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Assessment of the contribution of urban agriculture to employment, income and food security in Kenya: A case of Kisumu municipality

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Kenya's long – term development strategy (Vision 2030) has prioritised agricultural sector to drive the growth, although it does not mention urban agriculture. In 2009, the Kenya government prepared and approved National Land Policy. Prior to the passage of the National Land Policy, urban agriculture was not designated as an urban land use. Therefore, the National Land Policy creates a basis for systematic development of urban agriculture in the country. The main theme of this study is to assess the role of urban agriculture in income, employment and food supply. The study involved a survey of 194 urban farmers in Kisumu municipality. The results of the study show that urban agriculture is a manifestation of urban dualism. Most urban residents (60%) live in the informal settlements lacking basic infrastructure and services. In addition, a similar proportion of the residents live in poverty. Most urban farmers and their employees receive very low income, with a mean monthly income of US$ 135 (US$ 0.64 per person per day), which is below the acceptable one dollar a day per person. Urban agriculture supplements food requirements of the urban poor on the one hand and a source of income for the few commercial urban farmers on the other.

Key words: Urban, agriculture, employment, income, food security, Kenya.

INTRODUCTION

Urban agriculture is the practice of crop cultivation and livestock rearing within the boundaries or the immediate periphery of a city (Madden et al., 1997). UNDP (1996) defines urban agriculture as an industry that produces, processes and markets food and fuel, largely in response to daily demand of consumers within a town, city or metropolis, on land and water dispersed throughout the urban and peri-urban area, applying intensive production methods, using and recycling natural resources and urban wastes, to yield a diversity of crops and livestock. Urban agriculture is divided into five broadly defined farming systems: aquaculture, horticulture, animal husbandry, agro-forestry and other urban farming activity. Kenyan colonial administration designated agriculture as a rural land use and the successive independent governments have maintained the same policy position. The Physical Planning Act (1996) excludes urban agriculture in the land use classification, thus reinforcing the position on urban agriculture. Kisumu municipality is still governed mainly by bylaws of 1954 that were prepared long before independence. However, these bylaws permit agriculture under very stringent conditions far beyond the reach of most urban farmers within the municipality. Despite these official prejudices, agriculture still dominates the urban landscape suggesting that the practice will persist even in the foreseeable future.

Exclusion of urban agriculture in the land use classification deprives the sub-sector of the much needed

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support and thus reinforces the gap between the modern and traditional sectors. However, the passage of National Land Policy of 2009, which is awaiting implementation, creates room for the development of the urban agriculture as it recognises the sub-sector.

Kenyan urban centres have registered rapid rate of urbanization of about 6% during the last three decades. This has occurred against a national population growth of about 3% during the same period. The growth of informal settlements has been more pronounced, for example informal settlements have been growing at the rate of up to 12%. The rapid rate of urbanization has been associated with increasing incidence of poverty in both rural and urban areas. For example, national poverty situation rose from 46 to 60% during the last two decades, but the 2007 economic survey indicates that poverty situation has since declined to 53% (Republic of Kenya, 2007b). The other driver of rapid rate of urbanization has been the dualism between rural and urban areas. Since colonial time, successive governments have made urban centres more attractive to human settlements through investment in infrastructure and services compared to the rural areas. Therefore, urban centres have been perceived as areas with better opportunities compared to the rural areas. While the colonialists restricted rural – urban migration, the independence in 1963 ushered in freedom of movement. These explain rapid rate of urbanization in independent Kenya.

Africa's urban areas have been hard hit by declining economies and the resulting structural adjustment policies, the cost of which have been disproportionately felt by the urban poor. Life in the urban areas has become more expensive while employment in the formal sector has decreased and real wages have not kept pace with prices or have even declined in absolute terms. Many urban households are facing a serious decline in their purchasing power. People have responded in various ways, most notably by diversifying their income sources. A wide range of activities are being employed, all in the informal sector (African Studies Centre, 2006).

Kisumu municipality has witnessed rapid rate of urbanization during the last three decades. The population of the municipality is estimated at 500,000 having risen from 32,431 in 1969 to 322,734 in 1999, respectively (Republic of Kenya, 1970a, 2001). Kisumu municipality is the third largest urban centre in Kenya and it is the commercial centre in Western Kenya. It is strategically located on the shores of Lake Victoria with good transport and communication network in western Kenya. It serves as a gateway to parts of Eastern and Central Africa such as Uganda, Tanzania and Rwanda. In addition, the municipality is the headquarters of East Africa Lake Victoria Commission and a UN-HABITAT Millennium City since 2006 indicating its regional importance and environmental significance.

Despite the perceived importance of the Municipality, it has registered sluggish development. The municipality remains rural in character with agriculture dominating 80% of its landscape. The predominance of agriculture in the municipality occurs against restrictive legislative and policy bias. For example, while the Physical Planning Act of 1996 does not recognize agriculture as a legitimate urban land use, the municipal bylaws permits agriculture under very stringent conditions far beyond the reach of most farmers. Further, the municipality has exhibited internal dualism whereby the subsistence farmers have co-existed with modern market economy. The subsistence urban farmers have been exposed to increasing incidence of poverty, thus further alienating them from gainfully participating in the urban market economy. Against the high incidence of poverty and prevalence of agriculture in Kisumu municipality, this paper assesses the role of urban agriculture in employment, income and food security in the municipality.

Urban dualism and its relationship with agriculture in Kisumu municipality

Urban dualism is a manifestation of one or more structurally different / mutually exclusive land use and/socio – economic typologies in an urban centre. It is characterised by a more or less different socio – economic systems in an urban centre that should ideally be one system. The urban system is characterised with one or more lagging sector/region while the modern socio – economic sector continues to develop. Furthermore, there is no evidence that the lagging and prospering modern sectors will integrate, thus help bring up the former without special intervention by either the municipal or state authority. Without such intervention, there is a real possibility of deepening dualism, thus exposing the lagging sectors to increasing incidence of poverty and income inequality. As a result, the lagging sector is not only unable to benefit from the modern sector, but it cannot support the growth of the latter. Thus, urban dualism undermines the process of urbanisation as it makes it impossible to create an integrated urban system.

