemes de Oliveira, F. (2023). Challenges to Promote Sustainability in Urban Agriculture Models: A Review. *Int. J. Environ. Res. Public Health* 2023, 20, 2110. <https://doi.org/10.3390/ijerph20032110>
5. Berry, E. M., Dernini, S., Burlingame, B., Meybeck, A., & Conforti, P. (2015). Food security and sustainability: Can one exist without the other? *Public Health Nutr. Journal* 18, 2293-2302.
6. Boossabong, P. (2019). Governing Bangkok's city food system: Engaging multi-stakeholders for smart, sustainable and inclusive growth. *City, Culture and Society*, 16, 52-59.
7. Campbell, C. G., & Rampold, S. D. (2021). Urban Agriculture: Local Government Stakeholders' Perspectives and Informational Needs. *Renewable Agriculture and Food Systems*, 36(6), 536-548. <https://doi.org/10.1017/S1742170521000156>
8. Carolan, M. (2016). *The sociology of food and agriculture: Second edition.* 10.4324/9781315670935.
9. Chatterjee, A., Debnath, S., & Pal, H. (2020). Implication of urban agriculture and vertical farming for future sustainability. In *Urban horticulture-Necessity of the future.* Intech Open.
10. Clapp, J., Moseley, W.G., Burlingame, B. & Termine, P. (2022). Viewpoint: The case for a six-dimensional food security framework, *Food Policy*, Volume 106, 2022, 102164, ISSN 0306-9192, <https://doi.org/10.1016/j.foodpol.2021.102164>.
11. Diekmann, L.O, Gray, L. C & Thai, C. L. (2020.) More Than Food: The Social Benefits of Localized Urban Food Systems. *Front. Sustain. Food Syst.* 4:534219. doi: 10.3389/fsufs.2020.534219.
12. Drechsel, P. & Dongus, S. (2010). Dynamics and sustainability of urban agriculture: Examples from sub-Saharan Africa. *Integrated Research System for Sustainability Science*, 5:69-78. DOI: 10.1007/s11625-009-0097-x.

13. Food and Agricultural Organisation (FAO) (2013). World food and agriculture. FAO statistical yearbook. <http://www.fao.org/4/i3107e/i3107e00.htm>
14. Food and Agricultural Organisation (FAO) (2018). <http://www.fao.org/3/ca2079en/CA2079EN.pdf>
15. Food and Agricultural Organisation (FAO) (2023). The State of Food and Agriculture 2023 – Revealing the true cost of food to transform agrifood systems <https://openknowledge.fao.org/items/1516eb79-8b43-400e-b3cb-130fd70853b0>
16. Food and Agricultural Organisation (FAO) (2024). Global forum for food and agriculture. www.fao.org
17. FAO, WFP & IFAD (2013). The state of food insecurity in the world 2013: The Multiple Dimensions of Food Security. FAO, Rome.
18. Graefe, S., Schlecht, E. & Buerkert, A. (2019). Trends and gaps in scholarly literature on urban and peri-urban agriculture. *Nutrient Cycling in Agroecosystems* 115(3). DOI: 10.1007/s10705-019-10018-z.
19. Gunalan, S. (2021). Urban Agriculture for Sustainable Poverty Alleviation and Food Security. 10.13140/RG.2.2.33247.
20. Herrero, M, Thornton, PK, Mason-D’Croz, D et al. (2020). Innovation can accelerate the transition towards a sustainable food system. *Nature Food*, 1 (5). pp. 266- 272. ISSN 2662-1355. <https://doi.org/10.1038/s43016-020-0074-1>.
21. HLPE (2017). Nutrition and Food Systems. HLPE Report 12. A report by High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security (HLPE), Rome.
22. Mustafa, M. A., Mabhaudhi, T. & Massawe, F. (2021). Building a resilient and sustainable food system in a changing world – A case for climate-smart and nutrient dense crops, *Global Food Security*, Vol. 28, 100477, ISSN 2211-9124, <https://doi.org/10.1016/j.gfs.2020.100477>.
23. Ning Yuan, G., Marquez, G. B., Deng, H., Iu, A., Fabella, M., Salonga, R. B., Ashardiono, F. & Cartagena, J. A (2022). A review on urban agriculture: technology, socio-economy, and policy, *Heliyon*, Vol. 8(11) e11583, ISSN 2405-8440, <https://doi.org/10.1016/j.heliyon.2022.e11583>.
24. Pradhan, P., Callaghan, M., Hu, Y., Dahal, K., Hunecke, C., Reusswig, F., Lotze-Campen, H. & Kropp, J. P. (2023). A systematic review highlights that there are multiple benefits of urban agriculture besides food, *Global Food Security*, Vol. 38, 100700, ISSN 2211-9124, <https://doi.org/10.1016/j.gfs.2023.100700>.
25. Raybould, A. (2021). Improving the politics of biotechnological innovations in food security and other sustainable development goals. *Transgenic Research*, 30(5), pp.613-618.
26. Sharma, A., Suman, S. & Trivedi, A. (2022). Food Security and Nutrition and Sustainable Agriculture: key points for Achieving SDGs. In book: *New Dimension of Agricultural Sciences*. Publisher: Vital Biotech.
27. Smith, P. and Gregory, P.J. (2013) Climate Change and Sustainable Food Production. *The Proceedings of the Nutrition Society*, 72, 21-28. <https://doi.org/10.1017/S0029665112002832>.
28. USDA. (2022). Food Security in the U.S. <https://www.ers.usda.gov/topics/foodnutrition/assistance/food-security-in-the-us/interactive-charts-and-highlights/#trends>
29. United Nations (UN) News (2024). Global perspective Human stories. Growing or shrinking? What the latest trends tell us about the world’s population | UN News <https://news.un.org/en/story/2024/07/1151971>
30. Veenhuizen R. V. (2006). Cities farming for the future: Urban Agriculture for Green and Productive Cities. (C) Resource Centres on Urban Agriculture and Food Security (RUAF) Foundation.