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Sustainable Food Systems in Informal Settlements: Lessons from Urban Farming at Ponda Mali, Nakuru City, Kenya

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Abstract

Urban farming remains an occupational panacea positively turning the wheels of food security in many urban households amongst the developing countries. Historically urban agriculture has been condemned amongst the developing countries, with critics framing it as an unwelcome symptom of overurbanization rather than a legitimate economic or spatial activity. While macro-level city plans in many countries overlook the food production capabilities of urban spaces, local residents face persistent challenges in food access and nutritional deficits. A study of 120 households purposed to demystify urban farming as a symptom of overurbanization amongst the developing countries basing on lessons from Ponda Mali Estate Nakuru City's experience. A mixed method approach was adopted using the following tools; questionnaires, interviews, observation and documentary. The results showed that urban farming was a good strategy for the provision of food in urban setting agreed by both civil servants and self-employed (0.152<9.210 and 0.067<9.210) respectively. Females were more active in this activity compared to their male counterpart (95.8%). Both crop and animal rearing was practiced at Ponda Mali (93.3%). Urban farming was neither for employment nor leisure but a strategy for food security to both employed and self-employed statistically significant as follows (0.067<9.210 for Civil Servants and 0.952<9.210 for self-employed). So, urban farming functions neither as a primary source of employment nor as a leisure activity, but as a critical survival mechanism amongst the food insecure urbanites at Ponda Mali, Nakuru City-Kenya. The lessons drawn from Ponda Mali, Nakuru City can serve as a replicable blueprint for municipal authorities and community leaders designing resilient, self-sustaining food production networks in other informal settlements across developing countries Kenya inclusive.

Keywords: *food security, urbanites. urban farming, overurbanization, Ponda-Mali*

Introduction

Urban Agriculture or farming should not be myopically viewed as production of food in urban centres; it is recognised in most of the South and in some countries in the North as an integral part of urban food systems. Its other components include: food supplied from rural areas, urban food storage and transportation, processing and marketing, distribution and consumption of food in urban areas (Mougeot, 1994). The concept of urban farming is as old as urbanization itself, medieval urban centres contained within its wall's vineyards, gardens, pastures, fields, cattle and manure (Mougeot, 1996). This work did not lay emphasis on food storage and transportation besides processing and marketing.

Currently it is practiced on land and water dispersed throughout the urban and peri- urban areas, it utilizes intensive production methods, using and recycling natural resources and urban wastes, to yield a diversity of crops and livestock. Although urban farming is practiced differently in different countries, it encompasses the following four broadly defined farming systems: aqua culture, horticulture, animal husbandry, agro-forestry (UNDP, 2006). Sowmyalatha and Sahana (2022) lists ten types of urban farming practices as; Kitchen gardening, Green house gardening, Street landscaping, Rooftop gardening, Container gardening, Urban beekeeping, Peri-urban farming, Small scale animal husbandry, Vertical farming and Mushroom cultivation.

Urbanization is heavily driven by economic factors especially employment leading to rural-urban migrations (United Nations, 2012). It was projected that by 2020 and 2035, half of Asia's and Africa's population, respectively will be urban (United Nations, 2012). Thus population growth will be concentrated in urban areas of less developed countries, which would be expected to grow from 2.7 billion in 2011 to 5.1 billion in 2050 (United Nations, 2013). In Kenya where this study was done, there is an urbanization projection level of 63 percent by 2030, which is above Africa's average (Republic of Kenya, 2007). Kenya's urban population rise could be attributed to both high birth rates within the towns and rural-urban migration (Omondi, 2018). Kenya's urbanization has not been accompanied by equivalent economic growth consequently leading to widespread poverty and food insecurity among the urban poor.

Omondi (2018) has it that rapid population growth, urbanization, dietary shift, urban poverty and food insecurity are part of the forces driving urbanites into engaging in farming activities in urban areas, rural areas or both. The findings of national censuses, household surveys and research projects suggest that up to two-thirds of urban and peri-urban households in developing countries are involved in agriculture (FAO, 2001)**.** The engagement in urban farming is basically to mitigate the food insecurity menace amongst the poor urbanites. Urban farming may also offer health, environmental and economic advantages making it an appealing movement. Cases in point include among others supported by many authors; farming in cities provide increased access to healthy, cheap produce for urbanites, while lowering pollution impacts from transportation and waste products from the rural areas (Mukherji and Morales, 2010; Siegner et al., 2018; Satterthwaite et al., 2010 cited in Toromade *et al* (2024)).

Generally, urban farmers accrue the following benefits from the practice; vital or supplementary food source, fresh vegetables, food wastes turned into livestock feed, environmental benefits (such as, flood basins, carbon sequestration, urban heat island modification), employment for the jobless, survival strategy for low-income residents and use of urban wastes as fertilizers (Douglas, 2006).Mougeot (1994) has it that the importance of producing at least part of one's own food needs was revealed by surveys conducted in the late 1980s showing that poor urbanites in various cities in developing countries (African cities inclusive such as Bamako, Nairobi and Dar-es-Salaam) spent 60-90% of their income on food. However, Douglas (2006) claim that many women engaged in this practice suffer from stress and poor health attributed to their insecurity, risk of evictions and pollution of crops; excess fertilizers used lead to underground water pollution making bore hole and spring water unsafe for use; and poor home gardeners suffer from severe water shortages for they are unable to buy extra water or to purchase storage tanks for rain water harvesting. Therefore, despite urban farming's contribution to supplying immediate food needs, it has questionable efficacy.

Zeeuw de (2004) claims that urban farming is not its urban location distinguishing it from rural agriculture, but the fact that it is embedded in and interacting with the urban system. The links here include but not limited to; the use of urban residents as labourers, use of typical urban resources (like organic waste as compost and urban water for irrigation), direct links with urban consumers, direct impacts on urban ecology (positive and negative), being part of the urban food system, competing for land with other urban functions, being influenced by urban policies and plans, and the next. He continues to assert that it is often thought that urban agriculture is a relic of rural habits that has come with the migrants to the cities and that will dwindle over time but that is not correct. It is an urban phenomenon that tends to grow when cities grow (although its locations and characteristics change sharply) (Zeeuw de I.H, 2004). In Kenya it is now a common practice though not legalized.

Many authors agree that Intra-urban agriculture takes place within the city boundary. Most cities and towns have vacant and under-utilized land areas that are or can be used for urban agriculture, including areas that are not suited for building (along streams, within utility rights of way, close to airports, areas prone to earthquakes or flooding, buffer zones between residential and industrial areas, etcetera) and idle public or private lands (reserved for future uses, vacant due to speculation, lands waiting construction) that have or can be given a productive use in urban agriculture (interim or permanent use). Typical intra-urban farming systems include community gardens, back yard gardens, nurseries producing tree seedlings, herbs and medicinal plants, production of mushrooms, small livestock in low numbers (poultry, rabbits, bees, zero-grazed cattle etcetera). It also includes aquaculture (e.g., fish farming), aquaponics (e.g., integrating fish farming and agriculture) and non-food products such as producing seeds, cultivating seedlings, and growing flowers. Part of intra-urban agriculture is at subsistence level or for relaxation mainly and another part is market oriented (Zeeuw de 2004; Mukherji and Morale, 2010; Mougeot, 1994; Douglas, 2006; EPA, 2011; Omondi, 2018).

Urban farms can take a variety of forms including non-profit gardens and for-profit businesses. They can provide jobs, job training, and health education, and they can contribute to better nutrition and health for the community by providing locally grown, fresh produce and other products. In addition, urban farms can also contribute to the revitalization of abandoned or underutilized urban land, social and economic benefits to urban communities, and beneficial impacts on the urban landscape (EPA, 2011). Omondi, (2018) adds that it is an activity undertaken by households of all income groups thus not for the urban poor only. The products of urban agriculture are usually consumed within the farming households. Surplus production is normally sold to generate income. Some urban farmers utilise modern, innovative, and efficient farming technologies such as the use of vertical (sack) gardens and hrodoponics in vegetable farming. These technologies maximise the use of limited urban agricultural land for vegetable production (Omondi, 2019). The vertical (sack) gardens oozed in Nakuru city as experimental activity but now quite common observably.