Boeke (McKee et al., 1970) describes dualism in the economy of societies in which two systems clash. One is the modern capitalist economic system which relies on organization and specialization to accumulate capital through production and distribution of goods. The other is the indigenous pre-capitalist economic system in which the fulfilment of physical need defines the boundaries of effort - producers only produce as much as they need to fulfil their life support resources. The two dichotomous approaches to economic life co-exist and often clash in dualistic societies, and thus create a blend of social and physical processes and forms that are particular to each society. This culture of dualism is eventually manifested

in the behavioural and physical characteristics of human settlements in dualistic societies. An example would be a squatter settlement which grows unregulated to fulfill the immediate needs of the dwellers, as opposed to a well structured and regulated housing development, complete with proper infrastructure and facilities.

The concept 'dualism' is used to explain problems centring around the existence of a modern economy superimposed on a traditional economy. There exist social, economic and technological dualisms. As cities grow, surplus labour in the rural may gravitate towards the urban areas where some of it will no doubt be absorbed by growing service industries. However, many of the fledging urbanites will lack needed skills to function effectively in their new environment and will contribute to the ranks of the unemployed. Thus, one finds an urban peasantry, with their small gardens, and subsistence level of living. They have merely moved their base of operation into an area where they may constitute a direct interference with the expansion of the urban economy. The relocation of the surplus labour problem in an urban setting creates slums (McKee et al., 1970).

Nugent (2000) states that urban dualism evolves through prolonged structural unemployment that exists in many cities caused by a mismatch between labour force skills and needs of local employers, an inflow of workers that is consistently higher than the ability of an area to absorb them, generally low job availability in weak economies, or a combination of the above. As officially measured, agriculture does not make a substantial contribution to urban employment and gross domestic product (GDP). Countries lose primary sector jobs, such as agriculture, forestry and fisheries, as they become more urban. What were once villages become towns, and towns become cities. Land faces greater demands and fetches higher prices as buildings and infrastructure multiply and density increases. Multiple uses of land emerge, people desire proximity to jobs and services, and land "improvement" spreads. As this process evolves, cities change and the agriculture practised within and around them changes. The decision to farm and the level of effort spent on urban agriculture do not have a clear-cut relationship to income, wages, prices or employment opportunities.

Agriculture practiced in urban areas distinguishes itself from rural agricultural activities in several ways: agricultural production, processing, and distribution activities within and around cities and towns, whose main motivation is personal consumption and/or income generation, and which compete for scarce urban resources of land, water, energy, and labor that are in demand for other urban activities. Urban and peri – urban agriculture includes small- and large-scale activities in horticulture, livestock, fodder and milk production, aquaculture, and forestry - where several activities may be carried out within one enterprise. The absolute and relative growth in urban poverty and malnutrition raises two important issues. First, there is a clear link with food insecurity among urban populations. Second, there is evidence that instability in the urban labour market and its vulnerability to economic shocks directly impact on poverty. Urban agriculture has the potential to make an important positive contribution to both urban food security as well as urban employment. Since ancient times urban agriculture has made important contributions to feeding city dwellers. Increasing numbers of the urban poor are engaged in urban and peri-urban agriculture as a poverty alleviation strategy. Already as many as 800 million people are employed in urban and peri-urban farming and related enterprises, and this number is likely to expand in the future (Urban Harvest – CGIAR, 2005).

The urban dualism in Kisumu municipality is caused by a number of factors. First, urban dualism can be blamed on a faulty planning process that fails to fully discern and integrate the diverse but peculiar urban communities. For example, urban agriculture has suffered from official bias because it has not been legally classified as an urban land use in Kenya (Republic of Kenya, 1996). The problem is further exacerbated by the absence of land use policy in the country. Thus, the urban authorities find it excusable to do nothing in areas dominated by urban agriculture. Second, urban dualism can be caused by failure to plan and invest in adequate infrastructure and service delivery leading to organic forms of urban development. This is a situation where there exists policies and institutional framework for urban planning and infrastructure development, however the municipal authority fails to fully fulfill its mandate in the face of rapid urban growth. This has led to rapid growth of informal settlements outside the planned sections of the municipality, while the planned areas remained largely intact during the last three decades. In the case of Kisumu municipality, those living in the informal settlements account for 60% of the urban population, while the planned municipal area is approximately 10% (UN-HABITAT, 2005).

The municipality is still guided by the Physical Development Plan of 1969 which should have been revised at least twice by now. Urban agriculture is an integral part of the informal settlements in the municipality. Third, urban dualism can be caused by socio – economic changes. In the case of Kisumu municipality urban dualism has been caused in part by the changing socio – economic fortunes. The municipality was one of the urban centres that were designated as growth centres during the 1970/1974 National Development Plan (Republic of Kenya, 1970b). Also, the municipality benefited from rapid economic growth that the country witnessed during 1964/1986. This was the time the economy grew at the rate of between 3 to 5%. As a result, a number of industries were established within the municipality (fish processing, cotton mills and beer breweries while the neighbouring sugar belt attracted sugar and agro-chemical industries. These

