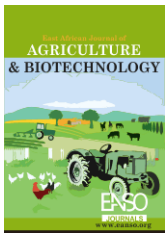

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Original Article

Effects of Urban Agriculture on the Socio-Economic Status of Farmers in Cities of Sub-Sahara Africa. A case of Zambia, South Africa, and Nigeria: A Review

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ABSTRACT

This paper reviews the current literature concerning the effect of urban agriculture on the socio-economic status of urban farmers in Sub-Sahara African Cities. The main objective of this review is to examine the impacts of urban agriculture on the socio-economic status of urban farmers in Sub-Sahara African Cities. Specifically, the paper reviews the impact of urban agriculture on income and food security as well as the benefits and challenges affecting urban Agriculture development in selected cities of sub-Saharan African countries. This paper reviews different articles and papers on urban farming in Sub-Sahara Africa and globally. The review posits that there is scanty information on how urban agriculture affects farmers' socio-economic status in sub-Saharan Africa. How farmers derive their social and economic status by engaging in urban agriculture, and the types and motivations of farmers are not clear. The review suggests that understanding the factors that are crucial for food security, income and related benefits in urban agriculture is essential to developing the right technologies and policies.

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INTRODUCTION

World Over Cities invests in Urban Agriculture (UA) initiatives (Van. Tuijl et al., 2018). This is backed by a variety of rationales and policies. On both the global and domestic fronts, UA is taking on many forms and is being driven by several motivations, which include farmers' interests, marketing systems, extension services, and policies on urban farming (Kirkpatrick & Davison, 2017). In the early years of urban farming, the practice was limited to simple agricultural practices meant to produce food and income to supplement the needs of the poor (Nicholls et al., 2020). As the practice increased in size and needs, the forms of UA increased, and the motivations increased (Stewart et al., 2013). The term 'urban agriculture' is spreading across developed and developing countries worldwide. In developing countries, UA is particularly used to feed the rapidly growing population (Gouldson et al., 2018), while in developed countries, UA is usually associated with lifestyle, health, community development, and innovation. According to Thebo et al. (2014), "urban agriculture" means the practice of growing crops, aromatic plants, herbs, spices, and ornamentals and the rearing of fish, poultry, and livestock for food, income, environment management, and medicine in and around the cities, towns & urban environments; and includes the processing and marketing of such products.

UA is now being 'formalised' due to its significant contributions to urban food systems, ecosystems, and the economy (Kangogo et al., 2020). Because of this formalisation, some countries in Sub-Sahara Africa (SSA) now have 'Urban Agriculture Directorates' as part of their government departments. UA in SSA encompasses a complex and diverse mix of production and marketing activities. The most common systems are 1) backyard gardening (mostly subsistence); 2) open space crop cultivation for irrigated vegetables, flowers and ornamentals, seedlings, and rain-fed cereals (mostly market-oriented); and 3) the rearing of livestock, small ruminants, aquaculture, and poultry (both subsistence and market-oriented) (Drechsel et al., 2006). Urban production systems are usually very intensive and small-scale due to the lack of farming space caused by competition from other sectors, especially housing. Production is supported by a marketing network and, to a lesser extent, processing systems. Regardless of the aforementioned developments in urban agriculture, there is still scanty information relating urban agriculture to the socio-economic status of urban farmers in sub-Sahara Africa. How farmers derive their social and economic status by engaging in urban agriculture, and the types and motivations of farmers are not clear. The review suggests that understanding the factors that are crucial for income and food security in urban agriculture is essential to developing the right technologies and policies. The review specifically looks at a) the impact of urban agriculture on the income and food security of Urban Farmersb) the challenges and opportunities affecting urban Agriculture development in sub-Saharan Africa.

METHODS

Secondary data was collected through the review of relevant published academic literature such as journal articles, books, periodicals, and unpublished literature (grey literature). The information considered in this review focuses on establishing the relationship between urban agriculture and income, then food security and the opportunities and challenges facing urban agriculture.

