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Assessing Urban and Peri-Urban Agriculture in Jinja City, Uganda

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Abstract

To achieve the second goal of the Sustainable Development Goals (SDGs), which is about ending hunger, it is suggested that towns and cities need to foster and promote urban and peri-urban agriculture (UPA). UPA is also recognized as one of the strategies that can be adopted to address contemporary urban challenges, such as food insecurity, climate change as well as urban poverty. Most intermediate and secondary cities such as Jinja however, lack coherent plans to foster urban and peri-urban agriculture (UPA). The purpose of this study is to assess and explicate the practice and dynamics of urban and peri-urban agriculture (UPA) in Jinja city in view of the city's recent experience as well as changing land use and development patterns. To achieve the stated objectives of the study, an eclectic research methodology comprising of both quantitative and qualitative approaches was used. The study also used both questionnaires and face-to-face interviews as data collection methods. The questionnaire survey targeted 129 household heads from the Northern and Southern Jinja city divisions. Respondents for the key informants' face-to-face interviews were selected using purposive sampling while those for the questionnaires were randomly selected. Results show a varied and diverse practice of urban and peri-urban agriculture in Jinja city. The city's UPA sector is dominated and characterized by poultry farming, crop farming (both food and cash crops), livestock farming (goat/sheep rearing, cattle rearing/zero grazing, rabbit rearing and pig rearing), horticulture/vegetables, fish farming, mushroom growing and agro-forestry (fruit/timber growing). Findings further revealed that, 38.1% of the HHs in Jinja city used their own land to participate agriculture, 21.6% used backyards/house compounds and 21.6% hired land to engage in farming. The rest, 3.1% used borrowed land. In addition, 50.9% of the urban farmers used less than an acre to farm while 0.9% had more than 4 acres. Only 33.3% of the HHs had adequate food for the family needs throughout the year

due to factors such as poor harvest and prolonged droughts caused by erratic rainfall. To foster urban and peri-urban agriculture (UPA) in Jinja city, it is suggested that the city authorities adopt strategies to establish a functional demonstration farm where citizens could learn new farming methods, provide cheap credit to urban farmers, strengthen collaboration with the National Animal Genetic Resource Centre (NAGRC) in Njeru town, foster irrigation-related programmes, promote greenhouse farming, promote school gardens in the city, build local capacity for the newly introduced Parish Development Model (PDM) farming groups, carry out public awareness campaigns targeting the youth to embrace urban agriculture, support agro-processing and value addition mechanisms for urban agriculture as well as review the current city zoning laws and building codes to accommodate backyard and roof-top gardening.

Keywords

Urban Agriculture, Sustainable Cities, Food Security, Climate Change Mitigation

1. Introduction

Over 50% of the world population now live in cities (United Nations, 2019). By 2050, it is estimated that 70% of the world population will be living in towns and cities (Abdulkadir et al., 2012; United Nations, 2019). Besides, most of the global city-related changes are expected to occur in Africa and Asia where the rate of urbanization is still low.

Only 43% of the population in Africa lives in cities compared to 50% in Asia, 82% in North America, 81% in Latin America and Caribbean, 74% in Europe and 68% in Oceania region (United Nations, 2019).

Besides, the growth and expansion of cities in Uganda is now considered as a critical national development policy and investment issue (National Planning Authority, 2021). The urban population in the country is also growing at a rate of 5.1% per year. This is higher than the national population growth rate (National Urban Policy, 2017).

As a country, Uganda has 11 cities, 31 municipalities and over 400 town councils. There are also several unrecognized growth centres and trading centres that are located in various parts of the country (National Urban Policy, 2017).

A key consequence and outcome of the recent growth of towns and cities has been on the rise in demand for food items (De Zeeuw et al., 2011; Abdulkadir et al., 2012; Lwasa et al., 2013). Recognized also are critical urban policy issues, such as nutrition security as well as access to healthy diets (De Zeeuw et al., 2011).

To achieve the second goal of the United Nations Sustainable Development Goals (SDGs) which is about ending hunger, it is suggested that towns and cities need to foster and promote urban and peri-urban agriculture (UPA). UPA is also

recognized as one of the strategies that can be used to address contemporary urban challenges, such as food insecurity, climate change as well as urban poverty (Lwasa et al., 2013).

Lwasa et al. (2013) defines urban and peri-urban agriculture as "the growing of trees, food and other agricultural products (herbs, pot plants, fuel, and fodder) and rearing of livestock and fisheries within the built-up area or on the fringe of cities".

Also, the Food and Agriculture Organization (FAO), which introduced the acronym UPA, describes urban and peri-urban farming as the type and category of "agriculture that takes place within the built-up city and in areas surrounding the cities" (De Zeeuw et al., 2011).

UPA often focus on perishable and high value products, such as green vegetables, mushrooms, herbs, fresh milk, eggs, poultry-related products, fruit trees, pigmeat and fish (De Zeeuw et al., 2011). UPA is carried out in places such as field plots, vacant pubic land, along the major roads, backyard gardens, rooftops, greenhouses and in wetlands (Abdulkadir et al., 2012).

Recognized also is that UPA contributes about 15 - 20 percent to the global food supply and consumption (Abdulkadir et al., 2012). And as the global urban population continues to grow, there is a concern that the urban poor will not be able to get enough food (Abdulkadir et al., 2012; De Zeeuw et al., 2011).

As a member of the United Nations (UN) and signatory to several international agreements, Uganda has in the recent past introduced several programmes to promote the United Nations Sustainable Development Goals (SDGs) including SDG number one 1) which deals with eradication of extreme poverty as well as SDG number two 2) that aims to end hunger.

