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Comparative Study of World Urban Farming Practices: Efforts to Support Food Security and Environmental Conservation

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Abstract

Accelerated urbanization, climate change, and rising food insecurity have led cities to adopt urban agriculture to improve food systems and support environmental sustainability. This study provides a comparative analysis of urban agriculture practices in seven countries: Iran, the United Kingdom, Argentina, South Korea, Singapore, Zimbabwe, and New Zealand. It examines how these practices contribute to food security and environmental conservation. Methods like community gardens, rooftop and vertical farming, permaculture, and community agroecology differ across contexts. They reflect varying levels of government support, ranging from strong policy-driven models in Singapore and South Korea to community-led initiatives in Zimbabwe and Iran. Urban agriculture plays a significant role in food security, especially in regions vulnerable to food shortages and in national food strategies. It also offers environmental benefits, including the creation of green spaces, climate mitigation, urban heat reduction, resource conservation, and improved biodiversity. The findings, based on a literature review of academic studies, policy reports, and case studies, show that the success of urban agriculture hinges on its fit with local conditions, support from policy frameworks, and its integration into broader sustainable development approaches. This positions urban agriculture as an important tool for building resilient urban food systems.

Keywords: *urban agriculture, food security, environmental conservation, public policy, comparative studies, sustainable development*

Introduction

Urban farming, which refers to agriculture in cities, has grown in recent decades as a response to several challenges, including food security, climate change, and environmental issues in urban areas. Many cities worldwide are facing problems due to urbanization, like limited green space and a heavy reliance on the global food supply chain. This supply chain is vulnerable to geopolitical conflicts, pandemics, and climate change.(Gatson et al., 2022; Khan et al., 2024) Urban farming has emerged as a nature-based solution. It provides fresh food for cities and supports sustainable development, biodiversity conservation, and stronger social ties in increasingly fragmented communities.(Cabral et al., 2017; Di Pietro et al., 2018)

Urban farming uses various facilities and infrastructure, including rooftop gardens, vertical greenhouses, aquaculture, hydroponics, and integration with public green spaces and underutilized land.(J. Kim et al., 2020; Teoh et al., 2024) Besides serving as a method of food production, urban farming is also recognized for its social, cultural, and environmental benefits. Communities or social groups play an important role in promoting mental health.

Method

This study uses a qualitative approach and compares findings based on a literature review. Data were gathered from scientific journal articles, policy reports, publications from international institutions, and case studies related to urban agriculture practices in seven countries that were the focus of the study. The sources were chosen based on their recency, credibility, and relevance to food security and environmental preservation. The data were analyzed thematically to identify the types of urban agriculture practices, their main goals, the level of government support, and their impact on food security and environmental safety. The analysis compared the similarities and differences between countries and examined the factors that affect the successful implementation of each practice in the local social, economic, and ecological contexts.

Result and Discussion

Global Urban Farming Development

Urban farming has rapidly expanded in recent decades due to challenges related to food security, climate change, and environmental degradation in cities. Cities globally are experiencing pressures from fast urbanization, limited green spaces, and a heavy reliance on global food supply chains that can be disrupted by geopolitical conflicts, pandemics, and climate disasters.(Gatson et al., 2022; Khan et al., 2024; Simbolon & Wiranata, 2021) In this situation, urban farming acts as a nature-based solution, providing fresh and nutritious local food while also contributing to sustainable development, biodiversity protection, and enhancing social cohesion in fragmented urban areas.(Cabral et al., 2017; Di Pietro et al., 2018)

Urban farming practices encompass a variety of forms, including community gardens, rooftop farms, vertical greenhouses, aquaponics, and hydroponics, as well as integration with green open spaces and previously unproductive land.(J. Kim et al., 2020; Teoh et al., 2024) Beyond food production, urban agriculture carries significant social, cultural, and ecological dimensions. For instance, community gardens have been shown to improve mental health, strengthen social networks, and foster ecological awareness across generations.(Gray et al., 2022; Hou, 2017; Sharif & Ujang, 2021) In some cases, urban farming even takes on a political role by promoting food sovereignty, advocating for the right to urban spaces, and encouraging forms of “quiet activism” through active citizen participation.(Ghose & Pettygrove, 2014; Kanosvamhira & Tevera, 2024)