Urban farming has been practiced in many cities worldwide for long, contributing to the lives of many people and providing food to about 15–20% of the world's population (FAO, 2014 cited by Yego, 2017). Statistics available indicate that in developing countries, about 266 million households may be engaged in urban crop production, that is, 29 million households in Africa, 182 million in Asia and 39 million in Latin America (Hamilton *et al*.,(2014) cited by (Yego, 2017).

However, in Kenya this gainful activity was illegitimate (Yego, 2017) and hence there is a need to support local authorities, NGOs and community organizations in devising creative and flexible solutions for improving access to land. Urban agriculture was seen to be a neglected area among the others in the informal sector. It does not receive support commensurate with its contribution because it is dominated by women and is considered economically marginal (Lamba, 1993 cited by Yego, 2017). Unlike the Ugandan experience basing on the Kampala Ordinance of 2006 (Halliday et al. 2019), Kenya has no finalized, comprehensive national policy governing urban and peri-urban agriculture. The regulation is decentralized to the county level following the country's two-tier devolution system of governance. Urban farming is promoted for food security but remains tightly regulated to ensure environmental health, safety, and proper land use, hence a review of the Nairobi Urban Agriculture policy (Onyango, 2025).

Dar es Salaam's urban and peri-urban agriculture (UPA) systems are quite diverse, involving a range of socio-economic classes, from very poor, landless groups to those in the middle and even high incomes. One of the interesting

features of the city's UPA is the increasing involvement of high-income residents in livestock keeping and cash-crop farming in peri-urban areas. This provides further evidence of the complexity and variability of UPA, which should not be solely thought of as a livelihood activity of recent immigrants from rural areas (Mlozi, M.R.S., Lupala, A., Chenyambuga, S.W., Liwenga. E. and T. Msogoya., 2014). Amongst the marginalized part of the urbanites it is done as a strategy for food security, part-time or full-fledged employment in the Global South. It is taken for greening, environmental conservation and beautification in the Global North which is food secure (Omondi, 2018). This is not only unique to Dar es Salaam but to most towns in the developing world Nakuru inclusive as per this study.

The study's purpose was to demystify urban farming as a symptom of overurbanization amongst the developing countries basing on Nakuru City's experience. Specifically, the objectives were to;

a) establish the importance of urban farming to the residents of Ponda Mali estate, Nakuru city;
b) assess the management of urban farming at Ponda Mali estate Nakuru City; and;
c) analyse urbanites' attitude towards urban farming Ponda Mali estate Nakuru City.

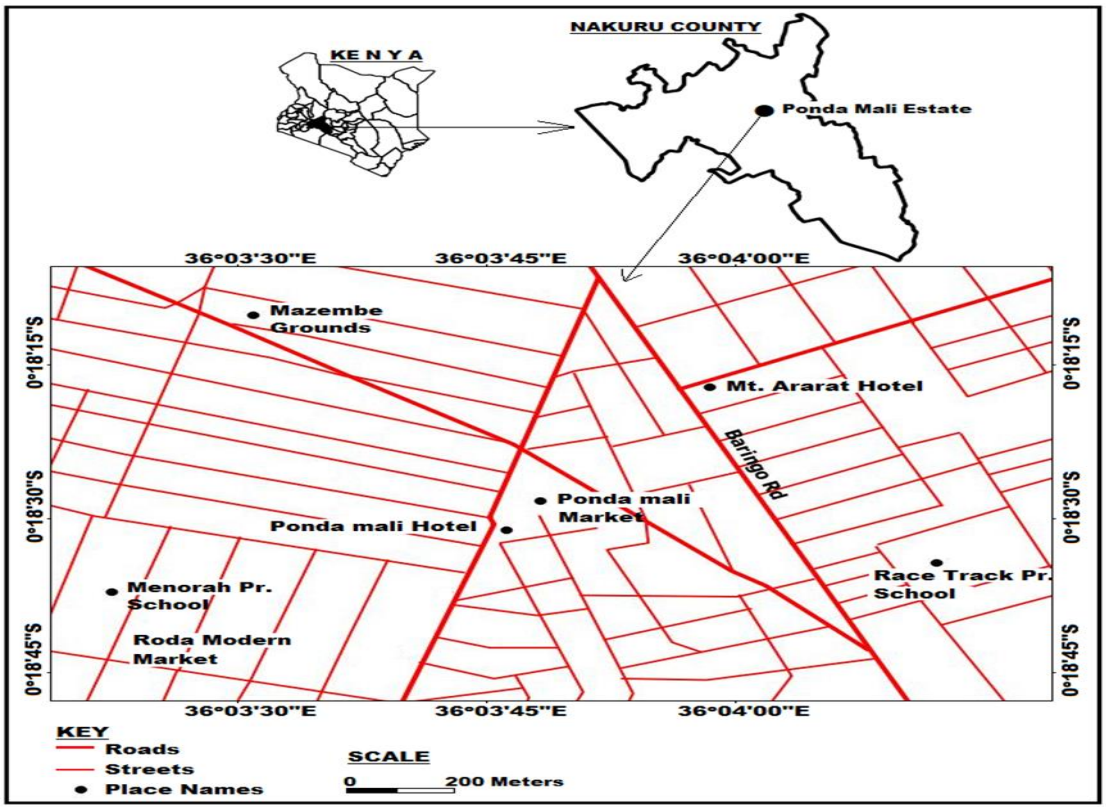
Description of the Area of Study and Methodology

Nakuru is located in the heart of the Great Rift Valley between latitude 00 10' and 00 20' South and longitude 360 and 360 10' East, at a distance of 160 km north-west of Nairobi (Foeken & Owuor, 2000). The etymology of the name Nakuru from its Maasai language refers to "a dusty place" or a place of the devil's dust. It is said that this is because the place had a history of dust gales at certain times of the year and this could explain why a certain estate in the town is still called "Kivumbini", meaning "within dust" (Mbuba, 1997; Kinani, 2014). Nakuru is located in the heart of the Great Rift Valley between latitude 00 10' and 00 20' South and longitude 360 and 360 10' East, at a distance of 160 km north-west of Nairobi. Geologically the town is located on the floor of the Great Rift Valley which has loose volcanic soils, such that during the dry season the town is engulfed in whirlwinds of dust hence the Maasai name. It should also be noted that during the rainy season there are cases of earth subsidence resulting in huge disastrous trenches. The town primarily consists of young volcanic rocks (Ministry of Health, 2019).

Many writers claim that Nakuru Town is located approximately 160km northwest of the capital city of Nairobi, and is linked to the west of the country by the Nakuru-Kisumu highway and the Mombasa Kisumu Railway line and to the North by the Nakuru-Nyeri-Nanyuki-Isiolo Moyale road system. It covers an area of 290Km^2. The town was founded in 1904. The town borders Menengai crater to the north, Lake Nakuru to the south, the pre historic Hyrax Hill to the east and Mau ridges to the west. It lies at an altitude of 1859 meters above sea level (Mbuba, 1997; Kinani, 2014; Ministry of Health, 2019). It is probably the only town in the world that boasts of a crater and a lake which are barely 10km apart. The town is located at the base of the Kenyan rift valley, a tectonic structure that makes up the main feature of central eastern Africa. Around Nakuru, the rift valley floor is approximately 40 km wide, and it is confined to the east by the Bahati escarpment/Nyandarua Mountains a nd to the west and south by the Mau escarpment (Kinani, 2014).