Most intermediate and secondary cities in Uganda such as Jinja however, lack coherent spatial plans to foster urban and peri-urban agriculture (UPA). Rarely is UPA treated as a key element of the approval process for the submitted building plans by the developers in Jinja city (Malmberg & Backlin, 2017; Jinja City, 2021).

While urban agriculture is indicated in the current physical development plan for Jinja city as a key land use, the reality on the ground is that there is no clear local regulatory mechanism to enforce zoning laws that aims to preserve and protect land that has been earmarked for farming purposes in the city.

Vast urban land that was used for farming has in the recent past been allocated to investors for commercial, industrial and residential development (Malmberg & Blacklin, 2017; Jinja City, 2021).

Within the inner-city zones as well as the central business districts (CBDs) of Jinja city, opportunities for food production and farming continue to diminish due in part to limited access to land as well as stringent urban regulation and enforcement mechanisms (Malmberg & Backlin, 2017).

In 2022, the supply of important food items such as wheat and cooking oil was interrupted by the global events such as the Russia-Ukraine war, leading to the escalation of food prices. Such events have also exposed Jinja city's inability to

address the contemporary challenge of food insecurity especially among the urban poor (Edema, 2022).

Most important, in July 2022, more than 50 people were arrested in Jinja city for protesting against high food and fuel prices caused by the global events as well as an inflexible national economic policy that is based on free-market capitalism (Edema, 2022).

1.1. Jinja City Profile

Jinja was declared a township in 1906 and became a municipality in 1956. In 2020, after so many years of lobbying and campaigning, Jinja was finally elevated to city status. This was after the Parliament of Uganda had approved the creation of 15 new cities based on the proposals made in Vision 2040, the National Urban Policy 2017 as well as the National Development Plans.

Besides, Jinja city is located 80 km East of Kampala city and covers an area of 216 square kilometers. Jinja city has two divisions, namely: the Northern Division and Southern Division (Jinja City, 2021).

The Northern Division covers largely areas that were annexed from Jinja district such as Budondo, Mafubira and Bugembe town council. Most areas in this division are rural in nature.

The Southern Division on the other hand covers the entire area of the former Jinja municipality (Jinja City, 2021), which also constitutes the urban core of Jinja city.

Figure 1. Map of Jinja city (Source: Jinja City Five Year Development Plan 2021-2025).

Figure 1 above shows the two divisions of North and South in Jinja city that were created after Jinja municipality was elevated to city status in 2020.

In 1906 Jinja's population was about 3000 people. This later increased to 47,872 people in 1969, 71,213 in 2002, 76,183 in 2014 and 247,074 in 2020 (Jinja City, 2021).

The Northern division comprising of newly annexed areas and sub-counties from Jinja district is the most populated area with a total of 170,886 people

compared to the Southern division whose total population is 76,187 people (see Table 1).

Jinja city also has a total of 39,167 households of which 55% are engaged in subsistence agriculture (Jinja City, 2021).

Table 1. Population in Jinja City Divisions.

Division	Males	Female	Total
Southern	38,167	38,021	76,188
Northern	80,000	90,886	170,886
Total	**118,167**	**128,907**	**247,074**

Source: Jinja City, 2021.

The annexed areas comprising of the Northern division of Jinja city are largely rural with agriculture serving as the main source of employment. Over 60% of the people in this division are farmers, growing crops such as vegetables, maize and sugar cane.

Some urban farmers in Jinja are also engaged in dairy farming, focusing mainly on zero grazing. Dairy products such as milk and beef are also sold to the city residents in Jinja. Farming activities in the city are however, affected by the changes in weather patterns as well as unpredictable climatic conditions (Jinja City, 2021).

Farming activities in Jinja city are also threatened by pests and diseases that have emerged as a result of climate change as well as the destruction of the ecosystems such as wetlands in the city.

Food insecurity has in the recent years become a pervasive problem in Jinja because of the continued focus on sugar cane growing as well as the failure by the city authorities to introduce a coherent plan to revamp the food production sector based on local conditions and realities (Edema, 2022; Jinja City, 2021; Malmberg & Backlin, 2017).

1.2. Objectives of the Study

The overall objective of this study is to assess the practice and dynamics of urban and peri-urban agriculture in Jinja city in view of the region's recent experience as well as changing urban land use and development patterns. Specifically, the study aims to achieve the following objectives:

- To assess the current urban and peri-urban agricultural practices in Jinja city;
- To investigate people's perceptions towards urban and peri-urban agriculture in Jinja city;
- To identify local innovations and new practices that can be embraced and popularized by the city authorities to improve urban and peri-urban agriculture in Jinja;
- To propose viable and scalable strategies for improving urban and peri-urban agriculture in Jinja city.

1.3. Scope of the Study

Investigations on urban and peri-urban agriculture were carried out in Jinja city, one of the intermediate cities in Uganda. Specifically, the study was carried out in both Southern and Northern division of Jinja city. Besides, the Northern Division of Jinja city covers largely rural areas that were annexed from Jinja district such as Budondo, Mafubira and Bugembe town council. The Southern division on the other hand covers the urban core and the entire area of the former Jinja municipality (Jinja City, 2021).

2. Review of Relevant Literature

2.1. Previous Studies

According to Lwasa et al. (2013), several illustrious studies conducted during the past three decades have highlighted the role played by the urban and peri-urban agriculture (UPA) in the transformation and development of cities across the globe. Most of these studies however, have focused on UPA and its contribution towards poverty alleviation and nutrition improvement as well as climate change mitigation and adaptation (Lwasa et al., 2013).