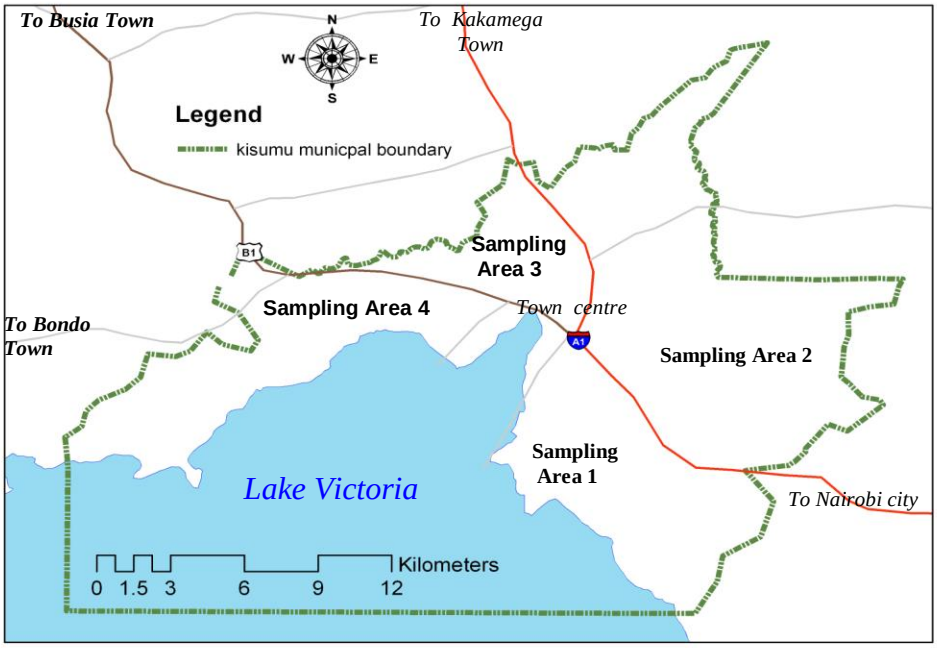

Figure 1. Kisumu municipality and the sampling areas.

industrial activities enabled the municipality to consolidate its position as the third largest urban centre in Kenya. However, the market liberalisation that was implemented in the 1990s led to the closure of most industries. As a result, the municipality has suffered from massive unemployment problems. The massive unemployment problems gave rise to rapid growth of informal activities, especially hawking, bicycle and other public transport services (motorcycle and tricycle) as the main sources of employment. Urban agriculture absorbed some of the jobless as the urban poor seek means of survival in crops and livestock farming for both subsistence and cash. While the modern sector somewhat shrunk during the last three decades, the informal sector witnessed rapid growth heightening dualism between the modern and informal sectors. Currently, save for the sugar industries that are currently being revived in the periphery of the municipality, the municipality has only two industries: 1 fish processing and 1 agrochemicals, which operate below capacity partly because of weak infrastructure.

METHODOLOGY

In this work both secondary and primary data were used. The primary data was obtained from a sample of 194 households, resource persons, and focus group discussion and field observation. Structured household questionnaire was administered to each sampled household. Pre-survey was conducted to gain insight on the study area, recruit and train research assistants, test the household questionnaire and refine research instruments. Urban farmers were sampled using a combination of stratified - simple – random sampling as well as systematic random sampling. The municipality was stratified into to the following 4 spatial units based on the main roads. The confluence of all the major roads as shown in Figure 1 is the town centre. The stratification was arranged along the main roads to ensure that the whole municipality is covered in the survey. Each spatial unit covered both the planned and informal settlements as each sampling area originate from the town centre. The planned settlements cluster around the town centre while further away from the town centre is predominantly informal settlements.

The planned settlements are inhabited mainly by immigrant workers, while the occupants of informal settlements are both the indigenous settlers and immigrant workers. Thus, both indigenous and immigrant farmers were captured in the sample. The indigenous inhabitants who are engaged mainly in subsistence farming have been engulfed by urban growth and are exposed to increasing incidence of urban poverty. The immigrant workers occupy almost exclusively the planned settlements in addition to the cheap rental housing in the informal settlements where they reside together with indigenous inhabitants. Informal settlements accommodate about 60% of the urban population. There are two general categories of immigrant farmers, namely (i) commercial urban farmers composed of the medium – high income group and (ii) the poor immigrant urban workers, which engage in urban farming mainly to supplement household food requirement as well as earn income.

In each sampling area two sampling methods were used. In the planned settlements stratified - systematic – random sampling was used to sample households for interview. This was done using plot numbers listed in the municipal register. Because of the organic nature of informal settlements, transect lines were established parallel to the major roads with an interval of about 1 km. A transect walk was made to determine and mark the farmsteads after which simple – random sampling was used to sample the households for the study. In each spatial unit three transect lines were established in equal interval parallel to the main road outwards. Alongside, structured questionnaire, field observation was made in each of the sampled farms to pick any unique features relevant to the study. One focus group discussion involving urban farmers was conducted

to consolidate information generated from households and resource persons. The focus group discussion was attended by 20 farmers, five from each sampling area.

The following resource persons were sampled for interview: Municipal Director of Environment, Municipal Director of Planning, Municipal Administrative Officer, District Social Development Officer, District Agricultural Officer, District Livestock Officer, District Physical Planning Officer, District Fisheries Officer, and Provincial Water Quality and Pollution Control Officer.

Kisumu municipality is situated approximately 00°06' South of the Equator and 34°45' east of Greenwich. It lies between Lake Victoria with an elevation of approximately 1140 m above sea level and the Nyando Escarpment to the North, which rises to over 1800 m above sea level. The municipality covers an area of approximately 417 km^2, of which 297 km^2 is dry land and approximately 120 km^2 under water. The municipality receives mean annual rainfall of 1245 mm occurring in two seasons, the long and short rainy seasons occur during March to June and October to November periods respectively. The mean annual minimum and maximum temperatures are 17.3 and 28.9°C respectively.

RESULTS AND DISCUSSION

Land tenure system and land sizes of urban farmers

The results of this study show that freehold land system is the most predominant tenure system (91%) among the surveyed households. Other land tenure systems in the study area are leasehold (6.3%) and trust land (1%). The existing land tenure systems have very important implications on the future of urban agriculture and urban land use system in Kisumu municipality. Freehold land tenure system is one where land owners hold land for an infinite period of time. It is also referred to as traditional land tenure system. The owners of land held under freehold tenure system can either bequeath it to their children or sell it to prospective developers. As a result, freehold land owners usually subdivide their land as they allocate it to either their relatives or for sale. Land subdivision is also driven by demand for urban development. Since Kenya does not have standards for land subdivision thresholds, subdivision of such land often results into unviable land sizes for both agriculture and urban development.

Freehold land tenure system is a secure form of land ownership. Thus, it is possible to undertake long-term investment in agriculture on such land. The farmers on such land are not exposed to harassment by the law enforcement agents, which is common among farmers on insecure land tenure system (squatters). Farmers with freehold land can make long-term commitments to improve their farms without fear of harassment or risk of loosing land to urban authorities. Farms on such land are less predisposed to pollution risks as haphazard disposal of municipal waste is minimised given the watchful eyes of the resident land owners. The secure land tenure system also makes it possible to improve farming through continued technical support. Also, the secure land tenure system legitimises farming and makes it easy to secure the much needed financial support from the government and other agencies. However, farmers on insecure land tenure system tend to be temporary as their farms are easily destroyed by either the municipal authorities or legitimate land owners.