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RESULTS

Farmer Income and Food Security

Impact of Urban Agriculture on the Income of Urban Farmers

According to Mupeta et al., (2020) in their study about the impact of urban agriculture on household income in Zambia, they used the propensity score matching (PSM) method on urban agriculture and non-urban agriculture practising households. Information was from the analysis of results that were based on the 2007/2008 Urban Consumption/Expenditure secondary data collected in Kitwe and Lusaka districts, with a total sample size of 2,682 urban households, revealed that the results from the three matching algorithms as shown in Table 1. The nearest neighbour matching methods showed that urban agriculture had a positive and significant impact on household income. Engaging in urban agriculture increased household income by 19.1%. Likewise, radius matching methods indicated that urban agriculture had a positive and significant impact on household income. Practising in urban agriculture increased household income by 13.7%. Kernel matching methods further confirmed the impact of urban agriculture on household income.

According to the kernel matching method, urban agriculture increased household income by 14.5%. All three matching methods used were consistent with the estimated impact of urban agriculture on household income, with a very narrow variation in the estimates. It can be observed and concluded from the results that controlling for observable characteristics, participation in urban agriculture would increase household income in the ranges of 13.7% to 19.1%. These results were significant at a 95% confidence level. These results are consistent with other studies such as Salcu and Attah (2012) and Zezza and Tasciotti (2010), who also concluded that urban agriculture is positively related to household income. In addition, Ogot (2016) confirmed the findings in his study that established that income generation from urban agriculture is able to improve the living standards of farmers and contribute to poverty reduction, thereby improving the purchasing power of farmers and creating a market for industrial products.

Table 1: Expected log of total household income: treatment effects of urban agriculture in Kitwe and Lusaka districts.

Variable	Matching method	Sample	AU Participants	AU-non-participants	ATT	S.E	t-Stat
Log of Total household income	Nearest Neighbour	Matched	9.1382	8.9472	0.191	0.05	3.82
	Radius	Matched	9.1137	8.9764	0.1373	0.0426	3.22
	Kernel	Matched	9.118	8.973	0.1445	0.0431	3.35

Source: Mupeta, Kuntashula & Kalinda (2020)

Impact of Urban Farming on Food Security

Urban agriculture ensures a constant food supply, thus enhancing the population's food security (Foeken, 2006). According to Sangwan and Tasciotti (2023), food security is looked at in terms of increased food diversity both in quality and quantity and a decrease in food expenditure by the household. In addition, Anberbir (2022) further gave a more current and worldwide accepted definition of food security, which was revised at the World Food Summit in 1996 by combining additional dimensions known as four pillars of food security that include availability, access, utilisation, and stability. Thus, in this definition, food security is said to be achieved "when all people, always, have physical, social, and economic access to sufficient, safe, and nutritious food to meet their dietary needs and food preferences for an active and healthy life (FAO 2006). This concept of food security can be achieved through producing foods, being involved in safety net programs or diversifying livelihoods in order to have purchasing power for food utilities. According to Zezza and Tasciotti (2010)

