



## Enhancing food security through home gardening in urbanizing environment in Machakos County, Kenya

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### ABSTRACT

Kenya is rapidly urbanizing at an annual rate of about 4.3%. One of the consequences of urbanization has been the problem of food insecurity in peri-urban areas. Increased migration to urban from rural areas has enhanced food insecurity in these areas. The peri-urban area of Kangundo-Tala in Machakos County is one of the fastest-growing peri-urban areas due to its proximity to the capital city of Nairobi. This study investigated the impact of home gardening in enhancing food security in the rapidly urbanizing middle-income Kangundo-Tala peri-urban areas of Machakos County, Kenya. The specific objectives of the study were: to identify the causes of households' food insecurity in the study area; to examine the factors influencing the adoption of home gardening and; to establish the role of home gardening as a measure of households' food security. To measure food security, three consumption behaviors were analyzed: consumption changes, food expenditure reduction and income expansion. A qualitative approach was adopted where a total of 120 newly settled households were interviewed. The three main causes of food insecurity were identified (i) small land sizes, (ii) low and erratic rainfall and, (iii) the socialization of peri-urban dwellers. About 68% of the households were practicing at least one form of home gardening. The need for safe and nutritious food, seasonal unavailability, and inaccessibility of food encouraged the establishment of home gardens. From the gardens, households were able to diversify their diets, access safe food and have food readily available. With enhanced stability in food availability, accessibility, and utilization, the study concluded that home gardens played a major role in enhancing food. However, the production was at a very small scale. Up-scaling of home gardening by the Ministry of Agriculture through training was recommended.

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## Introduction

In the twenty-first century, urbanization has become among the most significant global social trends (NCPD, 2018). Urban population is experiencing unprecedented growth globally. Estimates indicate that urban population will rise to 4.98 billion by 2030 from 2.86 billion in 2000 (Cohen, 2004) accounting for almost 60% of the global population (Beyhan, et al., 2012). Africa is the most rapidly urbanizing continent with more than 50% of Sub-Saharan Africa's population estimated to be urbanized (Jelili, 2012). With the spontaneous development of cities, urban sprawls are inevitable (Beyhan, et al., 2012) resulting in urban resilience challenges (NYU, 2018; UN-Habitat, 2007). Urban resilience is the capacity of institutions, communities, individuals to subsist in urban centres regardless of the chronic pressures and shocks they experience (NYU, 2018).

At an annual urban growth rate of about 4.3%, Kenya is rapidly urbanizing although it remains under-urbanized (Cira, et al., 2016). By 2017 about 26% of Kenya's population lived in urban centres compared to 7% in 1960. The emergence of real estate business and individual preferences for a suburban lifestyle has seen Kenya rapidly urbanize since 2008. Almost everyone informal and self-employment, particularly the middle and high-income earners is settling in an urban home. This has led to an unparalleled expansion of urban and peri-urban zones. Güneralp et al (2017) observe that the urban middle class has caused suburbanization of the countryside. The once-rural areas are quickly transforming into peri-urban zones or urban sprawls through a multiplier effect. NCPD,

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(2018) observes that large and small cities are quickly expanding and some merging creating urban and peri-urban settlements. The Kangundo-Tala peri-urban area is an example of the emerging Nairobi Metropolitan corridor. Others include Ruiru, Athi River, Juja, Thika, Kitengela and Ongata Rongai. The urban growth is bringing with it a myriad of challenges (UN-Habitat, 2007) including food insecurity. Due to the increasing demand for settlement in peri-urban areas, the arable lands have been segmented into small plots not viable for any significant agriculture. Coupled with high food prices, the consequences have been inaccessibility to sufficient, safe and nutritious food. About 14.5 million people (32%) in Kenya are food poor. Although the majority are in rural areas (10.4 million people), about one million food-poor people live in peri-urban while 3.2 million live in core urban areas (NCPD, 2018). Rapid urbanization in Kenya is inevitable and the problem of food insecurity is true. Over time, more people are expected to be food poor in both urban and peri-urban areas due to increased rural-urban migration.