Nakuru Municipality, currently a city, has a number of estates besides Ponda Mali such as; Nkata, Langalanga, Rcecourse, Mercy Njeri/Kiamunyi, Milimani, Whitehouse, Bahati, Lanet Barracks, Shauri Yako, Section 58, London, Satelite, Naka, Free hold, Mawanga, Mwarik, Pipeline, Pangani, Ngata, Bondeni, Bangladesh, Shabeb, Kaptembwa, Royal, Viwandani, Paul Machanga, Abong Lo, Weye, Kivumbini, Kaloleni, Old Ojuka, New Ojuka, Nakuru Press, Nakuru Garden, Nyanjoro Gated among others (Aboyeka, 2019)(refer to the map below).Nakuru Town in its hey days boosted of the following industries which beckoned a large population from both its neighbourhood and the country at large; the dry cell manufacturer Eveready, motor vehicle assembly plant Sam Con, the East Africa Flour Milling giant the Milling Corporation of Kenya and the State owned Pyrethrum Board of Kenya–all in the industrial area of Nakuru town (Mwale, 2019). Low-cadre workers stayed at Ponda Mali Estate amongst the cheapest estates in Nakuru municipality. However, most of these industries closed but some of their previous workers remained doing petty jobs in town.

Many authors agree that the etymology of the name Ponda Mali is from Swahili translating to "enjoy your wealth", "increase wealth" or "multiply assets" a reflection of aspirations common in rapidly developing urban area worldwide (Ndiritu, 2012; Otieno, February,2019; Matara, September, 2021). Otieno, (Feb; 2019) continues to assert that despite the name pointing at a leafy suburb associated with the rich, Ponda Mali is one of the biggest slums in Nakuru county. Pondaa as it is known by residents, is a very busy locality equipped with both a taxi terminal and a market. Ndiritu, (2012) traces its development to Nakuru's expansion during Kenya's post-independence period, particularly from the 1980s onwards, as the town grew and required new housing solutions for its increasing population. Its apparent that the area exploited development on land that may have had previous uses, potentially including agricultural land or areas designated for urban expansion under municipal and county planning frameworks (Republic of Kenya, 1996). So, its unplanned development generally referred to as slum area of Nakuru town.



Ponda Mali Estate in Nakuru City
Source: Google Earth Satellite Map (2025)

In planning the study, a respondent was considered to be a member of family of people who lived in one household, shared the same food and were registered under one name within a segment that residents, estate agents and the county use for day-to-day reference. The segments were; Ponda Mali "Proper" / Core, Ponda Mali Extension (KFA Side), Ponda Mali "Upper" / Bunda Ridge, Railway Reserve Belt, Ponda Mali Centre (Shopping Strip) and Ponda Mali "Sewer-line" / Green Belt. One hundred and twenty respondents were randomly selected from the six segments for the interviews based on two criteria: first the level of participation in urban farming by the respondents and second residence at Ponda Mali, Nakuru City. These admittedly were affected both directly and indirectly with the urban farming activities.

Data was collected using basically questionnaires, interviews, observation and documentary analysis as portrayed in results and discussions section. The first three tools were used during day time that was from 8.00 am to 6.00 pm. The questionnaires were translated into Kiswahili with the assistants of research assistant mainly from the area. The research assistants were got through snowballing in reference to the segmentation and trained on data collection techniques. Data analysis Answers recorded during the interviews were coded and entered for computer analysis using Lotus 1-2-3. A variable description file was prepared and data were analysed using both SPSS computer software and manually analysed as presented in the results and discussions section. Chi square statistic of the relationship between occupation and use of urban farming at Ponda Mali, Nakuru City. Knowledge of such a relationship is important because socio-economic factors such as employment and income determine the extent to which the urbanites depend on urban farming for their livelihood. Urbanites perception towards Urban farming at Ponda Mali- Nakuru City was subjected to attitudinal index using a 1-5 Likert Scale rating.

Results and Discussion

TABLE 1. Socio-demographic characteristics of the respondents (N=120)

Characteristics	F	age **(%)**	Characteristics	F	age **(%)**
Sex			**Educational Background**		
Male	46	(38.3%)	Below Primary	12	(10.0%)
Female	74	(61.7%)	Primary	70	(58.3%)
Marital Status			Secondary	23	(19.2%)
Single	40	(33.3%)	Post-Secondary	15	(12.5%)
Married	60	(50.0%)	**Land sizes**		
Divorced	12	(10.0%)	<Hectare	112	(93.3%)
Widowed	08	(06.7%)	1 Hectare	06	(05.0%)

Occupation			2 Hectares	02	(01.7%)
Self-Employed	105	(87.5%)	>2 Hectares	00	(0)
Civil servant	15	(12.5%)	**Dependants**		
Age			0	40	(33.3%)
Mean 40			1-2	63	(52.5%)
Median 35			3-5	12	(10.0%)
			6-7	05	(04.2%)
			>7	00	(0)

Source: Researcher's field data 2025

More than half of the respondents (61.7%) of respondents were women (Table. 1). This gender disparity could be attributed to women being nest-bearers undertaking light continuous domestic activities such as food preparations, child caring and gardening traditionally in Africa (Olinga, 2007). The domestic activities need were a pulling factor on women engagement in farming activities besides having over two thirds of the respondents (66.7%) having dependants (Table 1). It was also clear that over two thirds of the respondents (66.7%) were then or once married according to the table 1. It is therefore, imperative to note that, urban agriculture has emerged as a significant issue, especially in developing economies Kenya inclusive, where it serves as an effective poverty alleviation strategy for the urban poor and contributes substantially to the socioeconomic development of cities globally (Solomon, 2022 cited by Amalai, 2024). Currently the practices have extent to the affluent urbanites also (Kwiringira et al, 2024). Ponda Mali, Nakuru town was not left behind as the table depicts.

Table 1 shows that majority of the respondents were self-employed (87.5%) while civil service sector hardly made the remaining quarter(14.5 %).The self-employed sector engaged in the following activities; wholesale and retail trade, market vending, taxi operations, repair of motor vehicles and motorcycles, this was in concomitant with the writings some authors like Otieno (February,2019) besides Naeku and Irungu(2024). (Mwale, 2019) Mwale (2019) as mentioned earlier claimed that the mass unemployment caused by closure of industries led the affected to Ponda Mali estate due to the low-cost housing. The few civil servants in the area apparently were from public administration, defense, education. Human health and social work activities. These were mostly low cadres whose pay could not make them live in the estates of the affluent such as Milimani, London Estate, and Ngata. Besides proximity to their work places hence settlement at Ponda Mali.

Despite most of them having less than a hectare of land (93.3%) (Table.1), there was farming in the compounds of the rented houses, besides farming was common either in the compounds of the individual renters or between the housing blocks. Off-plot farming by many residents on land that does not belong to them also occurs in this place. This was in disregard to Municipal by-laws and Public Health Act (Foeken & Owuor, 2000). It was quite common to see some form of farming to supplement expenditure on food in terms of both crop and animal husbandry. It should also be bone in mind that most residents at Ponda Mali were low income earners so farming was very cardinal for food security as seen on Fig 1 below.



Fig.: 1 Roadside farming at Ponda Mali Estate, Nakuru, (Source: Field photo taken on 19th May 2026)

Table 1 has it that many of the respondents attained more than basic education (90.0%), Thus could have engaged themselves in urban farming other than for food security but as a form of occupation to curb the open urban unemployment in Nakuru City. Many of them could have been the rendered jobless by the closure of several industries mentioned earlier. few were civil servants (12.5%) hence the need for food security (Table 1). This therefore compelled women the main

domestic managers to eke a living through urban farming given the mean age of 40; adults, as presented on the table.

Importance Of Urban Farming To The Residents Of Ponda Mali Estate, Nakuru City

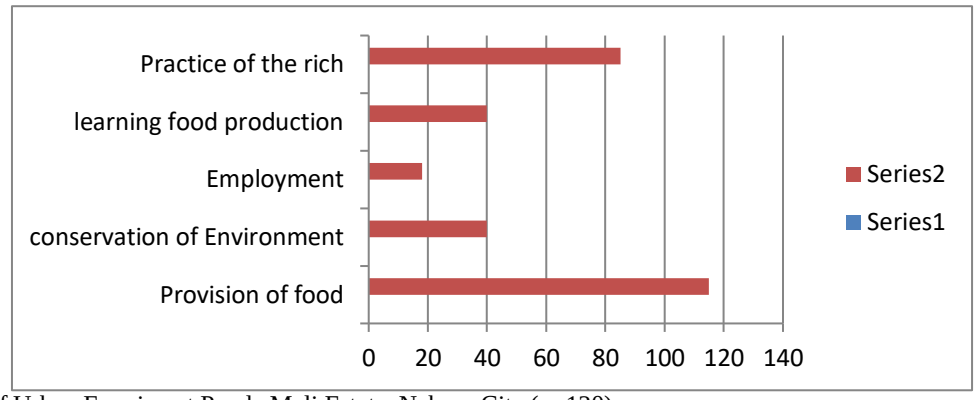


Fig: 2 Uses of Urban Farming at Ponda Mali Estate, Nakuru City (n=120)
Source: Field Data, 2025.