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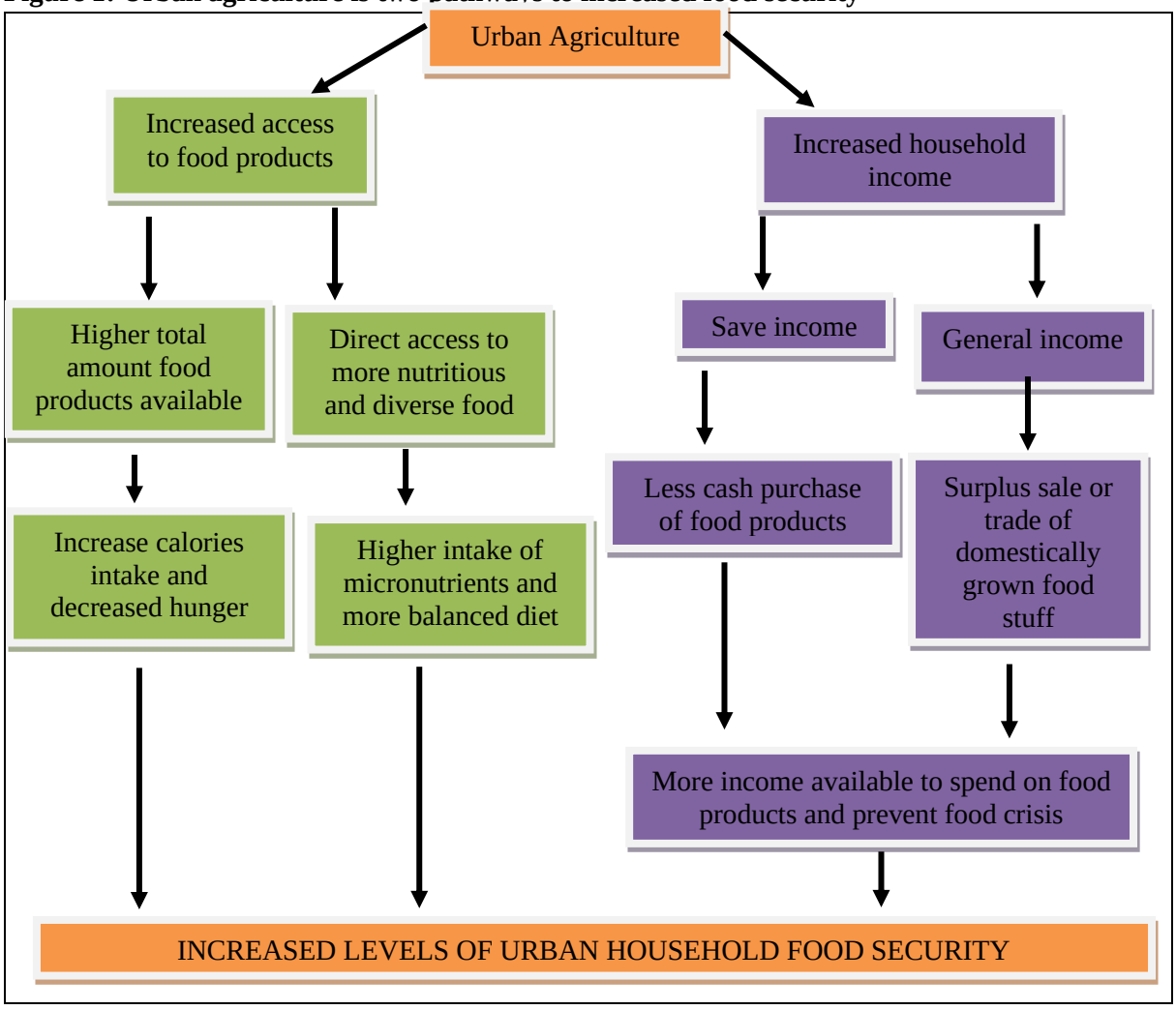
and Mougeot (2005), urban agriculture is one of the ways of producing food in order to provide fresh, cheap, nutritious, and from-farm-to-table foods that may contribute to achieving food security for the urban agriculture-producing households and the community level at large.

According to Korth et al. (2014), Urban Agriculture is thought to increase food security through two main pathways: improved access to food and increased income. The first pathway assumes that home-grown foodstuffs increase the total amount of food available to a household and thus can prevent hunger and malnutrition. Secondly, UA is considered to increase household cash income. Domestic producers can either save income, as the household limits its need to purchase food, and/or increase income by selling or trading their products, as indicated in *Figure 1* below.

Figure 1: Urban agriculture is two pathways to increased food security



Source: Korth et al. (2014)

A study by Modibedi (2018) analysed food security status among urban farmers in Emfuleni Local Municipality, Gauteng Province, South Africa, with special emphasis on the contribution of urban community gardens to food security with specific reference to food availability, food accessibility, food utilisation and food stability. The results revealed that the factors influencing food utilisation with specific reference to the consumption pattern of vegetables from community gardens using chi-square are indicated in *Table 1* below.