The predominance of freehold land tenure system is a manifestation of urban dualism in the municipality. This is a situation where modern urban market economy co-exists with traditional peasant farming communities. This distorts the urbanisation process as little is done to transform the land use system from rural to urban forms and functions for the good of the whole municipality. As modern urban market economy grows, the hitherto traditional indigenous rural communities persist. They are thus engulfed in the urban areas following rapid growth of informal settlements lacking planning and infrastructure and basic services. Such forms of development give rise to unique form of urban poverty, where the traditional subsistence communities are unable to transform themselves in response to urbanisation in their midst. The urban dualism is also reinforced by continued loss of their only physical capital – land through sale to urban developers.

Leasehold land tenure system is preferable in the urban areas as it facilitates planning, development and management. Leasehold land system is that which the holder of the lease holds his interest in the land for a period of say up to 99 years and it is renewable subject to certain conditions. Leaseholders usually pay land rents and land rates that are used to develop infrastructure and provide services. Only 10% of the municipal land area falls within the leasehold land tenure system and incidentally that is the only planned part of the municipality. Most of the urban growth in the municipality has taken place in the informal settlements. Thus, the land values of the urban farmers are bound to be less competitive compared to the planned settlements with basic infrastructure and services (Table 1). Therefore, most urban farmers dispose off their land at less competitive rates, thus exacerbating their poverty.

Analyses of land sizes reveal that most of the surveyed households (62%) own land sizes of 0.24 and 0.8 ha, but a reasonable proportion of them (24%) own land sizes of over 0.8 ha. The mean land size is 0.56 ha, but those owning over 1.2 ha account for just 8.6%. The mean household land sizes in Kisumu municipality is comparable to the findings of Republic of Kenya (2007b), which established that mean land sizes in the study area is 0.458 ha. The household land is used for both construction of traditional homestead (taking up to 0.4 ha) as well as farming and other activities. Against continued land subdivision associated with freehold land tenure system and sale of land for urban development, it is possible expect that less and less land will be available for urban agriculture. This implies that urban agriculture will equally change in response to the continued land subdivision. UNDP (2006) blames food insecurity in

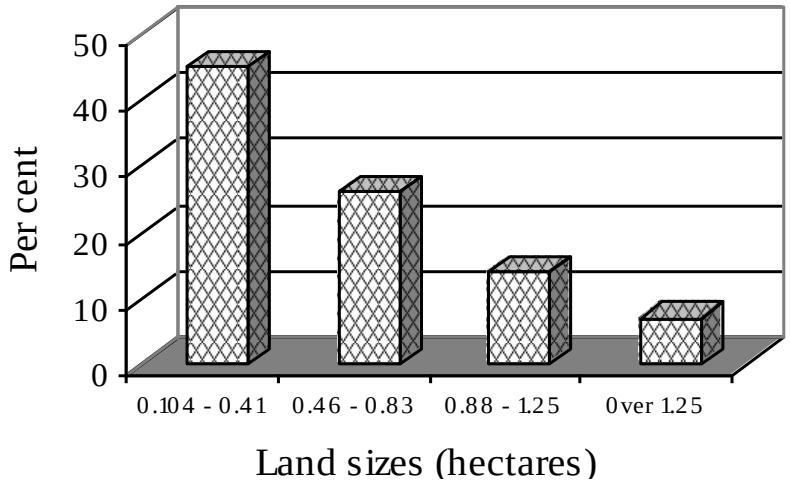

Figure 2. Mean household land sizes in Kisumu municipality. Source: Field survey, 2005.

Kenya to land fragmentation. As a result of the fragmentations, some 89% of the households live in less than 3 ha and, more strikingly, 47% live on farms of less than 0.6 ha. This shows that the farms in Kenya are predominantly small (Figure 2).

The small land sizes places serious restrictions on the types and viability of urban agriculture. It makes it difficult to practice subsistence farming particularly maize and sorghum, which are the main sources of carbohydrates for the surveyed households. The small landholding calls for intensification of commercial farming (crops and livestock) with high returns on investment. This calls for changes in farming practices from the hitherto predominantly subsistence farming to intensive high value commercial farming. Some of the surveyed households are already engaged in commercial dairy, poultry and fish farming suggesting that there are possibilities for structural shift from subsistence to intensive commercial urban agriculture.

Types of crops and livestock

Field survey results show that most urban farmers are engaged in subsistence farming. Varieties of crops are being grown in the municipality, including maize (*Zea mays),* millet (*Eleusine coracana),* sorghum (*Sorghum bicolour),* soya beans (*Glycine max),* beans (*Phaseolus vulgaris),* cassava (*Manihot esculenta),* sweet potatoes, (*Ipomea batatas),* rice (*Oryza sativa),* yams (*Dioscorea),* bananas (*Musa paradisiaca),* sugar cane (*Saccharum officinarum),* papaw (*Carica papaya),* napier grass (*Pennisetum purpureum),* kales (*Brassica oleracea),* green grams (*Vigna radiate),* cabbages (*Brassica oleracea),* onions (*Allium cepa),* tomatoes (*Lycopersicon esculentum),* cowpeas (*Vigna unguiculata),* and traditional ones. Maize is the most popular crop grown in the municipality being grown by close to half of the surveyed farmers. These results compare favourably with the Republic of Kenya (2007b) study, which shows that maize, sorghum and beans are the most commonly grown crops in Kisumu district. These crops are grown mainly for subsistence use. IITA (2007) identified three major types of cropping system in Yaounde: (1) mixed crop systems (vacant lots, unused municipal lands); (2) monocropping systems of maize grown and; (3) intensive horticultural systems primarily the production of traditional leafy vegetables. In addition, there is widespread use of small home garden plots for growing leafy vegetables and stands of banana (*M. paradisiaca)*, plantain, avocado (*Persea americana)*, African plum (*Dacryodes edulis*) and other fruit trees around homesteads. There exist two types of agricultural units: “commercial” and “household food” producers. The study found that women are the main producers for household food and for sales, accounting for 87% of the total sample. Amongst those men who are involved, they are overwhelmingly associated with production for sale. The urban farmers keep the following livestock: cattle, goats, sheet, poultry, dairy and pigs. Cattle are the most common type of livestock among the surveyed households having been registered in 36 of them (Plate 1).