With small portions of land not viable for any substantial agriculture, and coupled with frequent dry spells, households in peri-urban areas are increasingly becoming food insecure despite their financial capability of buying food. To cope, home gardening, though perceived as a domain for the rural poor and the landless (Mutotsi et al, 2008; Uzokwe et al, 2016), is gaining momentum in urban and peri-urban areas. Home gardening is the production of food on very small land areas near human settlements. Whereas field agriculture has remained the main source of food in rural households in Africa, home gardens provide supplementary sources (Uzokwe et al, 2016). In terms of food quantity, the staple food is produced in field agriculture while for quality vegetables and fruits are particularly grown in home gardens (Ajah et al, 2013).

Despite the financial capability, the peri-urban households still engage in home gardening, a practice perceived to be for the poor. Food poverty according to Wagah et al (2018) goes beyond income poverty measures to show the interconnection between lived poverty and food insecurity. Although the study disputes the discourse that urban agriculture is a potential solution to food insecurity it does not explore the motivations of self-food production nor the potential of urban agriculture in the households that practice it. This study answers the question "why is it important to practice home gardening among middle and high-income peri-urban areas in relation to food security"? What is the role of home gardening in enhancing food security in urbanizing environments? This paper provides insights and stimulates promotion and improvement of home gardening practices by key stakeholders as a means of promoting food security in peri-urban areas. As Marsh (1994) observes, statistics of national and international consumption overlook the contribution of home gardening to the food supply.

The purpose of this study was to establish the impact and implications of home gardening in enhancing food security in the rapidly urbanizing middle income Kangundo–Tala peri-urban areas of Machakos County, Kenya. More specifically, the study sought to (i) identify the causes of households' food insecurity in the study area (ii) examine the factors influencing adoption of home gardening in the study area and, (iii) the role of home gardening as a measure of households' food security in the study area.

## **Literature Review**

The main focus of studies on urban agriculture in developing countries has been on the urban poor particularly those in the informal settlements (Gallaher et al., 2013). Contribution of food vendors to food security in informal settlements has also been a key research area (Ahmed et al., 2015). Studies on (peri-) urban agriculture (UPA) among the high- and middle-income earners have mainly been done in the global north (Astee & Kishnani, 2010; Gondhalekar & Ramsauer, 2017; Saha & Eckelman, 2017). Differing needs and priorities has been shown to motivate urban agriculture including environmental concerns among the educated (Lee, 2015); access challenges that face low-income earners (Mugisa et al., 2017); and the need of high-quality food that has increased the uptake of organically produced foods (Corrigan, 2011). In addition to income poverty the more widely spread conditions of living in urban areas including inadequate water, sanitation and energy also contribute to food insecurity (Battersby & Watson, 2018). Peri-urban areas are characterized with high informality levels and relatively lower access to services (Wagah, Obange & Ogindo, 2018). This is exemplified by studies in Kisumu that show that peri-urban households experience higher food insecurity rates compared to their urban counterparts (Wagah et al., 2018; Opiyo & Agong, 2020).

Motivations or reasons that influence the adoption of UPA by (peri-) urban residents may determine the nature and the level of stakeholder's involvement in agriculture development in these areas. Research on food insecurity should also focus on the manifestation of food poverty across people of different socioeconomic status. While the circumstances surrounding UPA in developed countries may differ substantially from those in the global south research gaps exist between the two economically different regions. The former shares the more scholarly work particularly on UPA by middle- and high-income earners. Khumalo and Sibanda (2019) for example study comprehensively the motivations and the contribution of UPA in peri-urban cities in South Africa. Although their study show that employment contributes to food security, they do not distinguish the economic status of those who participate in UPA.

