



Potentials and Contributions of Urban and Peri-Urban Agriculture to the Lagos Megacity Region

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Abstract. With the production of only 10% of its food demand and one of the fastest growing cities in the world, the Lagos region is faced with multiple challenges of providing food, jobs healthy environment for its residents. Evolving state agricultural policies and programmes do not consider Urban and Peri-Urban Agricultural (UPA) as potentially viable agricultural scheme and existing UPA enclaves and communities are fast going into extinct due to lack of recognition and the informal nature of UPA in Lagos. The need to therefore enhance food supply, minimize socio-spatial fragmentation and disparities in regional development brought this study to focus. This paper thus assesses the potentials and contributions of UPA to the Lagos Megacity systems in order to determine the untapped opportunities embedded in UPA in the Lagos region. Selected and relevant stakeholders of UPA (farmers, vendors, distributors, transporters, manure collectors, residents and neighbours, extension agents) were engaged in interviews and discussions across seven communities (Ibafo, Mowe, Ikorodu, Amuwo-Odofin, Tejuoso, Alapere and ojo) within the Lagos megacity region. About 320 questionnaires were administered among farmers and other stakeholders. Both qualitative and quantitative information were collected, collated, transcribed and analyzed using simple descriptive statistical, Pearson Correlation and Multiple Regression techniques. The study identifies income generation, food security and improved livelihood, job creation and use of waste as nutrient as the most important factors that contribute to relevance of UPA activities in the megacity region. Income generation and food security contribute the highest value (0.935). The paper recommends a more participatory UPA strategy in the megacity programme in solving the complex and emerging food insecurity, unemployment, waste disposal and income generation needs of the Lagos megacity region.

Keywords: urban and peri-urban agriculture, city- region, food system.

1.0 BACKGROUND

As one of the fastest growing cities in the world, Lagos region is faced with multiple challenge of providing food, employment and other livelihood services to its residents. With an average annual growth rate of about 6.5%, about twice the national population growth rate of 2.9% (Nwaka 2005), coupled with increase in world food prices, increase consumer demand for local food and inadequate control over the food system, the need for Lagos as an emerging megacity to have a strategic plan for its megacity-regional food systems remains paramount and inevitable. According to Veenhuizen (2006), rapid urbanization leads to continuous extension of the city into rural suburbs, bringing large areas under the direct influence of the urban centre. The peri-urban interface becomes characterized by rapid land use changes and change in livelihood conditions, and existing agricultural and land distribution system becomes disrupted by land seekers for non-agricultural activities, thereby enforcing traditional farmers to give up farming for other income earning activities.

The interdependence between urban and the surrounding rural communities therefore creates the need for a new paradigm not only for an emerging territorial food system planning that seeks to build diverse supplies of food from within and outside the city but for a robust UPA input, output, marketing and processing. Currently, Lagos produces only 10% of its total food demand and it hoped to increase this to about 25% by 2018 through a lined up of programmes namely: Strategic Program for Accelerated Agricultural Growth (SPAAG), Agric-Yes, Eko Farm, Rice for Job among others, all of which are designated in remote locations outside of the megacity region and even in other states of the Nation far from Lagos and covering several hectares of land.

With the continuous expansion of the Lagos and its associated dynamics that is fast eroding and minimizing UPA activities, the actualization of the megacity programmes for self-reliance and sustainable city in terms of achieving a self-sustaining megacity has become doubtful. This is so because, the seven broad proposals underpinning the Lagos megacity redevelopment programme neither

consider the potentials and contributions of UPA as key to the re-development process nor a strategy for minimizing the socio-spatial fragmentation, inequalities and disparities that could pave ways for a more food resilience region and a vibrant city-regional system (Levin et al 1999).