Major cities like Singapore, Seoul, Rosario, London, and Berlin have incorporated urban farming into their spatial planning policies and food security strategies, using it as a tool for mitigating climate change.(Caputo et al., 2023; Lucena & Massuia, 2022; Park & Ahn, 2013) Nonetheless, the success of urban farming largely depends on the socio-political environment, institutional support, community capacity, and available technological advancements. In some places, urban farming emerged from grassroots movements reacting to economic crises or social marginalization, while in others, it is actively promoted by the government as part of smart and resilient city planning.(Low, n.d.; Sia et al., 2023) Urban farming includes various types of agriculture in cities such as community gardens, rooftop gardens, vertical farming, and micro-agriculture. This concept goes beyond simple food production to also include social, ecological, and economic values. Cabral et al., (2017) note that urban gardens serve as nature-based solutions addressing various social goals like well-being, community connections, and climate adaptation. Moreover, Khan et al., (2024) and Teoh et al., (2024) point out that urban farming can lower the carbon footprint of food transportation, enhance resource efficiency, and strengthen community resilience to shocks in the global food system. In this light, urban farming is not merely a method of food production; it also forms an integral part of the ecological and social systems of cities.

Global Urban Farming Case Study

a. Tehran, Iran

Asl & Azadgar (2022) investigated the distribution of community gardens in Tehran and found a strong correlation with residents' socioeconomic status. In wealthier areas, community gardens are typically better organized, more productive, and receive more support from local policies. In contrast, in lower-income neighborhoods, community gardens tend to be driven by subsistence needs and community solidarity.

This suggests that urban farming serves as a means for socioeconomic adaptation, though access to it is still not fully equitable. Urban planning needs to be more inclusive so that the benefits of urban farming can reach all societal levels. As Ghose & Pettygrove (2014) note, urban farming spaces in cities provide platforms for expressing citizenship and claiming rights to city spaces, particularly for marginalized groups with limited access to resources.

Additionally, Egerer et al. (2024) stress the importance of maintaining the autonomy and flexibility of community gardens to promote spatial and ecological justice. Without supportive policies, community gardens risk becoming temporary projects, vulnerable to commercial pressures and evictions. This concern is particularly relevant in Tehran, where infrastructure development and land requirements often ignore the socio-ecological value of community gardens. Thus, urban farming in Tehran not only reflects adaptive strategies to food insecurity, but also becomes a battleground for rights to space, ecological justice, and recognition of local knowledge in urban growth.

b. United Kingdom

A study by Caputo et al. (2023) reveals that community gardens in the UK are highly productive, even though they are managed on a voluntary basis. In some instances, community gardens produce more than 1.5 kg of food per square meter during a growing season, showing significant potential to contribute to community-based food systems. This is further supported by a study from Lin et al. (2024), which highlights the crucial role community gardens play in urban food production, despite the uneven distribution of benefits among the involved communities.

However, key challenges include financial sustainability and insufficient policy backing from local governments. Clarke et al. (2019) point out that urban farming in the UK is still regarded as a marginal activity in city policies, despite its potential to adapt to climate change by increasing water absorption and reducing the heat island effect. The lack of integration into city planning means that many community garden projects rely on donors or self-help initiatives that are susceptible to disruptions.

Wesener et al. (2020) highlight the importance of the “placemaking” aspect in developing community gardens in Europe, including the UK. The success of community gardens depends on more than just production; it also relies on their ability to create inclusive public spaces, strengthen social networks, and provide safe environments for residents to gather and learn.

Therefore, case studies from the UK illustrate that productive urban farming requires structural policy support that facilitates land access, long-term security, and integration into local food systems. The ecological and social potential of community gardens must be recognized as a vital part of urban infrastructure in addressing food and climate challenges.

c. Rosario, Argentina

In Rosario, Argentina, urban farming has become part of a social movement rooted in agroecology principles. Couretot et al. (2022) observe that this practice aims not only at food security, but also at

addressing social inequality and boosting the economies of marginalized communities. The local government leads the program in collaboration with civil society organizations, offering agroecology training, access to unused lands, tool assistance, and free seed distribution to urban farmers. This initiative transforms urban spaces into productive areas while enhancing citizen involvement in the local food system.