Respondents' perceptions on uses of urban farming reveal that provision of food was cardinal (Fig.2). it was also apparent that this farming was dominated by affluent part of the urbanites in this part of Nakuru Municipality as on the figure. Observably the rich hard fair parts of their lots for farming for instance they had space on their compounds. These compounds would be either rented or personal. Thus, part of their family could learn food production. The affluent at Ponda Mali could be categorised as home subsistence farmers, who farm on small plots around their homes, mostly for subsistence purposes (De Bon, Parrot, & Moustier, 2009) (Fig. 3). This therefore contradicts Kwiringira et al (2024) who perceived urban farming to be a domain for the poor urbanites. Despite the contradiction observed, Vermeiren et al (2013) confirmed that urban farming was a common practice in African cities in which almost all social groups are involved, thus not reserve for a particular group.



Fig. 3. Farming in the compound of affluent urbanite near Bayside Mama Ngumbu food store, Ponda Mali
Source: Field Photo taken 21st May, 2026.

Very few agreed that this farming provided employment (Fig. 2). In most developing countries where agriculture is the backbone of the economy and mainly subsistence farming practiced, citizens hardly perceive farming as a form of employment as portrayed in figure 2 and reflected from the interviews with the residents. This reflects a subsistence urbanization where farming was viewed as an informal activity in the city (Potts, 2000). Observations contradicted the figure 2 and sided with Njenga and Gikonyo (2020) where given the low barriers to entry in the activity the low-income groups participate actively in farming activities, which helps to increase household incomes and reduces unemployment rates among them. Thus, creating an enabling environment to foster social and economic resilience within the estate. Besides the given it be noted that engagement in farming activities at Ponda Mali estate contributes to poverty alleviation by creating direct and indirect employment opportunities, enhancing food security, and empowering marginalized community members (Mugambi et al., 2018; Njenga & Gikonyo, 2020).

A third of the respondents (40) agreed that farming conserved environment (Fig. 2). This relied mainly on the aesthetic modification of the environment through the planting of either fruit trees or flowers on the compound (Nhamo and Inyang, 2011). Smith and Jones (2020) adds that urban agriculture helps mitigate urban heat island effects by increasing green cover and improving air quality through carbon sequestration, not realized by the urbanites at Ponda Mali in Nakuru County. The residents have adopted to agroforestry where they plant grevillea, cypress, and mango trees, which

provide shade, improve soil structure, and contribute to biodiversity. These are planted alongside the primary food crops such as maize**,** beans**,** and kales**,** which benefit from the improved microclimate and soil fertility created by the tree cover (Mwangi et al., 2020). This could be done despite the low acreage of land as on Table 1. The rich with more than half an acre of land embraced agroforestry for both shades and fruits.

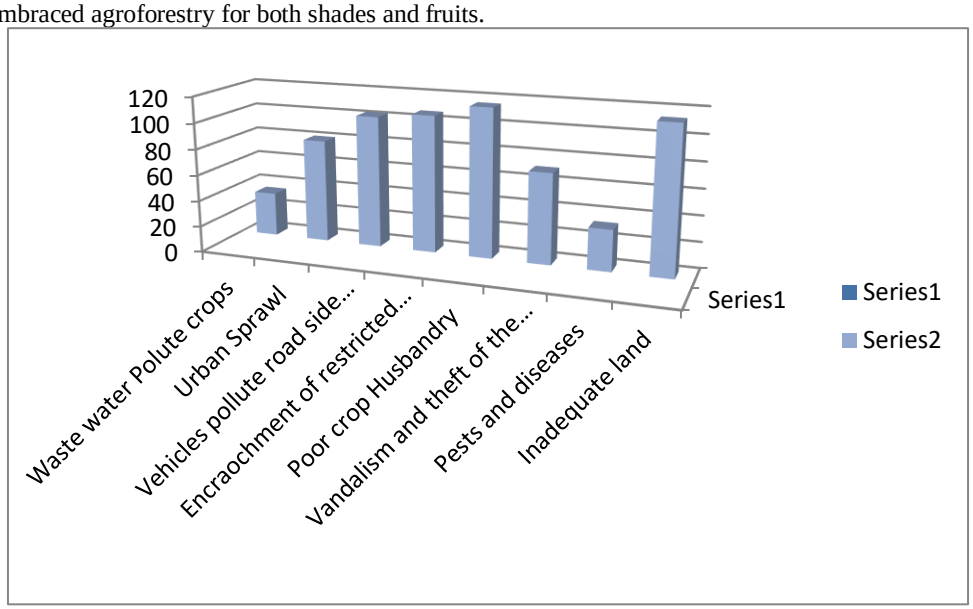


Fig. 4. Challenges to urban farming at Ponda Mali Estate Nakuru City
Source: Field Data 2025

The main challenges that faced urban farmers at Ponda Mali, Nakuru Municipality were inadequate land and poor crop husbandry (Fig.4). Land. Ponda Mali estate like any other in developing countries with urban explosion has limited land resources, which limits the scale of farming activities. Farming therefore competes with other land use practices akin to urban development on land such as; housing, accessibility, recreations facilities, shopping facilities and like; all these combine to limit the land for urban agriculture. This was worsened by the fact that Ponda Mali was an unplanned settlement within the Nakuru East Sub-County.

Figure 4 has it that poor crop husbandry was amongst the leading challenges to urban farming at Ponda Mali estate, Nakuru City. Observably intercropping was the main practice in the estate despite the size of the lots for farming. The main crops in the area were kales (Sukuma wiki), maize and beans others were onions, spinach, tomatoes, Irish potatoes, cowpeas, bananas and spider plant. The crops so planted them were for subsistence use though some could get their ways to the nearby market or sold to the neighbours. This the intercropping there was poor crop spacing and inadequate or inappropriate soil replenishments by the use of organic fertilizers such as chicken wastes, domestic ash, animal dungs and urine especially from cattle, goats and sheep reared. The farmers used tapped water to irrigate their farms. Worse still some diverted broken sewage flow to their gardens (Foeken & Owuor, 2000). This therefore justified the high response on poor crop husbandry though contrary to waste water polluted the crops as in Figure 4.

Clean water is more important to crops than wastewater because it promotes safe food production and healthy plant growth. Hazardous pathogens, heavy metals, and chemicals that can harm crops and contaminate soil are frequently found in wastewater (Smith et al., 2020). Furthermore, contaminants in wastewater have the potential to hinder seed germination and lower crop yields. By stopping the spread of pollutants, using clean water preserves soil fertility and safeguards human health and the environment (Ungureanu et al, 2021). Despite the negligible response on waste water polluting the crops, it mars the sustainability urban farming at Panda Mali, for farming also needs clean water (Fig 4).
Over the past few decades, Nakuru City in general and Ponda Mali estate in particular, has seen a sharp increase in both population and urbanization. As a result of this development, roadside farming techniques have become popular, and many urban farmers are using them to make use of the land that is available and increase food security (Nyangweso et al., 2019). However, this practice is carried out in an environment where vehicle pollution is on the rise, which presents serious problems for public health and agricultural productivity.