According to Dowding-Smith (2013), megacity-regional food systems is a driver of resilient cities and is related to many other regional policies as health and nutrition, education, economic development, environment, and social cohesion. An increasing number of national and local governments in places like Accra-Ghana, Cotonou-Benin, Kampala-Uganda, Rosario- Argentina and Bulawayo- Zimbabwe have formulated policies and programmes on UPA as part of a broader strategy for Sustainable City Development Policy, Poverty Reduction Strategy and Food Security Policy. The trend is also reflected in series of declaration { Quito (2000), Dakar (2002), AddisAbaba (2003 Beijing (2004))} on UPA in which local and national policies have declared their commitment to develop policies and programmes for UPA. Over 40 international organizations as FOA, UNDP, UN-habitat, IDRC, RUAF have shown attention and support for UPA and have argued that the way UPA is planned, designed and operated determines the extend food production and sustain livelihood is achieved in any city region.

With the general consensus that urban population would continue to grow rapidly in most cities, particularly in developing countries including Lagos (UN Habitat, 2004), it has become pertinent for executors of the megacity programme to look inward and restructure existing policies, that could discourage the increasing conversion of UPA lands into other perceived high valued land use type. The need for the Lagos Megacity projects and programmes to take into cognizance the contributions of not only large scale rural farming but also small scale UPA as a stabilizing force within the region formed the crux of the paper (Binns and Fereday, 1996, UN-HABITAT, 2000, FAO, 2011, Binns et al, 2003). The paper thus seeks to

examine the potentials and contributions of UPA to megacity development challenges using Lagos megacity as case.

2.0 CONCEPTUALING THE MEGACITY-REGION FOOD SYSTEM

Two main concepts serve as a framework for this paper. These are the megacity concept and the system approach. The word megacity is made up of two words, 'Mega' and then 'City'. Mega is a Greek word that connotes huge, great and mighty. It is often times refer to large, and even powerful. Looking at mega from a measurement perspective, Mabogunje (2007) sees the word as an element that is at least a million times more than the standard unit of reckoning. When applied mega to city, it connotes a big, large, huge and great city or one that is inordinately big or large for its times. As posited by Hall (1997), the greatness and largeness of megacities compel them to devise complex system of food supply and distribution, waste disposal and complex municipal policies. Following the end of the colonization in developing countries especially in Africa, most of the remarkable growth in the size of city has been attributed to socio-economic development with the resultant effects being the enhancement of life expectancy and acceleration of the population growth without adequate attention paid to agriculture and rural development. The growth in population simply increased rural poverty, out migration from rural to urban areas, where education, industrial and health care facilities were disproportionately concentrated. As at 1950, there were only 8 cities in the world with population of 5 million and more (Montgomery et al., 2004). With the United nations pegging megacity as any agglomeration with population of 10 million or more, there are about 21 megacities in developing countries with only 2 in Africa (Lagos and Cairo). Although megacities in developing countries show some element of economic vibrancy and multiple functions as Global cities, they differ from Global cities in that they have the most startling characteristics of the poor and unemployed attracted to them. They have low productivity, large service sector, inefficient government, massive infrastructure deficiency, pressure on land and housing, solid waste disposal challenge and insecurity .Poverty, food insecurity and

environmental degradation is thus vast and prevailing. It is against these characteristics of the megacities that this paper based its understanding of megacity.

Another framework that this paper adopted is identifying the megacities as system. System entails a synthesis of the challenges and solving such challenges through its component parts and its interconnected parts. System approach was first proposed under the name of "General System Theory" by the biologist Ludwig Von Bertalanffy. He noted that all systems studied by physicists are closed and argued that such an assumption is simply impossible for most practical phenomena. He opined for open system which allows interactions and structural hierarchy within itself and with other systems outside. According to Heylighen (2000), low level view in a system is all you need to understand the higher view. If you know the precise state of all the organs and cells in the body, you should be able to understand how that body functions. UPA as a sub-system of the larger regional system therefore involves all the physical and human infrastructure as well as all other processes required in feeding a population within a region. These include production, harvesting, processing, marketing, packaging, transporting, consumption and disposal of food and food related items. It also includes the input needed and output generated at each of these steps. A system operates within and its influence by social, economic, political and environmental context. Space must be made for different sectors and actors to get on board as UPA is as much important, and an integral part to the survival of the megacity region. (Heylighen 2000). This paper therefore sees UPA as equally important as transportation, waste management and other sector of the megacity region.