Existing literature on the UPA also show that although the majority of the urban farmers in the developing country cities are often categorized as the urban poor, there is evidence to show that the middle -class and high -income city residents are also involved in promoting agriculture in cities (De Zeeuw et al., 2011). In Dar es Salaam city for example, middle-level government employees have often used food stalls installed on their house plots to sell their agriculture products such as vegetables (De Zeeuw et al., 2011).

Also according to De Zeeuw et al. (2011), "more often than not urban and peri-urban farmers have already lived in the city for longer periods of time; time that is needed to gain access to urban land, water and other resources".

UPA is currently recognized as a legitimate economic activity in many developing country cities (Lwasa et al., 2013). This change of development strategy in several major cities is partly due to UPA's associated benefits such as its ability to provide employment to the city residents, improvement of nutrition security, poverty alleviation as well as proper management of solid waste (Malmberg & Maclin, 2017; Lwasa et al., 2013; De Zeeuw et al., 2011; Sabiiti & Katongole, 2016; Aryal, 2021).

Recent studies such as Lwasa et al. (2013) as well as De Zeeuw et al. (2011) have also highlighted the role played by the urban and peri-urban agriculture in mitigating climate change as well as in establishing cities that are resilient, inclusive, equitable and sustainable.

In their study, Berhanu and Akola (2014) found that 55.9% of the impacts of urban agriculture on the environment in Debre Markos town in Ethiopia were related to waste dumping, soil loss and loss of biodiversity due to the failure by the urban farmers to address critical environmental issues (Berhanu & Akola, 2014).

In a study that was carried out in three West African cities of Kano (Nigeria), Bobo Dioulasso (Burkina Faso) and Sikasso (Mali), it was found that urban and peri-urban agriculture production and expansion was constrained by high cost of inputs, water shortage, pests and diseases as well as inadequate fertilizer supply (Abdulkadir et al., 2012).

Previous studies such as Lwasa et al. (2013), Abdulkadir et al. (2012) as well as De Zeeuw et al. (2011) also focused on the metropolitan cities in the Sub-Saharan Africa (SSA) countries like Uganda, Tanzania, Senegal, Ethiopia, Nigeria, Kenya and Ghana.

Most intermediate and secondary cities in Uganda such as Jinja have failed to prevent urban expansion and changes in land use that threaten farming activities carried out especially in the peri-urban areas.

2.2. Summary of Research Gaps

It is thus clear that there are glaring research and knowledge gaps in the area of urban and peri-urban agriculture carried out in secondary and intermediate cities, which this study aims to fill. In addition, the study aims to build on the findings of previous studies such as Lwasa et al. (2013), Abdulkadir et al. (2012), De Zeeuw et al. (2011) as well as Malmberg and Backlin (2017).

3. Methodology

3.1. Research Design

This study applied a mixed methods research design focusing on both qualitative and quantitative approaches to research.

3.2. Target Respondents and Population

The target respondents for the questionnaire in this study comprised of household heads whose views were captured through a structured questionnaire survey.

For the face-to-face interviews, the target respondents and population comprised of 14 key informants from various departments of Jinja city council as well as Jinja City Development Forum.

3.3. Sampling Frame, Sampling Technique and Sample Size for Questionnaire

A sample size of 129 household heads was selected using a simple random sampling technique. Under simple random sampling, each element of the target population has an equal chance of being included in a sample and to participate in the study. Electoral registers for the two city divisions in Jinja city were used as a sampling frame.

Most respondents, that is, 60.5% came from the Northern Division due to high concentration of urban farmers here, followed by Southern Division with 39.5% of the farmers as shown in **Table 2(a)** below.

Investigations focused on the main wards of Budondo, Bugembe, Mufubira, Masese, Mpumudde and Walukuba areas where much of the urban agriculture is practiced.

Table 2. (a) Respondents for the questionnaire; (b) City officials interviewed at Jinja city.

(a)

Division	Total Respondents/Questionnaires Distributed	Percent %
Southern	51	39.5
Northern	78	60.5
Total	129	100.0

(b)

Department/Designation	No of Staff Interviewed
Head OWC Jinja district-UPDF-Jinja Office	1
Jinja City Development Forum President	1
Head Production Department Technical staff	1
City Mayors in 2 divisions	2
Agriculture Department Technical Staff in 2 divisions	7
Head Nakabango Farm	1
Physical Planning Department Head	1
Total	14

Source: Primary Data (July, 2022).

3.4. Data Collection Methods

3.4.1. Questionnaires Targeting Household Heads

Questionnaire were distributed to collect primary data from the 129 household heads in the two divisions of Jinja City. Both closed ended and open-ended questions were used in designing the questionnaire.

There was also pre-testing of study instrument (data collection tool) and translation of questionnaires into the local language for the respondents who did not understand English. This was intended to minimize the threats to validity and reliability.

3.4.2. Interview Schedule Used to Collect Data from the Key Informants

An interview schedule was used to collect information from 14 purposively selected key informants. Selected key informants comprised of the city officials from various departments of Jinja city as well as Jinja City Development Forum based on their knowledge on the issues under investigation. Specifically, the key informants comprised of two (2) city mayors, head of production department (1), agricultural department (7), staff from the 2 divisions including agriculture and

veterinary staff, head of OWC jinja city (1), Head Jinja City Development Forum (1), Head of Nakabango farm (i) and Head physical planning unit (1) as shown in Table 2(b) above.

3.5. Data Analysis and Management

Data collected using questionnaires was coded and processed using the Statistical Package for Social Sciences (SPSS) software. Processed data was presented and analyzed using descriptive statistics such as percentages. Data presentation was also done using tables, pie charts, graphs and report was developed after thorough review of the data analyzed and interpreted.