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Table 2: Representing goodness-of- fit (n=254)

	Chi-square	df	Sign
Pearson	987.022	1001	.618
Deviance	643.870	1001	1.00

Source: Modibedi, (2018)

From *Table 2,* the results reveal that there is no statistical significance (P>.05), implying that the model used is appropriate for the data. The Deviance chi-square statistic was also not statistically significant (p=1.000) at a 5% confidence interval. Therefore, both goodness-of-fit measures may not always produce the same results. *Table 3* below depicts the Pseudo R-square.

Table 3: Pseudo R-square

Cox and Snell	.127
Nagelkerke	.136
McFadden	.015

Source: Modibedi, (2018)

Table 3 shows three (3) pseudo-R-squared values. There is no equivalence in logistic regression to the R-squared values in OLS regression. Given the values of R-squared, it does not mean exactly what OLS regression means because their analysis is of less importance.

Table 4 presents the results of the parameter estimates of the Ordered Logit Model (OLM) of the factors influencing the vegetable consumption pattern of the respondents.

Table 4: Parameter estimates of the Ordered Logit Model (OLM) (n=254)

		Estimate	Std error	Wald	df	Sig.	95% CI	
							Lower	Upper
Threshold	Never =1	-689	1.356	.258	1	.612	-3.347	1.970
	Once a week =2	1.945	1.330	2.135	1	.144	-.663	4.552
	Two to four times per week =3	4.056	1.351	9.020	1	.003	1.409	6.703
	Five to six times per week =4	4.556	1.357	11.315	1	.001	1.905	7.224
Location	Gender	.086	.263	.107	1	.743	-.430	.603
	Age group	.310	.124	6.265	1	.012	.067	.553
	Level of education	.624	.204	9.384	1	.002	.225	1.023
	Participation period in the garden	.033	.043	.589	1	.443	-.051	.116
	Family size	.085	.060	2.039	1	.153	-.032	.202
	Number of family members working	.070	.136	.266	1	.606	-.196	.336
	Working hours/day in the garden	.013	.087	.021	1	.885	-.157	.182
	Working days/month in the garden	.010	.050	.040	1	.842	-.088	.108
	The main source of income	-.699	.310	5.082	1	.024	-1.306	-.091
	Annual income from the garden	3.256E-5	2.672E.5	1.486	1	.223	-1.980E-5	8.493E-5
	Average	.071	0.37	3.814	1	.051	.000	.143

Source: Modibedi, (2018)

The results in *Table 4* illustrate that 9 variables were positive out of 10 chosen ones (gender, age group, level of education, participation period in community garden, family size, number of family

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members working, number of working hours in the community garden per day, number of days working in the community garden per month and annual income from community garden). But only 3 variables (age group (0.012), level of education (0.002) and main source of income (0.024) were statistically significant at a 5% level of significance ($p<0.05$). On the other hand, the age group and main source of income were not statistically significant at a 1% significance level ($p\geq0.01$). The result implies that the vegetable consumption pattern of the respondents (utilisation) increases when the age of the respondents increases, with all other factors held constant. With regards to gender, this means that males consumed vegetables more often than women did; however, the difference was not statistically significant (p=.743). This contradicts some studies that have shown that females consume more fruits and vegetables than males (Darfur-Oduro et al., 2018; Othman et al., 2012). Although it is speculated that females are more concerned about a healthy diet compared to males, with more fruits and vegetables consumed (Yen et al., 2015; Othman et al., 2012), Specifically Yen et al. (2015) established that on average, Malaysian women consumes more vegetables and fruits per day than men. Further, Nicklett et al. (2013) found that older women eat more fruit and vegetables than older men, even though older men eat more food overall.

The influence of age on vegetable consumption patterns was also positive (increase in vegetable patterns increased with increasing age with all other factors held constant); therefore, older people were consuming vegetables from gardens more often than young ones. This is in agreement with Nicklett et al. (2013), who established that compared with younger adults, older adults tend to eat fewer high-energy sweets and fast food and eat more grains, fruit, and vegetables. They further argued that, on average, older adults eat more servings of fruits and vegetables, which might be nutritionally necessary given the change in metabolic processes that occurs in old age.