3.0 Methods

3.1 Study area

Urbanization process has continued in the municipal Lagos with increasing population and socio-economic activities (Odumosu, 1999). The population rose

from 230,256 in 1956 to 650,000 in 1963 (Oyeleye, 2001) and Odumosu (1999) quoting United Nations (1989) declared that Lagos metropolis has an estimated 7,377,000 out of a population of 8,157,000 for the state in 1999. This gives over 90% of the state population and with UN-Habitat projection of the population of Lagos to be over 24 million by 2015 (see Figure 3.1), The rapid population growth that has taken place in Lagos since 1963 has been very significant not only for urbanisation process in Nigeria but also in the world (Lagos Mega city and other Nigerian Cities Report, 2004). However, and as opined by Mabogunje, (2007) the population of the Lagos city is expected to reach some 25million people by the year 2015, indicating that a expansion rate will continue to swallowed several previously stand-alone peripheral towns especially in the north of Lagos which belongs to another administrative jurisdiction- Ogun State. Lagos is continuously expanding its built-up area that gulps parts of Ogun State comprising at least, four local government areas of Ado-Odo/Ota, Ifo, Obafemi Owode and Sagamu. "These areas spread through an estimated area of 22, 840 hectares, comprising 15, 640 hectares for non-urban uses, such as, agriculture, conservation/preservation, forest and water supply reserves, recreation, tourism and regional parks, while urban uses in Ogun State accounted for only 7, 200 hectares.

In terms of livelihood, Lagos and its environs is highly dependent on service and trade which accounts for over 80% of the total government revenue. Notwithstanding, UPA provides occupation for over 6% (Oyeleye, 2002) of the economically active population in various sub-sectors and there is hardly any household especially at the out sketch of the city centre without one form of agriculture. The UPA products in Lagos include livestock (cattle, poultry, goat/sheep, dog, piggery and fishing), non-traditional farming (snail, mushroom, bee keeping, herb and spice) and in crop production (vegetables, floriculture, pepper, okra).