However, a sizable number of urban farmers are engaged in commercial urban agriculture, especially dairy, poultry, horticulture and fish farming. Out of the 194 surveyed urban farmers, 12 of them engage in dairy farming. Dairy farmers sell their fresh milk to urban residents including business. The farmers are taking advantage of their proximity to the huge urban market. They are able to timely deliver milk to the consumers. Given the dwindling land sizes and the profitability of dairy farming, it offers an important means to improve livelihoods of the farmers. However, dairy farming generates waste that can be a source of nuisance and

Plate 1. Some of the traditional cattle kept within the municipality. Source: Field survey, 2006.

environmental degradation in the face of poor management system. While most of the waste generated from dairy farming can be recycled to support crop farming, odour smell and noise pollution can present a great challenge particularly with increased densification of settlements in the municipality. The survey covered two large scale fish farmers engaged in the production of fish baits. Fish baits are used to enhance fishing of Nile perch in the lake. The two fish farmers perform better than other farming ventures within the municipality. The municipality is in proximity to Lake Victoria, which is popular for fresh fish stocks. Therefore, fish farming for sale (direct to consumers and processing) would be less competitive compared with lake fish. Fish farming of fingerlings is competitive as it supports (Lake Victoria) Nile perch fishing industry. The lake is well known for the harvesting of fresh water fish species, such as tilapia and Nile perch.

Employment

Unemployment problem in Kisumu municipality

During the last two decades Kenya has experienced rapid increase in unemployment. The rapid increase in unemployment was more intense between 1990 and 2002. This was a time when the government opened up the domestic economy to international competition. Prior to market liberalisation, Kenyan economy was characterized by inward oriented inefficient import substitution industries. Following market liberalisation that begun in earnest in 1990, the hitherto weak economic structures were for the first time exposed to international competition. Therefore, market liberalisation led to serious loss of employment opportunities because of closure of many industries.

Kisumu municipality has similarly suffered from market liberalisation leading to closure of virtually all major industries such as Kikomi Cotton Mills, Kenya Breweries and Fish Processing Industries. The rate of unemployment in Kisumu municipality stands at 40% compared with the national figure of about 20%. The high rate of unemployment in the municipality is closely linked to high incidence of urban poverty that stands at 60%. At the moment, Kisumu municipality can be described as an informal municipality where informal activities are the main sources of employment. Given that 80% of Municipal landscape is dominated by agriculture, it is expected that the sector contributes to employment creation particularly in the light of increasing incidence of unemployment.

The number of employees in urban agriculture

Analysis of workforce size in urban agriculture reveals minor variations in workforce between seasons as well as by gender. On average the family workforce in urban agriculture is 1.84 per household during both the high and normal seasons compared with a somewhat lower figure of 1.52 during the low season. Across seasons, the

proportion of male family labour engaged in urban agriculture is slightly higher (53%) than women, however in the case of hired labour more women (54%) are employed compared to men. The mean hired workforce stood at 2.7 during the high season compared with 2.15 and 2 during the normal and low seasons respectively. There is wide variation in the size of workforce in urban agriculture indicating diversities in urban agriculture. The range of urban agriculture workforce is 1 to 7 for family labour compared with 1 to 31 for hired labour. The wide variation in the size of urban agriculture workforce is attributed to varying family sizes on the one hand and nature of urban farming (subsistence and commercial) on the other. It is expected that large families will engage large workforce in urban agriculture to meet family food security needs while commercial urban farmers will engage workforce depending on the scale of operation or level of effort. The single highest workforce was recorded in poultry farming. Field survey result shows that mean household size is 4. This result is comparable to the findings of Republic of Kenya (2007b), which shows that mean household size in the municipality is 4.

The results of the study shows that on average 2 members of the urban farming households engage in agriculture, while at the same time hire a similar number across seasons. This indicates that urban agriculture is an important source of employment. Given that 80% of Kisumu municipal landscape is dominated by urban agriculture, successful urban farming can be an important means of employment creation.

Mean daily working hours

The results of the study show that there is wide variation in the number of hours spent in the farms across seasons as well as by gender. High season is defined as planting, weeding and harvesting periods, while the low season is characterised by dry spells, land preparation and after harvest. Normal season occur in between those periods. In most cases workers were spending less than a typical man day of 8 h in the farms. During the low season, women (0.625 man day) spend more time in the farms compared to male (0.25 man day). This may be explained by the variation in the types of activities, for example men farm employees are engaged in livestock keeping while women are engaged in horticulture farms. Some of the male hired farm workers work beyond the accepted 1 man day. It is worth noting that while, hired male labourers work on average for 1.125 man day during the low season household male labourers work for just 0.25 man day. The low number of hours expended by household male workers in the farm could be explained in large measure by the cultural stereotypes that defines gender roles in household division of labour. During the low seasons men are engaged in preparation of farms, especially land clearance and ploughing while during the same season women oversee overall management of the farms.

There is very minimal seasonal variation in the number of hours spent by female family labour in the farms, implying that women farmers undertake farming all year round. For example during the low, high and normal seasons, women family labourers spend 0.625, 0.75 and 0.67 man day in the farm respectively. This means that on average female members of the family spend about 0.67 man day per day throughout the year. However, the time spent by male family members varies significantly between seasons. During the low season men spend just 0.25 man day working in the farm compared with 0.75 man day during both high and normal seasons. The results of the study show that while women consistently put in about 5 h in the farm, men are active in the farms only during the normal and high seasons. This could be explained in large measure by the cultural stereotypes, which define the division of labour placing greater responsibility of farm work on the women.