As seen in *Table 4*, the Logit coefficient estimate of the main source of income of the respondents (utilisation) is negative and statistically significant at a 5% level of significance (p=.024). The result implies that the increase in vegetable consumption pattern of the respondents (utilisation) is not increasing with an increase in the main source of income with all other factors held constant. This implies the respondents whose main source of income was farming were not consuming vegetables from the community gardens more often than those with non-farming as their main source of income. This can be partly explained by the need to sell vegetables to get some income to spend on other household domestic needs. Individual and household income levels also predict the intake of fruits and vegetables (Bowman 2007). Further, Nicklett et al. (2013), in their study on income differences in eating patterns among older adults, established that individuals in the low and medium-household income groups ate significantly fewer fruits and vegetables than those in the higher-income group. Fruit intake was progressively higher by income group as well (Brown 2007).

Benefits and Challenges Affecting Urban Agriculture Development

Benefits of UA development

The opportunities of UA are backed by the potential benefits of engaging in it, which include:

- Social development (Inclusive city). UA may contribute to social development in at least three (related) ways. Firstly, UA is an important element of food security strategies (Vågsholm et al., 2020). In developing countries, cities use food security strategies to 'feed citizens' and fight chronic hunger (Morgan, 2009). Urban agriculture complements rural agriculture in enhancing the efficiency of the national food system in providing products whose timely demand rural-based agriculture cannot supply easily (perishables) (Tefft. et al., 2017).
- Food security in UA can also contribute to the prevention of micronutrient deficiencies**,**

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provide non-market access to food for poor consumers, enhance food security during times of crisis and severe scarcity, and enhance the freshness of perishable foods reaching urban consumers, i.e. increase the availability of fresh, perishable food (Session, 2021). Secondly, UA can be used for community development. This refers particularly to urban gardening as an activity to increase social cohesion between different groups in society, to provide work and training experience for unemployed workers, and as a tool for crime prevention. Thirdly, UA is used in cities for educational purposes (Tuijl, Hospers & Van den Berg 2018). Through workshops, courses, and tours, urban farmers increase the awareness among citizens about the origin and production of food (e.g.' milk comes from a cow and not from the supermarket').

- Environmental development. UA has various benefits for environmental development, such as increasing biodiversity and reducing pollution. Cities also use UA for climate change mitigation and adaptation (Masi et al., 2014). Urban greening**:** Green roofs are used for stormwater management and energy savings, as well as for aesthetic benefits. Green roofs absorb stormwater and release it back into the atmosphere through evaporation and plant transpiration while reducing urban temperatures by limiting the number of heat-retaining structures, hence reducing the heat island effect. The vegetation on the roofs also absorbs a great deal of the pollutants in the water before they are released into the atmosphere. Rooftop gardens retain up to 100% of precipitation (Charalambous, 2019), which reduces stormwater runoff and minimises irrigation requirements (Kasprzyk, 2022). Rooftop gardens also reduce glare, noise, and wind, absorb CO2 emissions, increase biodiversity, and use sustainable technologies**.** Further, Urban Agriculture can significantly reduce Urban Waste**.** Tones of biodegradable organic wastes and wastewater produced in cities, municipalities, and town councils can be turned into productive resources such as compost or animal feed and energy sources like Biogas and Briquettes. Wastewater (grey water) can be reused to irrigate crops, thereby conserving water. Utilisation of vegetative wastes as compost by urban farms and gardens reduces waste volume directed towards landfills by as much as 40%. UA, therefore, plays an important role in balancing urban ecosystems in the urban environmental management system.

- Recreation: According to Shumsky (2014), edible plants engage people as they grow, harvest, and eat them. Whether in a private garden or a public space (Arya, l2018), people become more involved and connected to the land and the food that they grow (Ojelel. et. al., 2019). According to Becker (2015), the Fruit Tree Project brings together a range of community members to harvest and share the fruit.