The agroecology model in Rosario emphasizes a comprehensive approach to urban agriculture, focusing on biodiversity conservation, soil protection, and healthy food production without chemical pesticides. This aligns with findings from Sánchez & Aguilar (2021), which show that urban farming practices in various Latin American regions help create organic food grounded in community values and sustainability.

Urban farming in Rosario also demonstrates strong ecological activism as residents use farming to reclaim public spaces and advocate for food justice. In agreement with Kanosvamhira & Tevera (2024), this type of urban farming reflects "quiet activism", a form of resistance expressed in the everyday actions of citizens working towards food sovereignty. The situation in Rosario illustrates how urban farming can evolve from a mere survival tactic into a tool for socio-political change, tackling the issues of social exclusion and promoting more equitable, participatory, and sustainable food governance.

d. South Korea

South Korea has taken an integrated, policy-driven approach to developing urban farming, especially rooftop gardens in densely populated cities like Seoul. Kim et al. (2020) show that rooftop gardens designed under green building policies can lower surface temperatures by up to 3°C, helping mitigate the heat island effect and improve energy efficiency in buildings. Park & Ahn (2013) note that the Korean government actively supports urban farming as part of its sustainable city development strategy by providing incentives, drafting supportive regulations, and offering technical training to residents.

Experiments at the SAHA Disabled Welfare House S.-H. Kim et al. (2012) demonstrate how urban farming can serve as a means for social empowerment, especially for vulnerable groups like people with disabilities. In this instance, the rooftop garden became not only a space for food production but also a social and psychological space to aid in recovery and social integration. This highlights the potential of urban farming to provide therapeutic and inclusive benefits that extend beyond just economic and environmental factors.

Furthermore, Clarke et al. (2019) stress that effective urban farming policies in South Korea show how government intervention can foster collaboration between the public sector, local communities, and educational institutions. This approach aligns with the nature-based solutions framework promoted in global climate adaptation policies. Thus, South Korea exemplifies how urban farming can be strategically integrated into city governance while still allowing for social experiments that enhance inclusion, mental health, and the resilience of urban communities.

e. Singapore

Singapore employs one of the most integrated and high-tech approaches to urban farming. Nicholas et al. (2023) and Sia et al. (2023) indicate that the Singaporean government actively incorporates vertical farming, hydroponics, and aquaponics into urban infrastructure, such as government buildings, community centers, and public facility rooftops. This strategy aligns with Singapore's national goal of

achieving 30% local food production by 2030, aiming to reduce dependence on imports and improve national food security.

Lucena & Massuia (2022) note that urban farming in Singapore functions not only as a food source but also as a method for cutting carbon emissions, improving energy efficiency, and adapting to climate change. This high-tech urban farming system is designed to be water-efficient, low-waste, and environmentally friendly. For instance, closed systems in hydroponic farming enable effective water and nutrient circulation without causing environmental pollution.

Low's (n.d.) research suggests that Singapore's success is linked to robust government policy support, including financial incentives, spatial regulations, and the development of an agritech innovation ecosystem. The government also promotes participation from private sectors and startups in building urban farming systems, making this sector a central part of the national green economy strategy.

Despite its high-tech nature, urban farming in Singapore also addresses social aspects through education and engagement programs, such as vertical community gardens in HDB housing estates. This illustrates how technology, policy, and community involvement converge to create a resilient and sustainable urban food system. In this way, Singapore serves as a prime example of how a city-state can meet land and resource limitations through innovative approaches, positioning urban farming as a crucial component of national resilience and a transition to a low-emission city.

f. Aotearoa, New Zealand

Research by Wesener et al. (2025) in Christchurch, Aotearoa New Zealand, highlights the importance of spatial factors in the success of urban farming, particularly community gardens. They found that the location and accessibility of community gardens significantly affect how local communities can use them for food, education, and social interaction. Urban farming is viewed not just as a food solution but also as a "placemaking" strategy, creating meaningful social spaces for urban communities. Community gardens in Christchurch are designed collaboratively with the city government, local organizations, and residents, fostering a sense of ownership, participation, and community identity. This aligns with findings from Hou (2017) regarding community gardens as multifunctional spaces that connect ecological, social, and cultural aspects of urban landscapes.