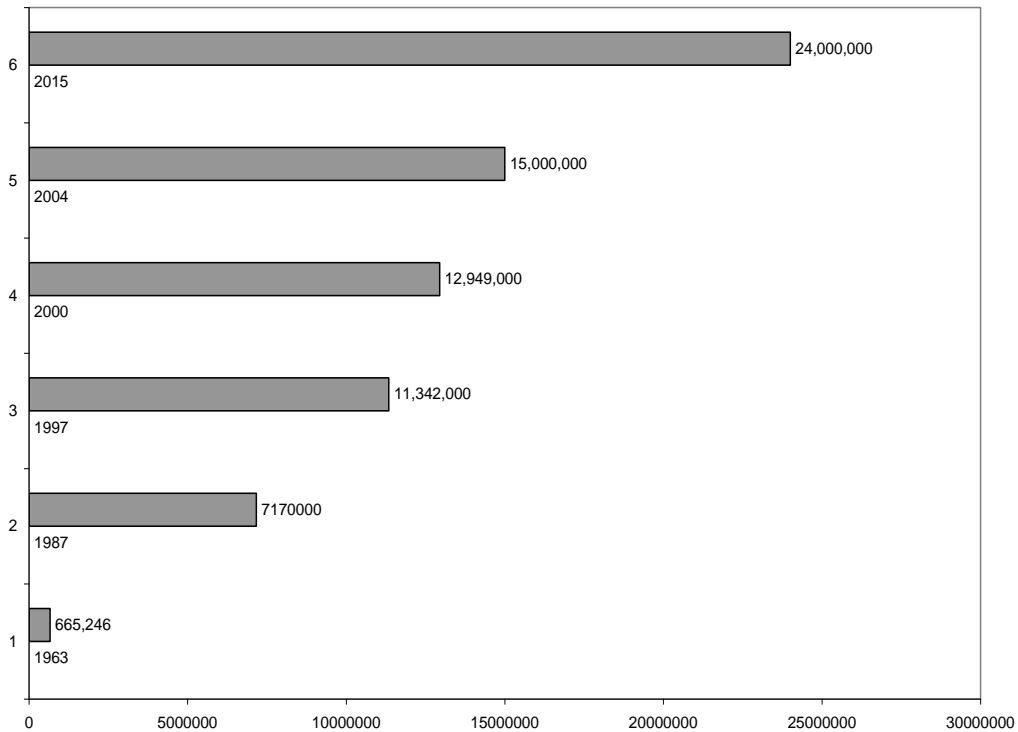


Figure 3.1: Population Growth in Metropolitan Lagos from 1963 to 2015.

Source: *Lagos State Regional Map as cited by Nigeria: Giant in the Tropics 1993 and UN-Habitat (2001)*

Within Lagos and its environ, it is a common phenomena to see rows of carefully tendered vegetables and flowers of different kinds on river banks, proposed sites for constructions, hospitals, vacant, households, and waste lands and road side and there are many patches of lands where Chicken, Sheep, Goat, Cattle are kept apart from other activities as marketing, transporting and processing of urban agricultural products. Although the contribution of UPA have not been extensively assessed, its positive roles in the lives of farmers have been possible through flow and interconnectivity between the city center and its surrounding rural communities where Lagos has its sphere of influence.

3.2 Data Sources

The study started with a reconnaissance survey visit to 15 farm locations. However, only seven farm communities were found to have well organized structured and highly viable UPA activities (see Figure 3.2). The sample size for the study was thereafter defined using a multistage sampling method to determine the population selection for the study. Two types of questionnaires were developed one for UPA and UPA related activities and another for non-UPA operators. A total of 320 open and close ended questionnaires were administered to farmers, vendors, traders, marketers, neighbours and consumers of UPA products. Seven selected numbers of the actors were further engaged in discussions and interviews at sales points randomly to determine their role of UPA in their locality.

The FGD and interviews were transcribed, while questionnaire for UPA household, consumers of UPA products, traders, marketers, hawkers and vendors were coded and analyzed within SPSS and Excel software using simple percentages, Pearson Correlation correlations and multiple regression analysis to determine the most important component of UPA values that contribute to the megacity regional system. The evaluation of the highest contributor was done using the following regression equation and indices

$$Y_1 = a + b_1X_1 + b_2X_2 + b_3X_3 + \dots + b_nX_n + e \text{ where}$$

Y_1 = contribution of UPA to city region food system

a = intercept

e = error terms

b_{X_1} . b_{X_n} = regression coefficient

X_1 - X_n = X_1 = income generation; X_2 = conversion of waste to nutrient ; X_3 = skill development and transfer; X_4 = increase transport economy; X_5 = Employment ; X_6 = food security and improve livelihood ; X_7 = efficient land use; X_8 = provision of raw materials; X_9 = sustaining biodiversity X_{10} = reducing to effect of climate change