- Economic development: UA offers economic benefits for cities in various ways. Firstly, it can be regarded as a new way of generating income. Urban Agriculture has economic benefits for everyone from the home gardener or urban farmer to the city government. Home and community gardens can reduce the amount of money spent on food. Urban Agriculture is highly compatible with other jobs and facilitates multiple income sources, hence enhancing resilience. UA products, particularly from agro-enterprises, serve as a source of income for the urban poor in addition to addressing their food needs. Income can be obtained through selling fresh food in the market in the form of vegetables, fruits, milk, meat, and eggs. Food production, processing and marketing also contribute to generating income and employment for many poor urban households. Secondly, UA is important for innovation, research, and knowledge development (Tuijl, Hospers & Van den Berg 2018). Thirdly, UA may offer the potential for recreational, tourist and marketing purposes (Hladkyi, 2021). Further,

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many urban farms are open to the public and organise tours, and as such, they could be compared to other tourist attractions (Shpak, 2022).

Challenges and Constraints of UA development

Notwithstanding the varying levels of benefits UA engagement offers for households, the activity is plagued by a wide range of constraints (Chihambakwe et al., 2019). In addition to understanding the significance of UA, it is vital to identify ways in which cities promote or deter cultivators from drawing maximum benefits from the practice. Moreover, to explore the application of the political concept of food sovereignty in urban food systems, it is important to consider how systems and processes influence the practice. Previous studies have well-articulated the barriers urban farmers face in their agricultural practices, particularly for off-plot cultivation (Clapp and Cohen, 2009; Cook et al., 2015; Prain and Lee-Smith, 2010). Beyond the well-known physical access to land, there are many spectrums to challenges faced by urban cultivators.

Urbanisation, as highlighted, translates to two related spatial challenges, which are the shrinking of urban spaces due to population growth and the resultant lack of 'readily' available space for food production (FAO, 2012; Crush et al., 2011). For example, Crush et al. highlight how less than 5% of poor households in Chipata, Lusaka, engaged in UA (Crush et al., 2011). This low percentage reflects the scarcity of land for food production. Secondly, insecure land tenure is one of the key challenges faced by urban farmers (Cook et al., 2015; De Bon et al., 2010). In a pilot project exploring the perception of Indian farmers along the Yamuna River, Cook et al. reported how the majority of urban farmers did not have land rights; most either paid rentals or cultivated 'illegally'. They also noted that the ambivalent attitude of the government towards UA discouraged them from making investments in their practices as they could be removed from the land at any time (Cook et al., 2012). Correspondingly, Toriro's article, which links the growth of UA in Harare to macro-economic challenges, points out that most farmers did not own the land they cultivated (Toriro 2009). While the designation of vacant spaces to UA is a rarity, there are cities such as Havana and Dar es Salaam that have reserved spaces specifically for food production (Premat, 2009; De Bon et al., 2010).

One of the key assumptions of the modernisation theory is that tradition is a condition that needs to be remedied by pulling the regressive into 'development'. The production of food is alleged to be illustrative of regression. Sceptics suggest that the practice plays a marginal economic role at the city level (Maxwell, 1995). By cultivating in cities, urbanites are deemed to be 'ruralising' urban areas. Coined by Stren, ruralisation (Viewed in opposition to modernisation where African cities were planned and arranged resembling 'clean' European cities. Conversely, rural life is associated with backwardness, undeveloped and scattered living arrangements. Therefore, in this context, increasing cultivation of crops and vegetables in cities gravitates towards the concept of the "ruralisation" of urban spaces as coined by Stren (1986), connotes a degenerative change from the 'developed' city arrangement to the 'undeveloped' Stren (1986). Cultivating in towns, particularly open spaces, is counter to growth, planning, and development as it spoils the aesthetics of the city. In the American context, Moore describes this reasoning using the concept of the "urban normative", which can be explained as an invented interpretation of a city's structure and function (Moore, 2006). Urban and peri-urban agriculture is seldom acknowledged through statutes and ordinances. A few states and, in some instances, cities, however have documented and actively work on strategies that enhance household food security through urban food production (Gerster-Bentaya, 2013). Policies and decrees embracing UA have been put in place in cities such as Accra, Beijing, Brasilia, Bulawayo, Govender Vlders, Havana, Nairobi, and Uganda (Clapp and Cohen, 2009, Cabannes, 2012). Until 2005, food production in Kampala was unlawful and rendered insubstantial; since its legalisation of UA, its importance has grown. The importance of government mechanisms supporting UA cannot

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be overlooked, given its primacy in the food provisions of the urban poor (Cabannes, 2012).