Apparently, the practice was an illegality manifested on encroachment of the farming sites used (Fig. 3). There was no specific zone for farming at Ponda Mali estate compared to Rhonda estate in her neighbourhood. Thus, Ponda Mali residents would farm in Rhonda estate with sizable free spaces. However, within the estate the following areas were observably used for farming; people's own compounds, a long road sides or accessibility, under power lines, vacant lands, next to sewage lines and the like. It should be noted according to Foeken and Owuor, (2000) that farming within Nakuru City, then municipality, is technically prohibited under municipal by-laws. However, farming has become a common practice in the town due to limited enforcement capacity. The municipality currently allows crop cultivation with the provision that the crops are less than one meter high. However, taller crops like maize are still widely grown. Keeping livestock is also practiced, but is prohibited if it leads to nuisance like foul smells, pollution or the spread of diseases. This therefore meant less attention from agricultural extension workers save for poultry.

Urban sprawl was a challenge as portrayed in Figure 4 this was manifested as follows; reduction of available land, environmental challenges, increased land prices, besides vandalism and theft was a common challenge amongst the crop farmers especially for those farming by the road sides and open spaces in town. Free range

poultry farmers were also challenged by theft especially farmers close to bars, restaurants and lodgings. Surprisingly the farmers were not affected by crop pests and diseases (Fig. 2). Interviews had it that poultry diseases were common amongst free range farmers especially those close to eating restaurants. Despite these challenges, urban sprawl has also created opportunities for farming in peri-urban areas. Agricultural activities still dominate here, although they face increasing pressure from urbanization. These dynamics highlight the need for integrated urban planning to balance urban development with the sustainability of urban farming.

Management Of Urban Farming At Ponda Mali Estate Nakuru City

Table: 2: Reasons for food shortages at Ponda Mali Estate, Nakuru City in Percentages (n=120)

Reason	frequency	%age
High population	92	(76.7%)
Inaccessibility	46	(38.3%)
Low purchasing power	96	(80.0%)
Post-Election Violence	105	(87.5%)
Weather changes	116	(96.7%)
Pests and diseases	36	(30.0%)
Dependence on food aid	92	(76.7%)
Long crop gestation period	111	(92.5%)

Source: Field Data 2025

Weather changes especially its unpredictability was the main cause of food shortages (96.7%) at Ponda Mali estate in Nakuru county (Table 2). This justified the fact that Kenya still depends on rain-fed agriculture (NEMA, 2008). Weather changes have a big impact on farming in Nakuru county generally. The area has a dry sub-humid equatorial climate with two rainy seasons, March to May and October to December (Foeken & Owuor, 2000). This could therefore cause food shortages due to; unpredictability of rainfall especially due to climate change; inadequate rainfall; extreme whether events besides the whirlwinds; pest and parasites infestations, crop diseases and livestock health challenges; and the next. Overall, weather changes create a major challenge for farming in Nakuru. This highlights the need for agricultural practices that can withstand climate impacts

Interviews had it that the citizens were interested in traditional crops whose gestation period is long compared to exotic crops (92.5%). The gestation periods for some of the commonly grown crops in Nakuru are as follows: maize: 3-4 months (90-120 days) depending on the variety; beans: 2-3 months (60-90 days); kales (Sukuma Wiki): 1-2 months (30-60 days) for the first harvest, with continuous harvesting possible afterward; spinach: 1-2 months (30-60 days) for the first harvest; tomatoes: 2-3 months (60-90 days) for the first harvest; Irish potatoes: 3-4 months (90-120 days); cowpeas: 2-3 months (60-90 days); onions: 3-4 months (90-120 days (Ngugi, et al,.1978) These durations can vary depending on factors such as weather conditions, soil fertility, and farming practices. This was a cause for food shortage.

Nakuru county is cosmopolitan with most Kenya's ethnic communities found though the dominant ones are the Kikuyu and Kalenjin with substantial numbers of Kisii, Luo and Luhya. Given the ethic nature of the Kenyan politics, the city becomes an epicenter of post-election violence which curtails farming in town (87.5%) as depicted on Table 2. Mohamed (2015) attributed post-election violence in Kenya to historical dynamics sustained by the patron - client nature of Kenyan politics and the resultant exclusion of non-power holding ethnic communities. Contemporary and historical factors were at the root of the vicious reactions before and after elections since 1992. The 1991 is key for it introduced ethnic based multiparty politics conjoined with pre and post-election coalitions in Kenya. Thus, with violence everything is brought to stand still hence disrupting all activities urban farming inclusive in Nakuru city.

The estate was dominated by self-employed residents (Table.1) whose income was unreliable hence the low purchasing power (80.0%) (Table. 2). Many of the urbanites in this section observably participate in the following petty activities; Operating from home doorsteps, roadside tables and evening "walk-about" sales; Casual construction & road-maintenance gangs hired at roadside points inside the estate; wages paid in piece meals that is daily basis on ongoing road-upgrade and housing projects; motor-cycle taxis locally referred to as either boda-boda or tuk-tuk shuttles for short trips between Panda Mali, Afraha Stadium, CBD and bus stage; Artisan services such as; welding, carpentry, shoe repair, phone charging shops run from metal kiosks. It could also be noted that some youthful women could commute to affluent Milimani, Section 58 and Kiamunyi estates for house-keeping, child-minding and elderly care. All these petty jobs were to individually curb the high unemployed and underemployment standing at 17% rate in Kenya (Omukhango and Etyang 2022). The take home was low to keep the high cost of living in Nakuru City checked. Thus some of the residents took to urban farming to supplement the little income from the given activities.

The second least reason was inaccessibility of food from the source (38.3%) (Table 2). This could be attributed to good road network in Nakuru county. Ponda Mali is within the road network of the following roads; Kenyatta Avenue (city centre), Oginga Odinga Avenue (1.3 km north-west); Mburu Gichua Road (turn-off near Afraha Stadium); Ronald Ngala Street (short connector); Landhies Road (continues west); Old Nairobi Road (also signed as Nakuru–Subukia–Nyahururu Highway); Ponda Mali. With this accessibility results from this study demystifies the notion that, world data tell claims that the world is progressing neither towards SDG target 2.1, of ensuring access to safe, nutritious and sufficient food for all people all year round, nor towards target 2.2, of eradicating all forms of malnutrition (FAO, et al (2020). Surprisingly, Nakuru City was not pest and diseases infested (30.0%) like other areas in developing countries

(McKinney, 1998).

Amidst all the given challenges population was high (76.7%) (Table. 2). The congestion in this estate is vividly evident by the congestions of the motor bikes (boda boda cycles); the estate connections to the main city in one tunnel with several branches congested; pedestrians walking along the accessible ways to and from the estate between 7.00 am to 8.30 am and 7:00 pm – 8:00 pm as rush hour. There was less congestions between 12.00 noon to 2.00 pm usually taken as rush hour amongst the developing countries (Bashingi, et al 2020). This contradicted the aspects of food accessibility prompted by transport accessibility but challenged by utility manifested in less congestion during lunch hours. It should therefore be noted that, the urbanites experienced food insecurity manifested in inadequate meals taken.

Table 3: How Urban farming was carried out in Ponda Mali estate Nakuru City(n=120)

Statement	Agreed	Undecided	Disagreed
Farming carried out for survival			
Farming plot close to residence	40(33.3%)	07 (05.8%)	73 (60.8%)
Both crop and animal farming practiced	100(83.3%)	00	20 (16.7%)
Done on either single plant in pots or large acreages	112(93.3%)	00	08(06.7%)
Farming done within the town boundaries	09(07.5%)	02(01.7%)	109(90.8%)
Large households more active than small ones	87(72.5%)	13(10.8%)	20(16.7%)
Females were active compared to males	76(63.3%)	11(09.2%)	33(27.5%)
Intercropping done in line with the conditions	115(95.8%)	02(01.7%)	03(02.5%)
Most urbanites get food supplies from the rural areas	88(73.3%)	06(05.0%)	26(21.7%)
	103(85.8%)	07(05.8%)	10(08.3%)

Source: Researcher's field Data 2025

Table 3 clearly indicated that women were the most active participants in urban farming (95.8), this was in line with the revelations on Table 1.it was observed that at Ponda Mali like other suburbs, women were increasingly concerned about promoting good nutrition and dietary diversity for themselves and within their families hence urban farming. Ponda Mali justified Vuciterna et al's (2024) claim that developing countries display a higher engagement of women in entrepreneurship, driven by necessity and marked by significant contributions to food security and economic stability, though under challenging conditions. They also added that this is contrary to the developed countries where farming is masculine and female effectively participates in decision making on Agri enterprises.