Qualitative data from the key informants were collected using recording tapes and smart phone recordings. The recording was then typed and analyzed manually and presented according to the themes and conceptual framework.

4. Findings of the Study

4.1. Key Characteristics of the Respondents for the Questionnaire

The summary of the characteristics of the 129 selected house hold heads in terms of gender, age, marital status, education, occupation, HH population, position in the households (HHs), Household income and residential status are hereby illustrated in Table 3 below.

As indicated in Table 3 below, 41% of the respondents for the questionnaire were male while 59% were female. Findings show that 47% of the respondents were within the age bracket of 36 - 59 years and 43% were between the age group of 18 - 35 years. Only 2% of the respondents were below 18 years and 9% were 60 years and above.

Table 3. Characteristics of respondents for the questionnaire.

Characteristic	Count	Percentage (%)
HOUSEHOLDS/RESPONDENTS	**Count (n = 129)**	
Gender of Respondent		
Male	53	41.1
Female	76	58.9
Total	129	100.0
Age Group of Respondent		
Below 18 years	2	1.6
18 - 35	56	43.4
36 - 59	60	46.5
60 and above	11	8.5
Total	129	100.0

Continued

Marital Status		
Single	17	13.2
Married	92	71.3
Divorced	5	1.2
Widow/Widower	9	7.0
Separated	6	4.7
Total	129	100.0
Education		
No formal education	5	3.9
Primary education	54	41.9
O Level education	49	38.0
A Level education	10	7.8
Tertiary Education	1	8.6
Total	129	100.0
Occupation Category		
Civil servant	6	4.7
Farmer	22	17.1
Businessman	45	34.9
Casual Wage worker	18	14.0
Self employed	13	10.1
Maid	13	10.1
Housewife	12	9.3
Total	129	100.0
Average Income Earned per month from farming		
Below UGX 50,000	44	34.1
UGX 51,000 - 100,000	36	27.9
UGX 101,000 - 200,000	14	10.9
UGX 200,000 and above	10	7.8
None/Nothing	25	19.4
Total	129	100.0
Total	129	100.0

Source: Primary Data (July 2022).

Based on the Table 3 above, the majority of respondents 71% were married, 13% were single, 1% single, 7% widowed and 5% separated. About 42% of the respondents had primary level education, 38% obtained O' Level education, 8% had A' Level qualifications and 9% had tertiary level education qualifications.

Findings further revealed that 62% of the respondents earned between Shs50,000 and Shs100,000 per month, 11% earned between Shs101,000 and Shs200,000, 8% earned Shs200,000 and above. Interestingly, 19% of the respondents earned nothing each month. Only 17% of the respondents were committed to farming, the rest, were civil servants (5%), businessmen (35%), self-employed (10%), maid (10%) and housewives (9%).

4.2. Current Urban and Peri-Urban Agriculture Practices in Jinja City

This section addresses issues of farming practices, markets for agricultural produce, value addition practices, labour and water for production issues, farming tools, land use, affordable financial sources and current government interventions in the agriculture sector in Jinja city.

4.2.1. Livestock Farming

The main animals reared in Jinja city include: dairy cows (22%), pigs (15%), goats and sheep (33%) and rabbits (10%). About 22% of the respondents practiced zero grazing for dairy animals using family labour and in some cases, employed casual workers to feed the animals. Rabbits are reared by 10% of the respondents, mainly youth. Rabbits are often sold to the Indian community in Jinja city, see Figure 2 below.

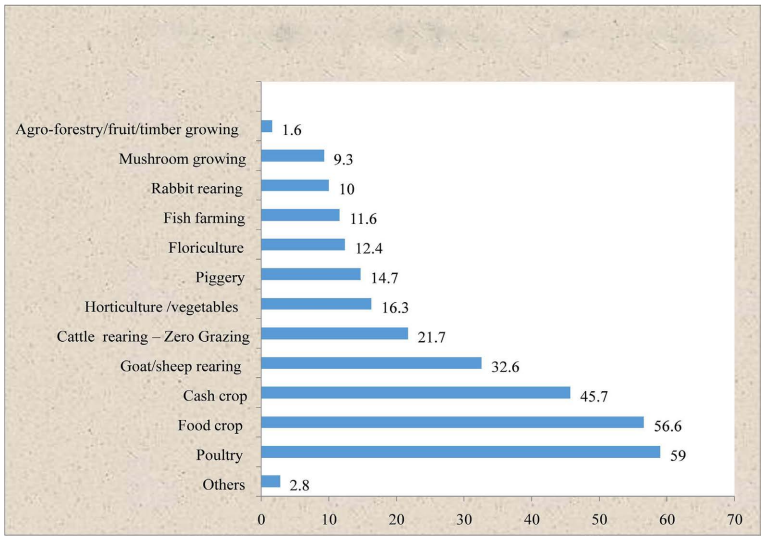

Figure 2. Proportion (%) of HH engaged in various forms of urban farming in Jinja City.

4.2.2. Agro-Forestry

As indicated in Figure 2 above, agro-forestry constitutes 1.6% of the urban agriculture sector in Jinja city. This is carried out on small scale at Budondo forest reserve. Agro-forestry is also carried out in wetlands especially in Masese wetlands. There are also forest reserves in Walukuba wards. Under this category of UPA, fruit trees such as avocado, mangos and oranges are the most popular

among the urban farmers in Jinja city.

4.2.3. Crop-Farming

Crop farming both for food (56.6%) and cash crops (45.7%) is carried out as back-yard gardening. The main food crops grown in the city include cassava, maize, yams and bananas.