However, hired men farm workers spend about 0.75 man day in the farms across seasons, compared with hired women workers who spend 0.5 and 0.75 man day in the farms during the normal and high seasons respectively. During both the normal and high seasons women spend about 0.625 man day in the farms compared with 0.75 man day for men. While on average hired men farm workers spend about 0.75 man day per day in the farm, some of them spend up to 1.125 man day working. Those spending up to 1.125 man day working are mainly those in the livestock sub-sector. The above results show that both hired and family farm workers spend comparable duration working during both normal and high season, unlike during the dry season when family male farm workers spend considerably less time working (0.25 man day) compared with both hired and family female farm workers. In fact, women family farm workers spend the same number of hours as the hired women workers (0.625 man day). Also, it is evident that women are actively engaged in urban agriculture across seasons indicating their pivotal role in the sector. Thus, women are key players in urban agriculture compared with men. Furthermore, the results indicate that working hours in urban agriculture is lower than the standard one man day (8 h per day) working in the farm, with the exception of those working in the livestock sub-sector who put in 1.125 man day.

The wage rates in urban agriculture

Analysis of wages earned by hired farm workers reveals that there are variations in earnings between genders. The mean monthly wage for male farm workers is US$ 30 compared with US$ 23 for women. The mean wages are far below the government's approved minimum wage. The approved minimum monthly wage for each farm

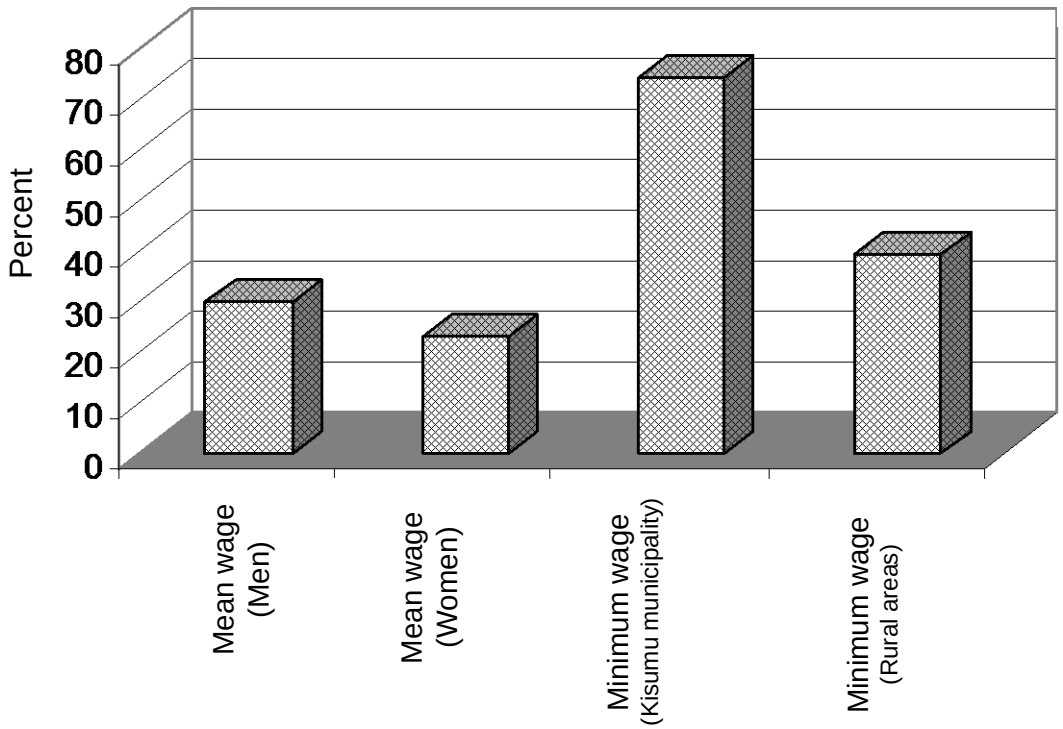

Figure 3. Mean monthly wage rates (US $). Source: Field survey, 2005.

worker in Kisumu municipality (the third largest urban centres) is US$ 74 and even the highest paid farm worker (US$ 71) does not earn the minimum wage. The wages of urban agriculture workers are below even the monthly wage for the rural workers who are supposed to earn US$ 39. The range of wages for men farm workers significantly vary unlike that of women. The wage rate for men farm workers ranges from US$ 8.5 to 71, while that of women varies from US$ 10 to 30. The fact that wage rates do not vary with seasons may be indicative of excessive unemployment problem in the municipality on the one hand and low productivity of labour in the sector on the other (Figure 3).

The variation in wage rates across sexes could be related to the following factors. First, the wage variation could be explained by the differences in the types of urban agriculture practised. The commercial urban farming activities such as dairy farming, poultry and fish farming are better able to pay higher wage rates compared with the other largely subsistence farming activities such as maize farming. Secondly, although male hired workers spend consistently more hours working but the differences in working hours cannot justify the relatively large wage differences between men and women. The variations in wages can be attributed to gender – bias that often favours men in wage commercial fish farmers in the municipality, the two fish farmers earn between them US$ 2142 and 3571 per month. The fish farmers produce fingerling baits for Nile perch fishing in the adjacent Lake Victoria. The high determination. However, Kenyan legislation prohibits gender discrimination in wage setting for those performing the same functions. The above results show that urban farm workers are very poorly paid, which predisposes them to high risks of poverty. Failure to implement minimum wage guidelines by the urban farm employers may be caused by either weak law enforcement mechanisms or low profitability of current urban farming practices.

Income from urban agriculture

Analysis of monthly income from urban agriculture reveals that most farmers engage in farming for subsistence and cultural reasons. This applies to both crops and livestock, for example maize and sorghum as well as cattle, goats and sheep rearing. For the purposes of determining earnings from urban agriculture, analysis was based on four activities with monthly earnings, namely dairy, horticulture, poultry and fish farming. The other activities are mainly for subsistence or cultural reasons. The results of the study reveals that although fish farming is limited, farmers engaged in fish farming registered the highest earnings, followed by dairy and horticulture farming respectively. While there are only two earnings from commercial fish farming may be explained by two key factors. First, it may indicative of the importance of Nile perch fishing in the lake, thus the high demand for Nile perch fish both in the domestic and

Plate 2. A section of one of the fish farms in Kisumu municipality. Source: Field survey, 2005.

international markets. Secondly, commercial fish farming is a high revenue earning venture because of the strategic focus on the production of fingerlings. This can be seen as an important niche in the fishing industry. This situation would be totally different if the fish farmers are engaged in production of fish for either consumption or input as they will be less competitive compared with fishing in the lake, which remains relatively productive (Plate 2).