Like in any other urban centre in Kenya both crop and animal farming was practiced (93.3%). Observation and interviews agree that the following crops were grown, maize, bean and vegetables besides poultry as in other urban areas (Gore, 2018). It was also evident that most urbanites got their food staffs from the rural areas (85.8%) as they engaged in petty businesses (Self-employment) such selling second hand clothes (Table 3 cf Table 1). The plots engaged in farming were very close to the residents of the farmers (83.3%). These plots included among others; the compound, unfinished buildings, road sides, unused public places, below heavy voltage electric lines and next. Despite majority denying using vertical farming through pots and bags some used (07.5%). The practice was similar to the one practiced in Kibera slums in Nairobi (Gallaher C.M, 2015).

In order to have maximum utility intercropping was used (73.3%) as depicted on the table (Table.3). Most urban farmers adopted intercropping at Ponda Mali for improving crop yields and resilience. This apparently was a transfer of rural farming style to urban farming though, through intercropping, the farmers adapt to climate change. By growing multiple crops together, farmers can promote biodiversity, improve soil health, and enhance climate resilience as was portrayed by the urbanites of Ponda Mali (Table 3). The same table 3 was also emphatic on disagreeing that farming was done on either single plant in pots or large acreages (90.8%). Observably maize and beans were intercropped in the small gardens offering the given services coincidentally not intentionally.

A substantial number of respondents (63.3%) agreed that large households more active than small ones (Table 3). African Studies Centre (2006) has it that, the larger the household (more mouths to feed), the more likely it is to farm in town. And by growing (part of) one's own food, money is saved that can be used for other essential expenses such as pay fees for children. At least (66.7%) of the respondents had dependents hence a need to feed cheaply and easily through urban faming as in Table 1 compared with the responses on Table 3. Observably some livestock were reared on free range basis such as poultry, goats and sheep. This affirms the fact that currently Kenya as country, has no comprehensive national or county-level policy dedicated to governing urban agriculture. However, existing laws such as the Public Health Act and Land Control Act influence urban farming to some extent, with local county governments often taking the lead in promoting and regulating urban agriculture within their jurisdictions **(**Briton, 2025). So, despite the existing laws enforcement is a big challenge given the citizen's personal needs as seen on Table 3.

Table 3 has it that majority of the respondents disagreed (60.8%) the farming at Ponda Mali was for survival. Urban agriculture has become an integral part of the urban economy where it forms an urban livelihood for the urban poor that struggle with eking out a living, without the current dynamism, and attracts the non-poor into the practice (Kwiringira et al, 2024). The large majority of the African urban farmers do so to raise the household's level of food security, although for many of the poorest it can be a matter of survival contrary to Table 3 (Rogerson 1992; Sawio 1994 cited by Foeken and Owuor, 2000). This could be justified by the practice of urban farming by both the haves and the have-nots. Observably the farming was both on-plot cultivation, where the plot is located near the house and is usually owned by the urban dweller. Crops could also be cultivated or animals kept on public land as earlier mentioned (Foeken and Owuor, 2000).

Urbanites' Attitude Towards Urban Farming At Ponda Mali Estate Nakuru City

Table: 4 Urbanites perception towards Urban farming at Ponda Mali- Nakuru City (N=120)

Variable	Response (%)	Attitude index
Are you willing to farm within your estate environs?		
Very much willing	62 (51.7%)	310
willing	50 (41.7%)	200
Unwilling	05 (04.2%)	010
Very much unwilling	03 (02.5%)	003
Are women more active than men in urban farming?		
Very active	40 (33.3%)	200
Active	65 (54.2%)	260
Undecided	02 (01.7%)	006
Inactive	02 (01.7%)	004
Very inactive	01 (00.8%)	001
Is land in your estate enough for farming?		
Strongly agreed	20 (16.7%)	100
Agreed	93 (77.5%)	372
Undecided	02 (01.7%)	006
Disagreed	02 (01.7%)	004
Strongly disagreed	01 (00.8%)	001
Would you agree with food supplies to come from the rural areas?		
Strongly agreed	40 (33.3%)	200
Agreed	63 (52.5%)	252
Undecided	07 (05.8%)	021
Disagreed	06 (05.0%)	012
Strongly disagreed	04 (03.3%)	004

Source: Researcher's field data 2025.

Table 4 has it that the respondents had varied perception on willingness to practice farming within the estate's environs ranging from 310 to 03 (very much willing and very much unwilling). It was also clear that the majority (77.5%) of the urbanites agreed that land was a predicament to farming in Ponda Mali estate, Nakuru Municipality (Table 4). This echoed Table 1 where most of the respondents (93.3%) had access to less than one hectare of land within the town. This could have been attributed to urban sprawl (Bowyer-Boyer, 2006).

There was a varied perception on gender roles in farming where women's activeness ranged from 260-01. Where many respondents rated them as very active compared to men at 200; while active rated at 260 with negligible numbers (2.5%) claiming that they were inactive (Table 4). Naturally women in Kenya command the kitchen, where its their responsibility to prepare and present food on the table. Thus, Ponda Mali was not exceptional on this practice.

Despite all these some respondents agreed that food supplies should come from the rural areas. This also varied in rating as follows Strongly agreed 200; agreed 252; undecided 21; disagreed 12 and strongly disagreed 04 (Table 4). It then goes without doubt that Nakuru County is one of the food baskets of the country hence Ponda Mali's proximity to agriculturally rick neighbourhood. it could therefore be concluded that the urbanites at Ponda Mali were willing to carry out urban farming but limited by land for cultivation as per the table.

TABLE 5 Chi square statistic of the relationship between occupation and use of urban farming at Ponda Mali, Nakuru City (N=120)

Type of occupation	Use of Urban Farming	O	E	Chi-Calculated	Chi-Tabulated	df	Significance
Self-employed	Provision of food	101	105	00.152	9.210	2	S
	Aesthetics	035	105	46.667	9.210	2	NS
	Employment	016	105	75.438	9.210	2	NS
	Leisure	074	105	09.152	9.210	2	S
	Food Security	095	105	00.952	9.210	2	S
Civil Servants	Provision of food	014	015	00.067	9.210	2	S
	Aesthetics	005	015	06.667	9.210	2	S
	Employment	002	015	11.267	9.210	2	NS
	Leisure	011	015	01.667	9.210	2	S
	Food Security	014	015	00.067	9.210	2	S

Notes: S=Significant; NS=Not Significant; and df=2 at 0.01=9.210

Source. Researcher's Field Data, 2025.

Both civil servants and self-employed agreed that provision of food through urban farming was significant

(0.152<9.210 and 0.067<9.210 respectively) (Table 5). This type of farming provided fresh, locally grown produce to urban residents, reducing reliance on either imported food or stale market food stuff. They also agreed that for food security urban farming was the way to go and thus significant at (0.067<9.210 for Civil Servants and 0.952<9.210 for self-employed). This was contrary to the observation of that Land used for urban agriculture to many was rented, borrowed or an encroachment and rare occasions for low income groups personal or owned. Those who did not own the land, a reclamation could be done at any time and at short notice. This therefore implied a low degree of security for the urbanite peasants and a disincentive to invest in their farms. Toromade *et al* (2024) adds that in USA cities the urbanites have resorted urban farming so as to reduce the carbon footprint associated with long-distance food transportation from farm to table. It should also be noted that urban farming contributes to enhancing food accessibility and affordability, thereby addressing undernutrition among urban populations (Siegner et al., 2018; Satterthwaite et al., 2010 cited in Toromade *et al* (2024)).