4.2.4. Hortculture Crops

Horticulture crops constitute 16.3% of the farming activity in Jinja City and there is a ready market for these crops at the main Amber court market area in Jinja city and Nakasero market in Kampala. Farmers in the Northern division also grow vegetables such as cabbages (28.6%), egg-plants (21.4%), dodo (14.3%), tomatoes (12.8%), Sukumawiki (10%), Nakati (8.6%) and onions (1.4%) and others (2.9%).

4.2.5. Floriculture

Floriculture is practiced by 12.4% of the house holds (HHs). Several nursery beds have been established near the Amber Court up to the police barracks area along the main Jinja-Kampala road.

4.2.6. Fish Farming

Fish farming constitutes 11.6% of urban farming in Jinja city. This is carried out in cages. Cage fish farming has been introduced especially in Masese ward on the shores of Lake Victoria. Fish ponds are also being promoted by some small -scale fish farmers in Masese area.

4.2.7. Reason for Engaging in Urban Agriculture

Based on the results of the study, 52.7% of the households (HHs) in Jinja city engage in urban agriculture as a source of income while 45.7% as source food and 2.6% for other reasons such as beauty, environmental protection and herbal medicine among others.

4.2.8. Value Addition

Table 4 below shows little value addition practiced in the Jinja city by the farmers due to the subsistence nature of farming activity. There is also hardly any farmer with over 4 acres of land. This in a way limits large-scale agricultural production and value addition. However, there cases where tomatoes, maize, milk and bananas have been processed to produce products such as tomatoes sauce, maize flour and yoghurt.

Table 4. Areas of value addition practiced by farmers in Jinja City.

Enterprise	Areas of Value Addition
Tomatoes	Making tomatoes sauce and juice at low level at homes with simple machines. There are also tomatoes seeds which have ready market in the city
Maize	Producing maize flour-related products such as bread, porridge and animal feeds. There are many maize milling machines in Jinja city involved in value addition

Continued

Zero grazing dairy cows produce milk	Several dairy products such as milk, butter, cheese, and ghee. Most farmers in the city have been linked to Uganda Dairy Development Authority for free training on yoghurt processing
Bananas	Value addition is in form of Banana bread and cakes.

Source: Primary Data (July, 2022).

4.2.9. Purchase of Food in Jinja

Table 5 below shows that the purchase of food from shops and markets by the households (HHs) was ranked the highest source of food by 60.1% of total respondents, followed by household stocks (30.2%) and farm/gardens/production of own crops (8.6%). This is because some of the HH do not have sufficient land to use for farming. The use of machinery in production in the city is absent and all farmers use the hand-held hoes to grow food.

Only 33.3% of the HHs had adequate food for the family needs throughout the year due to poor harvest and prolonged droughts. The situation became worse during COVI-19 lockdowns when food supply and distribution was affected.

4.2.10. Meals Taken

In terms of meals taken each day by the house holds, the study established that only 40% of HHs had more than 2 recommended meals a day while the rest (60%) had less than two meals a day. Some HHs reported that they reduced the number of meals taken each day due to the recent escalation of food prices. This has led to the increase in number of people seeking employment as casual laborers for alternative source of income to supplement their earnings especially women and youth in the areas.

Besides, 70% of the households reported to have faced food shortage in the past 12 months. This was especially the case during the Covid 19 pandemic.

Table 5. Sources of Food available for the households (HHs).

Source of Food	Percentage
Household stocks	30.2
Humanitarian distribution	0.6
Purchase food from shop and market	60.1
HHs own garden	8.6
Supplies from relatives/friends	0.5
Total	100.0

Source: Primary Data (July, 2022).

4.2.11. Labour Availability

Table 6 below shows that 55.8% of the HHs use family labour to work in the field/garden for 3 - 5 hours daily and about 19.4% work for more than 5 hours. This shows that, there is adequate time devoted to family labour thereby reducing

hired labour. HHs who use mainly family labour on small holdings use simple farming tools such as hoes and pangas.

4.2.12. Access to Extension Services

Only 18.6% of HHs have access to agricultural extension services. This is done through agricultural shows or tours, demonstration farms, NAADS, Operation Wealth Creation (OWC), Parish Development Model (PDM) and Emiyooga as provided by government programmes.

Table 6. Main sources of labour to support HHs farming activities.

Source of labour	No of HHs	Percentage
Hiring	52	40.3
Family labour	72	55.8
Other (specify)	5	3.9
Total	129	100.0

4.2.13. Farm Inputs

The study also revealed that urban farmers in Jinja have access to improved farm inputs such as improved seedlings, fertilizers, improved animal breeds, liquid manure, pesticides and technologies such as ploughs, tractors, and artificial insemination etc. These are supplied under NAADS, Operation Wealth Creation (OWC) and Parish Development Model (PDM), programmes that have been introduced in the recent years by the central government.

4.2.14. Markets for Agricultural Products

Most of the agricultural products produced by the urban and peri-urban farmers are sold to city food markets (41.2%), estate markets (7.5%), neighbours (10%) and vendors (2.5%) while the rest (37.5%) is consumed by the HHs themselves as shown in Table 7 below.

Table 7. Markets to sell agricultural products in Jinja city.

Markets for Agriculture Products	No. of Farming HHs/Respondents	Percentage
Estate Kiosks	10	7.5
City food markets	53	41.2
neighbors	13	10.0
On line platform markets	2	1.2
Do not sell-All is consumed by my household	48	37.5
Vendors/hawkers/businessmen	3	2.5
Total	129	100.0

Source: Primary Data (July, 2022).