In addition to the challenges of UA in cities mentioned above, there is also climate risk. Weather changes are becoming unpredictable, characterised by long drought spells and violent storms, which pose great challenges to UA. Flooding is a critical risk in Kampala. Much of the city is located in the valleys between steeply sloping hills. While the extent of UA losses due to flooding has not been estimated, vegetable plots that are located close to informal settlements in wetland areas are regularly washed away after downpours. Of course, flooding presents compound risks that extend well beyond the loss of vegetable crops to include damage to housing in informal settlements, more waterborne disease outbreaks, and loss of other livelihood resources that further erode household food security. Also, it can be argued that UA is not as healthy and fresh as expected. Vaneker (2014) even noted that due to (air) pollution in cities, there are health risks concerning 'urban vegetables' that may contain high concentrations of heavy metals. It is a widely known fact that cocoyam grown in wetlands in urban areas is heavily polluted by heavy metals, including copper. Similarly, Fussy (2022) has argued that new soilless growing technologies lead to 'artificial food' that lacks sufficient natural nutrients (Gumisiriza, 2022).

Furthermore, UA may lead to conflicts with other urban functions, such as living and working. There can be a lack of sufficient and suitable land for agricultural activities in cities, and whenever space is found for it, UA may cause negative externalities, such as air pollution (e.g. odour from livestock) or overcharging the city's energy grid (Lawson, 2016). Environmentalists may also protest against farming in cities, particularly referring to (animal) husbandry. For instance, in Rotterdam, environmentalists have (unsuccessfully) protested against a pilot project dealing with pig farming in rooftop gardens, which is said to go against the well-being of pigs (AD, 2015). Moreover, and related to the previous point, UA may be hindered by legal constraints and governance conflicts. Zoning policies and certification have an impact on all aspects of UA, including sitting, production, infrastructure, marketing, and access to inputs (Pfeiffer et al., 2015). In general, certification is seen as an important constraint for the social dimension of UA rather than producing for the market (Thomaier et al., 2015). Finally, UA requires large investments to cover high operational costs, including the costs of infrastructure, energy, and management (Van der Valk, 2012). Therefore, it may be hard for beginner urban farmers to generate sufficient income (Dimitri et al., 2016). This is backed by the results from the survey by Salau & Attah (2012) on Socio-Economic Analysis of Urban Agriculture in Nasarawa State-Nigeria, using 90 respondents. The study found that among the constraints that urban farmers face, poor extension service areas, the dominant at a mean score =2.07; this is followed by low capital at a mean score =2.2, followed by high costs of labour at a mean score of 2.001, inadequate inputs supply at mean score 1.93, followed by inadequate land at mean score=1.93 also, followed the theft of products by mean score =1.91 and lastly encroachment of farms by mean score 1.78 which further presented in *Table 5* below.

Table 5: Mean scores of Likert rating of factors affecting urban agriculture from Nasarawa state, Nigeria.

Constraints	Mean scores	Ranking
Low capital	2.02*	2nd
Inadequate land	1.93	4th
Poor extension service	2.07*	1st
Encroachment of farms	1.78	7th
Theft of products	1.91	6th
High cost of labour	2.00*1	3rd
Inadequate inputs supply	1.93	4th

**= Serious constraints.*

Source: Field Survey by Salau & Attah, 2012.

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CONCLUSIONS

This paper reviewed information on the contribution of urban agriculture to the socio-economic status of urban farmers. The review has proved that urban agriculture can be lucrative and supplemental household income. This is backed by many opportunities and benefits one enjoys when engaging in urban agriculture, notably food security, healthy eating with fresh food, and recycling of waste products, among others. Notwithstanding the challenges and constraints, which include inadequate inputs, theft of products, high cost of labour and lack of guidance from trained professionals, among others. Therefore, there is a need to consider urban agriculture by city planners when formulating city regulations.

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Declaration of Conflict of Interest

The authors do hereby declare no conflict of interest for this research and publication.

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