Clarke et al. (2019) highlight that urban farming, particularly through community gardens, is crucial for adapting to climate change in cities. In Aotearoa, community gardens help manage stormwater with natural drainage, create cooler areas, and support local plant and insect species that promote biodiversity. The collaborative approach in Christchurch shows how urban farming can build social ties, reduce inequalities in access to green spaces, and support climate-resilient urban development. Thus, urban farming serves as both an ecological and social practice that fits into urban planning.

Country/Region	Type of Urban Farming	Main Objective	Government Support	Contribution to Food Security	Contribution to Environmental Sustainability
Iran	Community gardens	Social solidarity and survival	Limited	High impact in low-income areas	Creation of green spaces and improved air quality
United Kingdom	Community gardens	Food production and social cohesion	Moderate	Significant at the community level	Green infrastructure and climate change mitigation
Argentina	Community agroecology	Community empowerment and	Strong (local level)	Provides alternatives to	Soil regeneration and biodiversity

		food justice		industrial food systems	conservation
South Korea	Rooftop gardens	Urban aesthetics and energy efficiency	Strong	Efficient but limited in scale	Urban heat reduction and carbon sequestration
Singapore	Vertical farming	National food security strategy	Very strong	Strategic and highly sustainable	Circular systems with low environmental emissions
Zimbabwe	Permaculture	Food sovereignty and self-reliance	Minimal	High impact in food-insecure communities	Water management and soil conservation
New Zealand	Inclusive community gardens	Social inclusion and rehabilitation	Strong (local level)	Fair and inclusive food access	Natural drainage systems and public green spaces

Table 1. Global Comparation of Urban Farming

Source: Processed by the Author

Impact on Food Security and Environmental Conservation

Urban farming is increasingly viewed as a versatile strategy that can tackle challenges brought by urbanization, environmental harm, and food security worldwide. As cities grow, space for food production becomes scarcer, and the effects of climate change necessitate more adaptive and sustainable food systems.(Khan et al., 2024) This analysis reviews seven case studies from Iran, the UK, Argentina, South Korea, Singapore, Zimbabwe, and New Zealand. While each has different practices, goals, and levels of policy support, they all aim to improve food security while protecting the environment.

In Iran, community gardens are essential for low-income urban communities. Research by Asl and Azadgar (2022) shows that community gardens in Tehran are mainly found in poor areas and serve as a survival strategy for those lacking access to food and green spaces. Government support is limited, so the sustainability of this practice relies heavily on community bonds. Besides providing food, these gardens offer a space for social interaction, helping combat urban isolation.(Ghose & Pettygrove, 2014) In the UK, community gardens have been part of the urban fabric for a long time, functioning as both food production areas and social hubs. A study by Caputo et al. (2023) found that when managed collectively, UK community gardens can achieve high production efficiency despite their generally small size. The government offers moderate support mainly through green infrastructure programs and climate policies.(Cabral et al., 2017) Furthermore, community gardens are crucial for climate change adaptation by enhancing soil permeability and reducing the urban heat island effect(Clarke et al., 2019; Simbolon & Wiranata, 2021).

Argentina is notable for its community agroecology approach, especially in Rosario, Santa Fé. Couretot et al. (2022) mention that this initiative, led by local governments, aims to empower low-income communities through sustainable food production. Agroecology not only increases food availability but also improves soil health and enhances biodiversity.(Di Pietro et al., 2018) This method provides an alternative to industrial food systems, which often exploit communities and perpetuate social injustice. South Korea is focusing on rooftop gardens to address land shortages in crowded cities. Rooftop gardens in Seoul can lower building surface temperatures by up to 5°C, thus reducing energy needed for cooling. Supported by strong policies,(J. Kim et al., 2020; Park & Ahn, 2013) South Korean rooftop gardens blend aesthetics, energy efficiency, small-scale food production, and also emphasizes the social benefits of these gardens, particularly in fostering community engagement and connection among residents.