4.2.15. Access to Water

Findings in Table 8 below shows that piped water system possessed by 89.1% of HHs in the city boost agricultural production during dry season as well as enhance food security. However, results show that only 26.4% of the respondents use available HHs water sources for agriculture activities.

Table 8. Main water source for agriculture/farming activities at HH Level.

Main Water Source	No of HHs	Percent
Borehole	3	2.3
Protected spring	4	3.1
piped water	115	89.1
swamp/wetland	1	0.8
rain water harvesting tank	6	4.7
Total	129	100.0

Source: Primary Data (July, 2022).

4.2.16. Access to Land

As indicated in Table 9 below, 38.1% of the HHs in Jinja city use their own land for agriculture, 21.6% use land from backyard /compound and 21.6% hired land. The rest of the respondents, 3.1% used borrowed land. However, due to increasing population in the city, land is likely to be limited. This means new farming practices like vertical farming and greenhouse farming need to be embraced.

Besides, 52.7% of farming HHs live on rental accommodation curtailing their ability to participate in the urban agriculture.

Table 9. Type of land used for farming in the HH.

Type of land Used for Agriculture	No. of HHs	Percent
Hired Land	28	21.6
Own Land	49	38.1
Borrowed From Friend or Relative	4	3.1
Land From Backyard/Compound	28	21.6
Other	20	15.4
Total	129	100.0

Source: Primary Data (July, 2022).

In terms of the used land size, 50.9% of the households responded that they use less than one acre of land while 31.1% did not have any land to use. This forced them to use their backyards to carry out agriculture. About 11% of the respondents used one acre of land to farm, 4.7% had two acres and 0.9% had more than four acres as shown in Table 10 below.

Table 10. Land size used by HH for agriculture activities in acres.

Land Size in Acres	No of HHs	Percent
Less Than One	66	50.9
One	15	11.3
Two	6	4.7
Four	1	0.9
More Than 4	1	0.9
None	40	31.1
Total	129	100.0

Source: Primary Data (July, 2022).

Due to limited land in the city, some 8.5% of the HHs reported that they have ever carried out agriculture in wetland/swamp in Jinja for irrigation and some thought it was free land. Asked about fertilizer application, only 13.2% responded that they do use fertilizers to improve the fertility of soils.

4.2.17. Access to Credit and Financial Services

About 22% of the HHs had access to cheap credit and loan market (i.e. agricultural banking or micro finance, or SACCO) activities in Jinja city. Based on the findings, the sources of funding for urban agriculture included: savings and credit co-operative societies (SACCOs), Baroda Bank, Brac Bank, Finca Uganda Ltd., and Polking Uganda Ltd.

Besides, 4.7% of HH reported that they had already formed groups/associations/saccos to access parish model development (PMD) funds in their respective wards.

4.2.18. Saving Levels among Urban Farmers

Results from the study show that 32.4% of the respondents saved UGX 50,000 - 100,000 in the last one year compared to 14.7% that saved less that UGX 50,000 and 6.9% that saved UGX 101,000 - 500,000. Only 1% of was able to save above UGX 500,000. It was also established that 45.1% of HHs did not save because they mostly practiced agriculture to produce food for home consumption and nothing was left for sale as shown in Table 11 below.

Table 11. Total savings (UGX) of by HH in the last one year resulting from agriculture production.

Savings in UGX	No of Households	Percentage %
Less than 50,000	19	14.7
50,000 - 100,000	42	32.4
101,000 - 500,000	9	6.9
Over 500,000	1	1.0
None	58	45.1
Total	129	100.0

Source: Primary Data (July, 2022).

Interviews conducted with the key informants revealed that most urban farmers used hand-held hoes, pangas, slashers and rakes. Some HHs however, use wheel barrows to ferry their agricultural inputs and outputs. Tractors are often used by some few private individual farmers who can afford to hire them.

Farmers perceptions towards Urban and Peri-Urban Agriculture: Jinja City is divided into three zones namely 1) Central zone which is for business, 2) Big court yard which is for agriculture including the residential areas and 3) Walukuba zone which is mostly for Africans with much land for agriculture.

4.2.19. Youth Participation in Urban Agriculture

Only 24.6% of the youth were actively participating in urban farming. Most youth shun agriculture as a dirty activity and meant for school drop-outs. Therefore, there is a need to sensitize and educate the youth to participate in urban farming and food production in Jinja city.

4.2.20. Levels of Satisfaction among Urban Farmers

Asked about their level of satisfaction as urban farmers, 30.2% of the households (HHs) responded that they are satisfied, while 56.6% were neutral and only 13.2% were dissatisfied, see Table 12 below.

Table 12. Level of satisfaction about urban farming benefits to the farming households.

	Frequency	Percent
Satisfied	39	30.2
neutral	73	56.6
dissatisfied	5	3.9
very dissatisfied	12	9.3
Total	129	100.0

Source: Primary Data (July, 2022).

4.2.21. Conservation of the Environment by Farmers in Jinja City

Jinja city has a varied climate and environment pattern. It has a long shoreline on Lake Victoria in the south. It has a variety of clay, light soils and sandy loamy soils which are good for agriculture. Table 13 below shows that 33.6% of the HHs conserve the environment through proper drainage of water to avoid stagnation and 15% plant trees in their compounds. Only 3.7% do it through crop farming. About 48% reported that they do not conserve the environment. This is therefore an important area of intervention by Jinja city to protect its environment.

Table 13. Ways of conserving the environment by the HHs.

Ways of Conserving environment by HHs	No. of HHs	Percent
Planting trees/grass around HHs	19	15.0
Proper drainage of water sources to avoid stagnation	43	33.6

Continued

Crop farming	5	3.7
Nothing done	61	47.7
Total	129	100.0

Source: Primary Data (July, 2022).