The mean monthly income from dairy farming is US$ 66. The range for the monthly income from the sale of milk is US$ 6 to 469. Out of the surveyed urban farmers only 12 households engage in dairy farming. The wide variation in earnings from dairy farming is indicative of the existence of active engagement of some farmers as well as marginal farmers with low levels of output. Those earning US$ 6 per month may be selling milk that they would otherwise use at the household level save for poverty. The viability of dairy farming in the municipality is reinforced by the proximity to the huge market in the municipality. However, the low levels of farmers' engagement in dairy farming can be explained by the low levels of awareness, high investment and operational costs and weak institutional support. Kisumu municipality suffers from high incidence of poverty (60%), so most of the inhabitants cannot raise the requisite investment for dairy farming. At the same time, the urban farmers are mostly original inhabitants who have been engulfed by urbanisation but have maintained traditional way of life. Therefore, most of them have continued to practice subsistence farming despite existing opportunities for improved income, such as dairy farming.

Commercial poultry farming is another form of urban agriculture, which generates a relatively high income. Only seven of the surveyed households engage in commercial poultry farming. Four of the poultry farmers engage in eggs production, while the other three engage in chicken poultry farming. The urban poultry farmers engaged in eggs production earn between US$ 129 and 1607 per month compared with those producing chicken whose monthly income ranges between US$ 429 and 10,286. The wide variation shows that poultry farming has attracted both small and large – scale commercial farmers. Despite the small proportion of urban farmers engaged in poultry farming, the large market within the municipality enhances its viability. The small number of poultry farmers could be explained by lack awareness, high investment requirement and technical sophistication associated with the practice. The viability of poultry farming in the municipality could be driven by the small landholding. The main constraints to poultry farming lie in the noise pollution and solid waste management associated with the practice. Poultry farming generates solid waste that is often a nuisance to the farming households as well as the neighbours.

The monthly income from horticultural farming is similar to that of dairy farming. The main horticultural crops grown are: kales, tomatoes, cabbages and onions. The mean monthly income from horticultural crops is US$ 44 with a range of 7 to 441, which compares favourably with income from dairy farming. Just 28 of the surveyed households engage in horticulture farming. The very few farmers engaged in commercial horticultural farming indicate the dominance of subsistence farming in the municipality. In fact, small – holder horticulture irrigation is practised by only 25 of the surveyed farmers. The municipality is endowed with abundant water resources, especially the lake, rivers and ground water resources, which can support vibrant small scale horticulture. The farmers would then be able to sell fresh produce in the

Table 1. Sampling frame.

S/N	Spatial sampling unit	Sample size		Total sample
		Planned settlement	Unplanned settlement	
1.	The area between Oginga Odinga road, Kenyatta Avenue and Nairobi road and the lake – towards municipal boundary	9	41	50
2.	The area between Kakamega road, and Nairobi road - towards municipal boundary	8	37	45
3	Area covering Kakamega road, Kenyatta avenue, Oginga Odinga road and Busia road - towards municipal boundary	9	40	49
4.	Busia road, Oginga Odinga road and the lake - towards municipal boundary	9	41	50
5	Total	35	159	194

rapidly growing urban market. Productive and safe small – holder irrigation offers a real opportunity for improved livelihoods of urban farmers through improved income and employment. However, there is need for technical support on safe farming practises to reduce the risk of pollution that characterise urban agriculture in the municipality (Mireri et al., 2007). The monthly income from commercial urban agriculture in Kisumu municipality (US$ 66) compares favourably with the findings by IITA (2007) study in Yaounde, Cameroon, which reported that commercial urban farmers earn US$ 69 per month.

Further attempts were made to determine whether or not the commercial farmers are engaged in other activities to sustain their livelihoods. The results show that most of the dairy and poultry farmers are in formal employment, unlike horticultural farmers who are not gainfully employed. These results may indicate that urban commercial farming is not undertaken as a full – time household economic activity except to supplement income from wage employment. Most of the commercial urban farmers are public service employees suggesting that salaries from public service employments cannot meet the basic household needs. Further, the fact that dairy and poultry farming has attracted the public servants with formal education may be indicative of the importance of education and skills in this type of farming. Surprisingly, the results of this study suggest that commercial horticultural farming is less attractive to those in gainful employment despite the proximity to the market. This could be caused by the dwindling land sizes in the municipality. Also, horticulture demand relatively large land sizes compared with poultry and zero-grazing dairy farming.

Kisumu municipality study shows that dairy, poultry, horticulture and fish farming have the potential to improve the income of the urban farmers. Similar results were found in a study by ICRAF/IRAD (2007), which identified: poultry, dairy cattle, piggery, avocado, mangoes (*Mangifera indica)*, papaya, leafy vegetables and mushrooms as high value alternative crops with high enterprise potential. Farmers chose poultry, mushrooms and pig-raising as their best-bet options for agro-enterprise. Mireri (2002) reports that with modest investment in commercial poultry (US$ 1870) and pigs (US$ 2933) farming in Nairobi city agriculture can be an important source of income. Therefore, urban agriculture should be concentrated on strategic crops/livestock to remain viable in the face of continued urbanization.

The income from formal and informal employment outside urban agriculture

Analysis of mean monthly household income of the urban farmers indicates that they live on less than one dollar (US$) a day suggesting high incidence of poverty. The mean monthly household income is US$ 135 with a range of US$ 8.6 to US$400. Assuming a mean household size of 7 and a month of 30 days, this translates to a figure of mean income of US$ 0.64 a day with a range of US$ 0.04 and US$1.9 a dollar a day per person. Analysis of income from formal employment suggests that over 90% of those falling within that category live on less than one dollar a day assuming that they depend exclusively on the income indicating widespread poverty. This position is reinforced by the fact that most of the urban farming households engage in subsistence farming.

Further analysis of the income from informal employment indicates even a more pathetic situation.