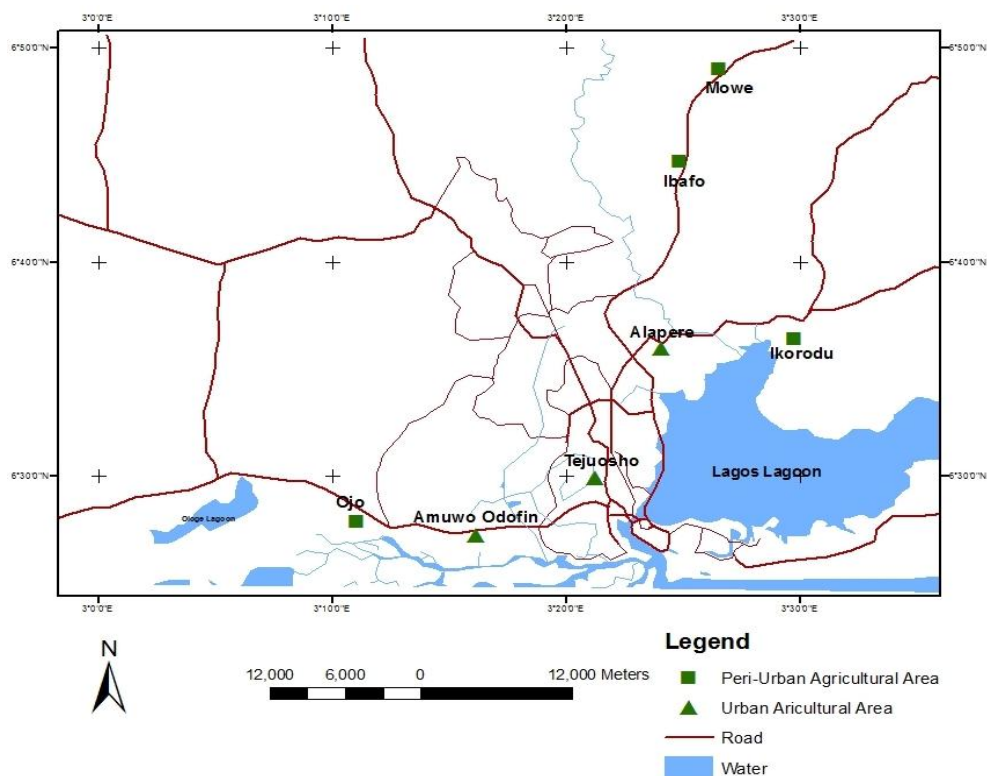


Figure 3.2: The study area

4.0 Results and Discussions

4.1 Socio-demographic profile of study population

The demographic analysis revealed that 79% of the respondents were married, 12.5% were single and 8.5% widowed/or separated. High percent (84.8%) of the urban farmers fell within the economically active group, in which ages 31 to 45 accounted for 43.3%, ages 18 to 30 accounted for 18.9% and ages 46-60 accounted for 22.55%. The household sizes of the UPA farmers revealed that between 4 and 7 persons accounted for 40%, and those between 8 and 11 persons were 21%. Only 18% had household smaller than 4. Ethnic background shows that 45% are Yoruba, 38% are Hausas while the remaining 17% are farmers from Igbo, Edo, Tiv, Ebira, Igala. This pattern exhibited by the ethnic background of the UPA farmers also relates to farmers' religious background. Over 55% are Christians while 44 are Muslim. Majority of the respondents in all the farm sites have education level below

secondary school level except in Barracks where 49.3% of the farmers obtain secondary education and above.

4.2. Livelihoods and income profile of the megacity region

From the survey, the ratio of full-time to part-time farmers is 3:2. As depicted in Table 4.1, varied UPA activities were observed in the study area. The study revealed that 14% are engaged in fish ponding, 2% in snailing, 2% in bee farming, 5% in cattle rearing, 9% in poultry and 50% in vegetable farming (exotic and indigenous) in the sampled communities. Average monthly income for all sampled locations is higher than Nigeria's minimum wage of N18000. There are more male (52.2%) of in the production stage while more women (47.8%). are in the marketing and distribution cadre of UPA. Relatively large land holdings were found in the peri urban areas with average of 6.5 plots per farmer at the peri-urban Ojo, Ikorodu, Ibafo and Mowe, while smaller land hold about 1.5 plots per farmer were observed at Alapere, Amuwo Odofin, Tejuoso.