5. Local Innovations and Practices That Can Be Promoted to Foster Urban Agriculture in Jinja City

Face to face interviews conducted with the key informants revealed several local innovations and new farming practices that be promoted in Jinja city to improve urban agriculture. Notable among them are:

5.1. Operation Wealth Creation (OWC)

Under the OWC programme, the national army has been used to promote agriculture in both rural and urban areas. Farmers have also been supplied with agricultural inputs such as improved livestock, fish fry, and poultry, citrus seedlings, coffee and cocoa among others.

OWC is largely being implemented by the Uganda army, called the Uganda People's Defense Forces (UPDF). The use of the national army in promoting urban agriculture was intended to reduce corruption and improve efficiency in the distribution of farming inputs. The army is also known for being disciplined and execution of duties through orders.

5.2. Nakabango Demonstration Farm in Jinja

This farm supports research in livestock and crop farming and is linked to the National Agriculture Research Organisation (NARO). The Nakabango farm also produces major crops such as maize, soya beans, bananas, coffee, tomatoes, cabbage and Sukumawiki and Nakati. Under the farm there is a zero grazing unit for livestock (cows). The farm has a green house and nursery shades mainly for horticulture crops and coffee covering 30 acres. The demo farm is a hot spot for legume crops multiplication research centre especially for groundnut seeds and improved breeds of cows.

5.3. Jinja City Solid Waste Composting Plant

This plant was established with the funding from the World Bank and local support from the National Environment Management Agency (NEMA). Under this project, the waste collected from the various parts of the city is sorted at the plant. Separated biodegradable waste is mixed with cow dung obtained from the city abattoir to produce manure. The manure produced is then sold to the urban farmers in Jinja city.

6. Key Challenges Facing Farmers in Jinja City

Face to face interviews conducted with the key informants also revealed that

Nakabango Demonstration Farm in Jinja district is underfunded by government with no allowances for existing staff. The district senior agricultural officer was deployed to manage the centre due to the lack of the substantive head and other staff.

Farming activities in Jinja city are also affected by the challenges of pests and diseases, insufficient skills and knowledge among farmers, erratic rainfall, inadequate land, poor -quality agriculture inputs, low motivation to farming as well as the lack a regulatory framework for urban agriculture.

Most city residents are tenants with no land to use and when they are evicted from failure to pay rent they altogether abandon the farming practice they adopted. Additionally, modern urban farming requires adequate capital to succeed.

Poor agricultural inputs. Some of the agricultural inputs provided by government under its new programmes are of poor quality, leading to loses. For example, the animals given to HHs were not treated and many died due to diseases.

Inadequate extension workers. The department of agriculture in Jinja city lack enough extension workers. Currently, they are only 11 extension workers, serving hundreds of farmers in Jinja city. Besides, technical staffs are sidelined from some extension services especially with the Operation Wealth Creation (OWC) programme which is run by the army.

Insufficient funding of farming activities: The budget for the production department for the FY 2022/2023 is low at currently UGX 717.1 million (16.6%) out of total Jinja City budget of UGX 48.2 billion.

7. Discussion of the Findings

Results of the study show that farming in Jinja city is practiced in various ways including livestock farming where the majority of the HHs practiced zero grazing, agro-forestry, poultry, crop farming (both food and cash crops such as cassava, maize, yams, banana etc.), horticulture crops (especially vegetables such as tomatoes, Sukuma wiki, cabbages, nakati, dodo, onions, egg plants etc.), floriculture and fish farming at Masese in Lake Victoria. This finding is not different from those of previous studies such as Malmberg and Macklin (2017).

Findings also show that 38.1% of HHs participated in urban farming using their own land, 21.6% used house compounds/backyards and 21.6% hired land. The rest 3.1% borrowed land to carry out agriculture. Closely related is that 50.9% of HHs used less than one acre to farm, 11.3% had one acre, 4.7% had two acres and just 0.9% had more than 4 acres. Interestingly, 52.7% of the urban farmers lived on rental accommodation which curtailed their ability to farm. What is also clear from these findings is that access to land is still a major constraint to farming in Jinja city and new strategies should be adopted to address this challenge.

Similarly, a study by Malmberg and Blackin (2017) found that due to rapid urbanization, restrictive city planning laws as well as building codes, urban farmers have not had enough land to increase food production in cities. This has in the

end left many city residents especially the urban poor without food.

Based on the study results, it is clear that the majority of the households (52.7%) participated in urban agriculture to boost their incomes. Also 45.7% participated for household food consumption and nutrition security and 2.6% for several reasons such as beauty, environmental conservation and a source of herbal medicine, among others. These findings do not differ much from those of previous studies such as Eshetu (2011), Juma (2017), Eshetu (2011) as well as Malmberg and Blacklin (2017).

Eshetu (2011) argues that UPA is normally carried out by the households (HHs) for various reasons including commercial production/income generation and household food self-efficiency/household food consumption. In Bishoftu town of the Oromia region in Ethiopia, 49% of the households participated in agriculture for income generation and HHs food consumption (Eshetu, 2011). In Kakamega, the majority of the youth (77.4%) participated in vegetable growing for food while only 3.8% of them grew vegetables to gain economic independence (Juma, 2017).

Most of the agricultural products produced by the urban and peri-urban farmers in Jinja city are sold to the city's existing food markets (41.2%), estate markets (7.5%), neighbours (10%) and vendors (2.5%) while the rest (37.5%) is consumed by the HHs themselves. This means that more than 50% of the markets for UPA products are outside the official physical food markets provided by the city authorities. It is thus critical that a new strategy is adopted by the city authorities in Jinja to promote these non-physical food markets including online marketing/virtual markets.