The two groups also agreed that urban farming could be taken for leisure by them. On issues of urban farming being for employment was rejected at (75.4>9.210 for self-employed and 11.267>9.210 for civil servants) thus not significant (Table 5). There was a contradiction on farming being used for aesthetics especially the planting of flowers and maintenance of flower gardens where civil servants claimed it was significant at (06.667<9.210) while the self-employed rejected it at (46.667>9.210) so in significant (Table 5). Therefore, urban farming was not wholesale significant. Perceptions played a major role in determining the significance as seen from Table 5. Despite the perception it should be noted that urban farming and gardening can create new forms of recreation activities, to improve the quality of spaces for recreation, to develop the network of soft mobility (cycle/pedestrian paths) and green infrastructure. Urban and peri-urban farming can also contribute to preserve local knowledge, memory, cultural traditions and cultural heritage of food and food products, quality and multifunctional use of open spaces and open views, scenic and aesthetic values of landscape, landscape heterogeneity, as well as traditional landscape features and components such as hedges, tree avenues, terraces, stone walls and historic buildings EFUA, 2022). Most urbanites rarely visited their ancestral homes given the economic hardships so their children were unregistered eco-tourists for the gardens at Ponda Mali,

Conclusion

Urban farming was a good strategy for the provision of food in urban setting agreed by both civil servants and self-employed (0.152<9.210 and 0.067<9.210) respectively. Crucially, the study establishes that urban farming at Ponda Mali is highly gendered; women constitute the overwhelming majority of active farmers (95.8%), making them the primary drivers of localized urban food security and household survival. In most developing countries provision of food is dominated by women taken literary as cooks for the family. Both crop and animal rearing were practiced at Ponda Mali (93.3%). The primary food crops such as maize, beans, and kales were grown with simple poultry, sheep, goats and cattle depending on the size of land and affluence of the household. Urban farming was neither for employment nor leisure but a strategy for food security to both employed and self-employed statistically significant as follows (0.067<9.210 for Civil Servants and 0.952<9.210 for self-employed). The practice has now come to stay amongst the developing country thus should not be taken as overurbanization but improved.

Recommendation

Recommendations drawn from both the major findings and conclusion include among others the following: -

There is a need to re-frame and formalize the devolved Urban Planning Policies in Kenya to de-stigmatize Urban Farming by urban planners moving away from the outdated perspective that views urban agriculture as a sign of rural-urban regression or "overurbanization". It is thus high time Nakuru County Government formalize the integration of urban farming into municipal city plans, zoning frameworks, and public health codes, recognizing it as a legitimate and essential urban land-use activity revealed by this research.

Designing gender-responsive support frameworks is now a necessity through tailored Micro-Credit and Grants given that women drive 95.8% of urban farming activities in Ponda Mali, Nakuru City. Therefore, financial institutions and non-governmental organizations (NGOs) should design targeted financial products and grants specifically for women micro-entrepreneurs. This should be accompanied by women-centric training where; agricultural extension services must optimize their training hours and locations to accommodate women, focusing on high-yielding, low-labor, space-saving technologies. For an African woman is observably a beast of burden in her providence for the family.

Support of integrated mixed farming technologies is paramount through subsidize mixed-farming inputs. This should be so for, 93.3% of the community relies on both crop and animal rearing. Nakuru county government should therefore subsidize inputs that support circular micro-farming such as, small-scale poultry feeds, vertical garden sacks, and organic waste-composting kits. This needs to be accompanied by Technical Extension Outreach to teach safe, small-space sanitation practices to manage the public health aspects of rearing livestock and crops simultaneously within highly dense informal settlements. Generally, through the outreach programmes clean crop husbandry practices and curbing diseases affecting urban farming should be prioritized. Hence for provision of fresh, unrefrigerated, and home-grown food stuff the urbanites should adopt urban farming at all cost.

A priority should be given to broadening socio-economic target programs such as inclusive extension design. Given that the statistical significance spans across both formally employed civil servants and the self-employed, urban food security programs should be inclusive enough without any economic bias. Inclusivity should be manifested in outreach initiatives offering flexible, multi-tiered urban farming packages accessible to all economic classes within the settlement.

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References

1. Aboyeka,Z., (2019). *List of Estates in Nakuru.* Victor matara.com. Nakuru Town. Electronic Source (Downloaded on 8th October, 2025).
2. African Studies Centre (2006). *Farming as a livelihood source for urban dwellers: Results from a research project in Nakuru, Kenya.* Info sheet (Downloaded on 8th, October 2025).
3. Amalai P. (2024) *Assessing the contribution of peri urban agriculture to household incomes: A case study of Goma sub county Mukono Municipality*. A special project report presented to the Department of Agribusiness and Extension as partial fulfillment of the requirements for the award of Bachelor of Agribusiness Degree at Busitema University, Tororo (Unpublished) (Downloaded on 5th August, 2025).
4. Bashingi, N., Mostafab M., and Dasc, D.K., (2020). The state of congestion in the developing world; The case of Gaborone, Botswana. AIIT 2nd International Congress on Transport Infrastructure and Systems in a changing world (TIS ROMA 2019), 23rd-24th September 2019, Rome, Italy. ScienceDirect Available online at www.sciencedirect.com
5. Bowyer-Bower, T.A.S (2006). The Inevitable Illusiveness of "Sustainability" in the Peri-Urban Interface: The Case of Harare in McGregor D, Simon D, Thompson D, *The Peri-Urban Interface: Approaches to Sustainable Natural and Human Resource Use*. London: Earthscan. Pgs 151-164
6. Briton, G. (February, 2025) *Kenya: Nairobi's New Urban Farming Policy to Set Pace for Other Counties*. info@scienceafrica.co.ke (Downloaded on 8th October, 2025).
7. De Bon H, Parrot, L, & Moustier, P (2009). *Sustainable urban agriculture in developing countries. A review. Agronomy for Sustainable Development* · September 2009 Available online at: www.agronomy-journal.org (Downloaded on 5th August, 2025).
8. Douglas, I (2006). Peri-Urban Ecosystems and Societies: Transitional Zones and Contrasting Values in D., Mcgregor D & Simon *The Peri-Urban Interface: Approaches to Sustainable Natural and human Resource Use*. London: Earthscan pg 21.
9. EFUA (2022) *Benefits of Urban Agriculture: The Benefit Leaflets. Version 1.0* https://www.efua.eu. (Downloaded on 25th November, 2025)
10. EPA (2011) *Partnership for Sustainable Communities: Urban Farming Business Plan Handbook September, 2011-Update*. Chicago. 77W Jackson Blvd.
11. FAO. (2001). *Urban and Peri-Urban Agriculture: A brief guide for successful implementation of urban and Peri-urrban Agriculture in Developing Countries and Countries of Transion. SPFS/DOC/27.8. Revision 2 Handbook Series Volume III.* Rome: Special Programme for Food Security-FAO
12. Foeken, DWJ & Owuor, SO (2000) *Urban farmers in Nakuru, Kenya. ASC Working Paper 45 / 2000.* African Studies Centre. The Netherlands. asc.fsw.leidenuniv.nl (Downloaded on 15th July, 2025).
13. Gallaher C.M, WinklerPrins A.M.G.A, Njenga, M. & Karanja N.K (2015). Creating Space: Sack gardening as a livelihood strategy in Kibera slums of Nairobi, Kenya. *Journal of Agriculture, Food Systems and Community Development*. Pgs 1-19.
14. Kwiringira, J., Mohling, E.W.P., Mathias, A. et al. (2024). *Urban agriculture as an evolved sustainable urban livelihood: evidence from Kampala city, Uganda.* Agric & Food Secur 13, 53 (2024). https://doi.org/10.1186/s40066-024-00507-y (Downloaded on 5th August, 2025).
15. Halliday, J., Platenkamp, L., Nicolarea, Y. (2019) *A menu of actions to shape urban food systems for improved nutrition*, GAIN, MUFPP and RUAF. (Downloaded on 5th August, 2025).
16. Matara, E.(September 2021) How 6 Nakuru town estates got their names. *Daily Nation. Thursday September 23rd 2021*. Nation Media Group. (Downloaded on 15th July, 2025).
17. Mbuba, J.M (1997) *The plight of maids in relation to exploitation and domestic aggression: A case study of Nakuru Municipality*, A master of Arts (Sociology) thesis of University of Nairobi. Nairobi (Unpublished). (Downloaded on 15th July, 2025).
18. McKinney, M.L & Schoch, R. M.(1998). *Environmental Science: Systems and Solutions.* London: Jones and Bartlett Publishers International
19. Mugambi, P. N., Gachanja, J. M., & Mbugua, J. (2018). Role of urban agriculture in poverty alleviation: A case of Nakuru town, Kenya. *International Journal of Economics, Commerce and Management*, 6(7), 123-134.
20. Ministry of Health (2019). *Report on A situation analysis on social determinats of health and health inequality in Nakuru Kenya.Nakuru-Kenya*: Electronic Source. (Downloaded on 5th August, 2025).
21. Mlozi, M.R.S., Lupala, A., Chenyambuga, S.W., Liwenga. E. & T. Msogoya.(2014). *Building Urban Resilience: Assessing Urban and Peri-urban Agriculture in Dar es-Salaam, Tanzania*. Nairobi, Kenya: United Nations Environment Programme (UNEP)
22. Mohamed, O.O (2015) *Election Violence In Kenya: A Case Study of Nakuru 1992-2008.* A masters of Arts Thesis-Kenyatta University Nairobi (Unpublished) (Downloaded on 10th August, 2025).
23. Mougeot, Luc J.A. (1994) *"Urban Food Production: Evolution. Official Support and Significance." Cities Feeding People Report 8.* International Development Research Centre, Ottawa. (Downloaded on 5th August, 2025).
24. Mougeot, Luc J.A. (1996). *Urban agriculture in Africa.* Nairobi: African Urban Quarterly. (Downloaded on 12th June, 2025).
25. Mukherji, N., and A. Morales (2010). *Practice urban agriculture.* American Planning Association. Chicago
26. Mwale. A., (2019). *Collapse of industries in Nakuru the base of residents*, KNA news. Nakuru Town. Electronic Source. (Downloaded on 12th June, 2025).