Table 4.1 Livelihoods Activities associated with UPA in Lagos Metropolis

S/N	Types	Percentage
1	Cattle, sheep and goat rearing	5
2	Poultry keeping	9
3	Dog keeping and piggery	2
4	Vegetable, herbal and spice farming	50
5	Fishing	14
6	Mushroom	1
7	Bee keeping	2
8	Snail keeping	2
9	Maize, plantain, fruits and other farm produce within the urban environ	3
10	Processors and marketer of agricultural products within the urban area	7
11	Floriculture	2
		100

Source: Source: field survey, 2012

Land holding is relatively large in the peri-urban area due to low competition from other land use activities (commercial, residential, industrial and recreational) but over time the land sizes reduce. Yield per plot differ in each location and by each UPA activity. For example, an estimated harvest of Amaranth Spp (Tete) on a plot of land could be 2610kg in a gestation period of about 83days in a farm like Barracks whereas Alapere would harvest 1,818kg in another farm community. The data similarly shows that UPA maintain non-continuous and but fragmented land holdings either within the same farm site or in other sites. Over 71 % of the respondents are engaged in single farming types, while 29% are into either integrated or mixed farming. The result further revealed that the contributions of UPA activities to individual lives and to the region vary. For instance Mrs Hana Samuel, a poultry farmer in Mowe farm community said during an interview session that ***"as a widow, I have been able to sustain my household with the proceeds from the poultry farm. I have been able to pay my children's school fees (6 of them), house rent and other bills (hospital, electricity etc) without any assistance from anyone since I lost my husband 7 years ago. At least I do not borrow and beg before we eat"***.

In order to statistically determine the factors that describe the contribution of UPA to the region a , simple correlation matrix were obtained using 10 variables (X_1 = income generation; X_2 = conversion of waste to nutrient ; X_3 = skill development and transfer; X_4 =increase transport economy; X_5 = Employment ; X_6 =food security and improve livelihood ; X_7 = efficient land use; X_8 =provision of raw materials; X_9 = sustaining biodiversity X_{10} = reducing to effect of climate change). The highest correlation was found to exist between X_1 (income generation) and X_5 (job opportunity) at 0.935 value. This possibly explains that people are engage in UPA in the region due to its strength to generate income and further create job opportunities for them. This finding is critical because a clearly and unique feature of megacities especially in developing countries is unemployment. Within the

megacity region, residents find it easier to engage in UPA due to its small nature and the fact that it is easier to manage UPA with little income. Beside, the study revealed that income from UPA activities correlates with food security and increase livelihood conditions (X_1 and X_6) with 0.910 values. This implies that continuous generation of income could enhance food security within the region as variety of fresh and nutritional products are become accessibly to farmers and residents of the farming communities.

Table 4.2 Correlation Matrix of contribution UPA Lagos mega city region

	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}
X_1	1									
X_2	0.852	1								
X_3	0.721	<i>0.944</i>	1							
X_4	0.896	0.710	0.804	1						
X_5	<i>0.935</i>	0.792	0.843	0.775	1					
X_6	<i>0.910</i>	0.88	0.937	0.691	0.845	1				
X_7	0.854	0.687	0.568	0.693	0.668	0.931	1			
X_8	0.792	0.711	0.705	0.921	0.712	0.662	0.573	1		
X_9	0.266	0.721	0.789	0.434	0.486	0.713	0.745	0.041	1	

Note: correlation higher than 0.600 is significant at 1% confidence level

Source: field survey, 2012

Regional mobility, marketing and food distribution are further enhances with less risk. The contributions of UPA to the region is such that it creates an avenue to reducing the cost of household expenditures dedicated towards food, which is usually around 80% to 85% as against 6% to 15%, obtained in United State of America and in Canada respectively.

Close relationship was found between skills acquisition and conversion of waste to nutrients (X_2 and X_3) with 0.944. This implies that UPA contribute to skill acquisition and knowledge transfer and development within the Lagos megacity region. This corresponds with some other values estimated in the analysis as over 89% of the UPA farmers agree to use one form of waste or the other as nutrient and feeds, thereby helping to reduce another significant megacity challenge- waste disposal. This process could further enhances organic food production and makes recycling possible, aside from reducing the huge waste management challenges common in the Lagos megacity region. Other variables that are highly correlated to X_1 (increase income) include X_4 (increase transport economy) 0.896 and X_7 (efficient use of land) 0.854. This suggest that increase to fund enhances access to transport and ability of the UPA farmers to make efficient use of land for maximum output.