Mean monthly household income from informal employment is US$ 67 with a range of 29 to 114. This translates to US$ 0.3 per person per day with a range of US$ 0.01 to 0.54. This indicates that all households depending exclusively on income from informal employment fall below the poverty line. The situation is made even more desperate because Kisumu municipality is basically an informal city where most of the urban residents are engaged in the informal sector. Petty trading/hawking, bicycle, motorcycle and tricycle public transport services account for a significant proportion of informal employment opportunities in the municipality.

The findings from both formal and informal employment are clear indications that the surveyed urban household cannot depend exclusively on employment for survival. The income from urban agriculture forms an important aspect of the livelihood support system, even subsistence farming becomes very significant for a household earning a minimum wage of US$ 8.6 per month. Smallholder commercial urban farming can be an important means of improving the income of the farming households. For example, assuming the dairy farming families earn an additional mean monthly income of US$ 50, this would translate to a mean household income of US$ 185. This means that the dairy farming would on average reduce the poverty level from US$ 0.64 to 0.88 per person per day. Thus, successful urban agriculture can significantly reduce poverty at the household level. Furthermore, with commercialisation of urban agriculture poverty situation can be significantly reduced thus improve living standards of the urban poor.

Urban agriculture and food security

A study of Nakuru municipality by African Studies Centre (2006) indicates that urban farming has increased considerably over the past decades. It is a way to improve the food situation of urban households and to diversify their livelihood options under conditions of persistent economic uncertainty and threats. A large majority of the urban farmers say they farm in town for food. For them, urban crop cultivation is an additional food source for the household, while for many of the poorer cultivators it constitutes a major food source. In general, 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.

The results of this study suggest that urban agriculture in Kisumu municipality contributes towards household food security. This is because most of the surveyed urban farmers engage in subsistence farming with most of the produce (95%) directly consumed by the household. At the same time, most of the commercial farmers engage in farming to supplement their income from wage employment suggesting that earnings from such activity directly contribute towards the household livelihood support system.

A significant dimension of economic vulnerability springs from the inaccessibility to a majority of Kenyans of assets for use in generating assured livelihoods, poverty, unemployment or even inflation pressures. Poverty at the individual or household level affects individuals' or households' capacity to achieve an acceptable quality of life. One dimension of poverty is the inability of the household to provide each of its members with sufficient food and shelter and meeting their basic needs. Poverty is the lack of minimum security to face the unforeseen events and crisis. The living standards for Kenyans have been declining steadily for over a decade. Nyanza province (within which Kisumu municipality falls) is the poorest in the country with a poverty incidence ranging from 65 to 80% (UNDP, 2006).

The high incidence of poverty is attributed to greater dependence on cash and market access for consumption needs and inherent instability of employment opportunities derived from informal sector. Land and good housing is often not easy to afford, thus the poor occupy land illegally and construct shanties without official permission. Urban poverty is as multidimensional as rural poverty, with common features such as the lack of employment, adequate housing and services. It is estimated that approximately 29 and 47% of urban and rural populations respectively live under conditions of absolute poverty. Food security is defined to include stable, sustainable and adequate quantity and quality of food supply for all and at all times, regardless of sex, age, class and race/ethnicity (UNDP, 2006).

Most of the Kenyan urban farmers (77%) produce mostly for households' consumption. In Nairobi, over 50% used the entire amount harvested to feed their families or dependants. The pattern that emerges is of a relatively simple self-sufficient peasant economy, based on petty commodity exchange existing in the larger urban centres (IDRC, 1994). Freeman (1991) found that most of the food produced on urban plots is reserved mostly for the cultivator's immediate family and/or dependants. Since most of the produce is for domestic consumption, it does exemplify the important role of urban agriculture in meeting food security needs of the farmers.

Conclusions

The main theme of this paper was to assess the role of urban agriculture in employment, income and food supply. The paper covered the following issues: urban dualism, land tenure system, land sizes, types of crops/livestock, employment, income and food security. The results of this study show that urban dualism manifests itself in urban agriculture and it is possible to expect that dualistic tendencies will persist in urban agriculture in future. Most of the urban farmers and

employees engaged in farming receive very low income and wages respectively, leaving them vulnerable to increasing incidence of poverty. While a few commercial urban farmers have taken advantage of their proximity to the municipal market, farming remains largely subsistence in nature. Most of the subsistence farmers are the original inhabitants who have been engulfed by urbanisation. Their failure to transform from subsistence to market economy, despite a long history of urbanisation in the municipality clearly points to urban dualism. Urban dualism in the municipality has been characterised by high rate of unemployment, land fragmentation, predominance of freehold land tenure, rapid growth of informal settlements and high incidence of poverty in the midst of the modern urban market economy.

Agriculture dominates the urban landscape as it is a key feature in 80% of the municipality. It contributes towards household income, employment and food security needs. Urban agriculture is important at three levels. First, it is particularly important to the original urban inhabitants who are structurally unable to gainfully participate in the urban economy. This category of urban farmers relies on farming as important source of food security as they supplement their household income through informal urban activities. Second, most of the commercial urban farmers are formally employed and they engage in farming to supplement their hitherto low wages. Urban agriculture is very important to this category of farmers as they will sink further into poverty in the absence of farming. Thirdly, urban agriculture creates employment to those who would otherwise be jobless because of weak economic base or lack of appropriate skills to gainfully participate in the modern sector. It is important to note that wages in urban agriculture is far below government's approved minimum wages suggesting that it is either a less competitive sub-sector or there is weak enforcement of minimum wage guidelines.

Despite the existence of widespread subsistence urban agriculture, commercial urban farming with high revenue was reported in poultry, dairy, horticulture and fish farming. Thus, it is possible to commercialise urban agriculture for improved incomes of the farming households. Commercialisation of urban agriculture is critical in the face of dwindling land sizes, proximity to the municipal market, increasing incidence of urban poverty and increasing tendency towards urban dualism. However, the promotion of urban agriculture in the municipality is hindered by official policy and legislative bias. The existing policies and institutional framework do not recognise urban agriculture as a legitimate urban land use. It is permissible under stringent conditions far beyond the reach of most farmers.

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