27. Naeku, C & Irungu, E., (2024). *Assessing Labour Productivity for Nakuru County. KIPPRA Policy Brief No. 78/2023-2024.* Nairobi: The Kenya Institute for Public Policy Research & Analysis.
28. NEMA (2008). *State of Environment Report for Uganda 2008*. Kampala: Author
29. Ndiritu, C. (2012). *The rise of slums in Nakuru Municipality, Kenya: A case study of Mawingu zone*. Journal of Social Sciences, 34(1), 47-54.).
30. Nhamo G and Inyang, E. (2011) *Framework and Tools for Environmental Management in Africa.* Dakar. CODESRIA.
31. Ngugi, D.N. Karau, P.K. & Nguyo W. (1978). *East African agriculture: a textbook for secondary schools.* London: English Language Society and Macmillan,
32. Njenga, K., & Gikonyo, L. (2020). Contribution of urban agriculture to employment and income generation in informal settlements of Nakuru town, Kenya. *Journal of Sustainable Development in Africa*, 22(3), 45-58. (Downloaded on 12th June, 2025).
33. Nyangweso, P. M., Oburo, K. D., & Wawire, N. (2019). Leveraging urban agriculture for sustainable urban development: Case study of Nakuru City. *Sustainable Cities and Society, 49, 101694*. (Downloaded on 12th June, 2025).
34. Olinga.F, (2007) Gender isssues in Agroforestry in Agea, J.G, Namirembe, S. Bukenya, M., Zziwa, A. and Waiswa, D. *Design of Approprite Agroforestry Interventions in Uganda.* Kampala: Fountain Publishers pgs 55-64.
35. Omondi, S. (2019). *Policy Brief- Urban Agriculture: The neglected gem for food security in Kenya. Nairobi:* Electronic Source. (Down loaded, 30th July, 2025)
36. Omondi, S.O., (2018) *Urban-Based Agriculture and Poultry Production: The Case of Kisumu and Thika in Kenya.* Doctoral Thesis Lund University(Down loaded, 30th July, 2025)
37. Omukhango M. and Etyang, M.N (2022) Effect of Youth Empowerment in Unemployment Intervention Programmes on Youth Employability in Nakuru County, Kenya. *Asian Basic and Applied Research Journal 4(1): 88-95, 2022; Article no.ABAARJ.815*
38. Onyango, E. (2025). *Review of Nairobi Urban Agriculture Policy Final External Stakeholders Convening Movenpick Hotel*, Nairobi, Kenya August 25, 2025. (Downloaded on 17th May, 2026).
39. Otieno, C. (15th February 2019): *3 places with beautiful names but pathetic conditions in Nakuru.Hivisasa. 15 February 2019.* (Down loaded, 30th July, 2025)
40. Potts, D. (2000). Urban livelihoods and poverty in Mbare, Harare, Zimbabwe. *Journal of Modern African Studies, 38(2), 207-235*(Downloaded on 12th June, 2025).
41. Republic of Kenya. (1996). *Nakuru Municipal Plan.* Ministry of Local Government, Nairobi. (Downloaded on 12th June, 2025).
42. Republic of Kenya. (2007). *Kenya Vision 2030-A Globally Competitive and Prosperous Kenya*. Government Printers: Nairobi
43. Smith, J., & Jones, M. (2020). *The environmental benefits of urban agriculture: A review. Urban Ecology, 15(2), 123-135* (Downloaded on 12th June, 2025).
44. Sowmyalatha, B.S. and Sahana, S. R. (May 2022). *Urban Farming –An Innovative Idea To Revolutionize Agriculture. ARTICLE ID: 4* www.justagriculture.in Vol.2 Issue-9, May 2022 (e-ISSN: 2582-8223).
45. Toromade, A.S , Soyombo, D.A, Kupa, E., & Ijomah, T.I (2024). *Urban farming and food supply: A comparative review of USA and African cities.* International Journal of Advanced Economics P-ISSN: 2707-2134, E-ISSN: 2707-2142 Volume 6, Issue 7, P.No.275-287. www.fepbl.com/index.php/ijae
46. UNDP (2006). *Urban agriculture: Food, jobs and sustainable cities. United Nations Development Program Publication Series for Habitat II, Vol I*. New York: Author
47. United Nations, (2012). *World Population Prospects: The 2012 Revision, Key Findings and Advance Tables, Population Division Working Paper N0 SSA/P/WP. 221*.New York: Department of Economics and Social Affairs, United Nations. (Downloaded on 12th September, 2024).
48. Ungureanu N., Vlăduț V., Biriș S., & Miluț M., (2021). The Effects of Wastewater Irrigation on Agricultural soils. *Annals of the University of Craiova - Agriculture, Montanology, Cadastre Series Vol. 51/2/2021 566 3.* (Downloaded on 12th June, 2025).
49. Vermeiren, K, Adiyia B,; Loopmans, M,; Tumwine, F.R;& Van Rompaey A. (2013). *Will urban farming survive the growth of African cities: A case-study in Kampala (Uganda)?* Land Use Policy ELSEVIER-ScienceDirect Volume 35, November 2013, Pages 40-49
50. Vuciterna, G. R, Chiara M, Sara M & Stefano C; (2024). *Women's entrepreneurial journey in developed and developing countries: A bibliometric review. Agricultural and Food Economics* https://doi.org/10.1186/s40100-024-00331-9. (Downloaded on 12th June, 2025).
51. Yego (2017). *Analysis of urban agriculture as a tool for increasing food security within Eldoret Town Uasin Gishu County, Kenya.* (Unpublished)-M.A. Geography Thesis of Moi University. Eldoret-Kenya. (Downloaded on 11th July, 2024).
52. Zeeuw de I.H. (2004). The development of Urban Agriculture: Some lessons learnt. *The International Conference " Urban Agriculture, Agro-tourism and City Region Development" Beijing 10-14 October*. Leusden, The Netherlands. Resource Centres on Urban Agriculture and Food Security (RUAF) ETC Foundation. (Downloaded on 12th June, 2025).