The contributions of UPA to increased transport economy of the Lagos city region correlates with income, but its relevant goes far beyond this. This is due to its importance in optimizing and expanding existing transportation network infrastructure into the rural and developing communities that serve the core or municipal area. The myriad of food flows from the different farm locations links and balances the socio-physical bonds between people, supports the geographic and economic complementarity between core and peripherals productions and displays the power of interactions that shows the reality of the continuum that exist within a region.

Table 4.3: Regression value of the variable to the megacity region

Variables	Parameter Estimate	Standard Error	R	R ²	Cumulative %	Percentage Contribution
intercept	2.341	1.071				
X ₁	14.592	0.5101	0.981	0.0952	93.2	93.2
X ₆	7.743	0.3213	0.952	0.0951	95.3	2.1
X ₅	4.674	0.3110	0.967	0.0922	96.4	1.1
X ₄	2.052	0.2451	0.973	0.0966	97.4	1.0

Source: field survey, 2012

The empirical regression test was therefore carried out to determine which of the 10 variables has the highest positive impact, in respect of its contribution to the megacity UPA system, using income generation; conversion of waste to nutrient ; skill development and transfer; =increase transport economy; Employment ; food security and improve livelihood ; efficient land use; provision of raw material, sustaining biodiversity; reducing to effect of climate change as independent variables and contribution to the megacity as the dependent variable (Y). The result suggests that only four of the ten independent variables were found to contribute significantly to the megacity –region. These are income, food security and improved livelihood, employment and improve transport economy system .The result revealed a jointed correlation coefficient of 0.967 and a coefficient of determination of 0.922, meaning about 96.4% of the contributions of UPA to city- region food system is jointly explained by three variables X_1 , X_6 and X_5 (Income generation, food security and improved livelihood and employment) . It can be deduced therefore that UPA activities thrives in order for actors to have more income, employment to ensure food security and reduced the effects of the high energy and low micronutrient diet, responsible for increasing obesity and non-communicable diseases like hypertension and heart disorder prevalence in the cities and its surroundings (Schaefer-Elinder, 2005).

5.0 Recommendation

With the identified contributions of UPA to the solving some of the pertinent megacity challenges, it becomes obvious that its potential for improving the megacity and providing better megacity development, jobs and income generation cannot be overemphasized. To achieve a sustainable megacity development therefore, UPA should be eradicated of its present challenges to increase its acceptability and maximum its interaction with other subsystems of the megacity system. UPA should be recognized as an important component of the regional system development strategies and plans involving innovation processes of

engaging all stakeholder consultation, policy-research dialogue and exchange to enhance the standards of the poorly maintained production, processing, marketing and transportation of the UPA products, in addition to proper conversion of solid waste and waste water to nutrients. This would require large-scale financing and up-scaling of UPA activities to make up for the long term neglect by government who owns the role and responsibilities to fill the lost opportunities. In addition, there is a critical need for an inventory and research gaps in the city-region food production system. Proper and adequate integration of UPA in city-region plans, such as the inclusion of home gardens in school curriculum, social housing schemes or in slum upgrading, land zoning, land tenure systems and waste and fragile lands.

6.0 Conclusions

The paper has showed the contributions of UPA to the megacity region through its ability to enhance income generation, job creations, improved food security and livelihood conditions, and reduced waste problem for its residents. UPA is a critical part of the megacity regional systems and developing other components of the larger system as transport and waste management, as against UPA could result into a more devastated problem in the future, as the city is increasingly expanding in physically and numerically terms. The reality of the megacity is that the abstract boundaries in regions are fast becoming blurry and porous, disregarding the traditional inseparable ways. It is therefore appropriate to consider UPA as an important activity that could enhance sustainable agricultural development to complement rural agriculture and defend the city and its region during emergencies.

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