Singapore exemplifies state support for urban agriculture with its “30 by 30” policy, which aims for 30% domestic food production by 2030. High-tech vertical farming is central to this strategy, utilizing space efficiently while reducing carbon emissions. Robust policy backing has allowed Singapore to weave urban farming into its national food security approach and low-emission circular economy.(Lucena & Massuia, 2022; Nicholas et al., 2023; Sia et al., 2023) If we look at to the other continent, Zimbabwe uses permaculture systems to bolster food sovereignty in areas with food insecurity. Limited government assistance has pushed communities to apply local knowledge for sustainable water and land management.(Kanosvamhira & Tevera, 2024) Permaculture adapts well to dry climates and aids in conserving natural resources. This shows that community-driven initiatives can succeed even without state support, provided they are socially accepted and contextually appropriate.

In New Zealand, community gardens focus on social rehabilitation and inclusion of marginalized groups. The location of community gardens in Christchurch was carefully chosen for easy access by all residents. Local government support is strong, aiming to transform parks into green public spaces, natural drainage systems, and environmental education hubs. Also, the success of New Zealand’s community gardens is heavily influenced by factors like placemaking and community participation.(Wesener et al., 2020, 2025) Overall, the contributions to food security in these seven countries can be categorized in two ways. First, there is a focus on increasing food access in food-insecure areas, as seen in Iran and Zimbabwe, where urban farming operates as a social safety net. Second, national efforts aim to lessen dependence on imports, such as in Singapore, where vertical farming technology addresses key food needs.(Modibedi et al., 2021; Teoh et al., 2024)

The contributions to environmental conservation also vary. In places like the UK, New Zealand, and Iran, urban farming provides green spaces that enhance air quality and support biodiversity. In South Korea, rooftop gardens help mitigate climate change and lessen the heat island effect.(J. Kim et al., 2020; Seitz et al., 2022) In Argentina and Zimbabwe, agroecology and permaculture contribute to soil and water conservation. Meanwhile, vertical farming in Singapore cuts carbon footprints by optimizing food supply chains.(Kanosvamhira & Tevera, 2024; Lucena & Massuia, 2022)

This analysis indicates that strong policy support speeds up technology adoption and expands production scale, as shown in Singapore and South Korea. However, community-based initiatives without extensive support can also be effective if they match local needs, as seen in Zimbabwe and Iran. Key success factors include active community engagement,(Hou, 2017; Sharif & Ujang, 2021) access to resources, and the ability to adjust to local social and economic conditions.

From a policy standpoint, incorporating urban farming into urban planning and national food security strategies can bolster the resilience of urban food systems against external shocks. Sharing knowledge between countries could also help spread best practices suited to specific local contexts.(UCLG-ASPAC, n.d.) Thus, despite differences in structure, goals, and government backing, urban farming practices across these seven countries demonstrate that a mix of technical innovation, community involvement, and policy support can lead to resilient and environmentally friendly urban food systems.

Conclusion and Recommendations

A comparative study of seven urban farming practices in Iran, the UK, Argentina, South Korea, Singapore, Zimbabwe, and New Zealand reveals that urban agriculture has two main roles: enhancing food security and aiding environmental conservation. The diverse practices, from community gardens and agroecology to rooftop gardens, permaculture, and vertical farming, show that no single model works universally. Successful implementation depends largely on how well the approach fits with the local social, economic,

and ecological setting, and the level of policy support provided. Countries like Singapore and South Korea, which have robust policy and technological backing, can achieve production targets and innovate more rapidly. On the other hand, community-driven methods in Iran, Zimbabwe, and Argentina demonstrate that citizen engagement and local knowledge can thrive despite limited government support. By melding technological advancements, community participation, and policy integration into urban planning, urban farming can be a long-lasting solution to food and environmental issues in an era of increasing urbanization and climate change.

To maximize the potential of urban farming for food security and environmental protection, these practices must be integrated into urban planning to ensure sustainable land use, supporting infrastructure, and regulations. The government should enhance policy support through incentives, subsidies for seeds and technology, and relaxed regulations for communities and the private sector. Increasing community capacity through training, workshops, and mentoring can enhance skills, efficiency, and production quality. A mixed method that combines high-tech solutions like vertical farming and hydroponics with community models like agroecology and permaculture may effectively tackle production challenges while ensuring ecological sustainability. Additionally, strengthening collaboration among the government, academic institutions, businesses, and local communities can optimize research, funding, distribution of benefits, and technological advancements. Urban farming should also be structured as a climate change adaptation strategy by reducing the heat island effect, conserving water, and boosting biodiversity in urban spaces.

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