Access to extension service: The accessibility to extension services is critical for enhancing knowledge and skills required for urban and peri-urban agriculture production. Results however, show that only 18.6% of the HHs or respondents have access to agricultural extension services, which is extremely low and should be a major concern for city managers in Jinja with plans to foster UPA. The rest of the HHs (81.4%) get farming knowledge and extension services through demonstration farms and others. Similarly, in a study that was carried in Kakamega (Kenya), it was found that only 27.7% of the youth sought extension services on vegetable growing, while the rest (72.3%) of the respondents did not seek farming knowledge (Juma, 2017).

With regards to youth participation, only 24.6% of the respondents were found to be urban farmers in Jinja city. This is not surprising given that most youth shun agriculture and perceive it as a dirty activity that is meant for those who have not gone to school.

Also, there is need to educate and sensitize the youth about the benefits associated with agriculture. This can also be done with the help of agricultural extension workers based at Jinja city. Most of the youth are now engaged in business activities which bring quick money such as commercial motorcycle business (Boda-Bodas), roasting meat along the streets and sports betting, retail shops.

Conservation of the environment: A widely shared view among experts and urbanization researchers is that UPA can be used as a climate change mitigation measure in cities like Jinja (Lwasa et al., 2013) and De Zeeuw et al. (2011). However, results from the Jinja city study show that 48% of the HHs did nothing to conserve the environment while carrying agriculture. Also 33.6% conserved the environment through proper drainage of water sources to avoid flooding and 3.7% protected the environment through crop farming.

The fact that a bigger percentage of the respondents still participate in activities that are harmful to environment means that public awareness campaigns need to be carried out to expose the danger associated with irresponsible farming activities that damage the environment in cities such as growing crops in wetlands and other ecologically sensitive areas. Also, according to the results of the study, 8.5% of the respondents carried out agriculture in wetlands and swamps in Jinja city.

With regards to source of funding for the urban farmers in Jinja city, it is revealed that only 21.7% of the HHs had access to cheap credit. The main sources of financing their agricultural ventures include the savings and credit co-operative societies (SACCOs), Baroda Bank, Brac Bank, Finca Uganda Ltd, and Polking Uganda Ltd. About 4.7% of HHs reported that they had already formed groups/associations/saccos to access parish model development (PMD) funds in their respective wards.

Only 40% of the respondents indicated having more than two recommended meals per day while 60% had less than two meals a day. It is thus clear from these results that the food security and nutrition status of the residents of Jinja city is not stable. Also, according to the Jinja City, 2021, the mean caloric intake per person per day in Jinja is estimated at 2190 kcal, which is less than the WHO recommended daily intake of 2300 kcal per adult per day.

8. Conclusion

Results from the study show that urban and per-urban agriculture in Jinja city is practiced in various ways. In Jinja, UPA is also dominated and characterized by livestock farming where the majority of the HHs engaged in zero grazing, agroforestry, poultry, crop production (both food and cash crops such as cassava, maize, yams, banana etc.), horticulture crops (especially vegetables such as tomatoes, Sukuma wiki, cabbages, nakati, dodo, onions, egg plants etc.), floriculture as well as fish farming at Masese in Lake Victoria.

Besides, the sustainability of UPA in Jinja city is threatened by the growing desire of the urban farmers to grow sugar canes, a crop that has reduced soil fertility as well as contributed to the destruction and degradation of the wetlands and swamps.

While urban agriculture is outlined as one of the key land uses in Jinja city's current physical development plans, the reality on ground is that farming activities have not been adequately supported, leaving many poor people in the city

without food.

Only 40% of the city residents are able to have more than two recommended meals per day while 60% had less than two meals a day. This means that the food security and nutrition status of the residents of Jinja city is not stable. Besides, the mean caloric intake per person per day in Jinja city has been estimated at 2190 kcal, which is less than that the WHO is recommended daily intake of 2300 kcal per adult per day.

Over 38% of the households in Jinja city participated in urban farming using their own land, 21.6% used house compounds/backyards and 21.6% hired land. The rest 3.1% borrowed land to carry out agriculture. In addition, 50.9% of HHs used less than one acre to farm, 11.3% had one acre, 4.7% had two acres and just 0.9% had more than 4 acres. Interestingly, 52.7% of the urban farmers lived on rental accommodation which curtailed their ability to farm.

What is also clear from these findings is that access to land is still a major constraint to farming in Jinja city and new strategies should be adopted to address this challenge. On way to address this challenge is by changing the building codes and zoning laws to promote community gardens as well as backyard and roof-top gardening in the city.

Findings also indicate that 32.4% of the HHs saved UGX 50,000 - 100,000 in the last one year compared to 14.7% that saved less than UGX 50,000 and 6.9% that saved UGX 101,000 - 500,000. Only 1% of was able to save above UGX 500,000. It was also established that, the 45.1% of HHs did not save because they mostly practiced agriculture for HH food consumption.

9. Recommendations

To foster and improve urban and peri-urban agriculture (UPA) in Jinja, it is critical that the city authorities adopt strategies to support the urban farmers in terms of improved inputs, establish a functional demonstration farm, foster school gardens, provide cheap credit to farmers, establish partnerships with the National Animal Genetic Resource Centre (NAGRC) in Njeru town, foster irrigation and greenhouse farming, build local capacity for the newly introduced Parish Development Model (PDM) farming groups, carry out public awareness campaigns targeting the youth to embrace agriculture, support agro-processing and value addition mechanisms for urban farming as well as reviewing the current city zoning laws and building codes to accommodate backyard, community gardens and roof top gardens.

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Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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