## **Research and Methodology**

### **Study Area**

Data was collected in the urbanizing middle-income peri-urban areas of Kangundo–Tala in Machakos County, Kenya. Due to the rapid rate of urbanization, Machakos County has more peri-urban than the core urban population. Specifically, the study was conducted in Malaa area along Kangundo Road, some 41 kilometres away from Nairobi City. Malaa is located in Matungulu Sub

County which has a total population of 99,731 persons. The area is rapidly urbanizing with real estate businesses putting up large gated communities in addition to hundreds of other standalone new households settling in (Fig 1). The climate of the area is characterized by frequent dry spells which result in recurrent food shortages particularly among low-income earners.



**Figure 1:** Location of Machakos County and the urbanizing sites in peri-urban areas of Kangundo–Tala

Three consumption behaviours related to food security were analyzed. This included: consumption changes, food expenditure reduction and income expansion. A qualitative approach was adopted where a total of 120 newly settled households were sampled and interviewed.

## Results and Discussion

### Causes of Households' Food Insecurity

Without any interventions, households in the Peri-urban areas of Kangundo–Tala were seasonal food insecure. FAO (2008) defines seasonal food insecurity as the one of limited duration, recurrent and occurs in a cyclical pattern depending on seasonal fluctuations in climate, cropping patterns and work opportunities. It is predictable. Due to financial capability, the households were able to cushion themselves against chronic food insecurity. However, with seasonality and poor rainfall performance, seasonal food insecurity was common. The three main causes of food insecurity identified were: (i) small land sizes, (ii) low and erratic rainfall and, (iii) the socialization of peri-urban dwellers. Households had purchased land from the land merchants. In 95% of households, the average landholding measured 465 square metres, locally referred to as plots. Within the land, there were houses and playgrounds or carparks leaving no space for substantial agriculture. The space available for cultivation averaged at 20 square metres. This land size was inadequate for field agriculture but suitable for home gardening. The climate of Kangundo –Tala area is a semi-arid one, with a mean annual rainfall of 500mm. The rain is quite unreliable for rain-fed crop farming. Rainfall was bi-modal with short rains being more reliable than the long rains. The short rains occur in October, November and December (OND) while the long rains occur in March, April and May (MAM). Nevertheless, in both seasons' rainfall performance was poor. While planting, households only chanced with the rains since they are very unreliable. Sustaining supply of food was only possible through irrigation. Unfortunately, there was an inadequate supply of water in the area, with most of the supplied water being saline. The source of water was from private companies who, due to monopoly overpriced with a cubic metre of water retailing at an average cost of US\$1.2. Thus, growing crops through irrigation was also a challenge. Households therefore dependent largely on local markets for the supply of foods stuff. The socialization of the household heads significantly influenced the perception of agricultural activities. Being middle-income earners with a gross monthly income of between US\$500 and US\$1,000, about 76% of the households perceived agriculture as a preserve of the unemployed, a factor that deterred some of them from practicing farming. A combination of these causes forced most of the households to purchase food from the markets.

### Factors Influencing Adoption of Home Gardening

The problem of food insecurity was largely associated with unavailability of vegetables and fruits but not the staple food, i.e., ugali (thickened maize meal porridge) and rice. Being middle-income earners, the purchasing power of households was good. The staple food was purchased every month posing no challenge to households' food availability. However, fruits, vegetables and animal products, which were accompaniments to staple foods, required to be purchased daily. The daily purchasing of the accompaniment food posed three challenges related to food security that led to the adoption of home gardening: (i) food safety, (ii) food prices and (iii) accessibility. There was a common belief from the households that vegetables and fruits purchased were not safe for consumption. Two arguments advanced: first, the allegations that some of the vegetables purchased from the market were grown using untreated sewer water exposing household members to toxins. Omondi et al, (2017) observes that about 12% of the famers in the nearby Thika town use water from potentially contaminated rivers for irrigation with another 5% using water from open sewers. A proportion of the vegetables produced finds its way to the market as surplus. Secondly, the unhygienic manner in which vegetables

were handled compromising food safety. Vegetables were displayed along the dusty roads (Fig 2), washed using dirty water in small basins and cut with dirty hands and knives. The growing concern on food safety among some households triggered the establishment of home gardens.

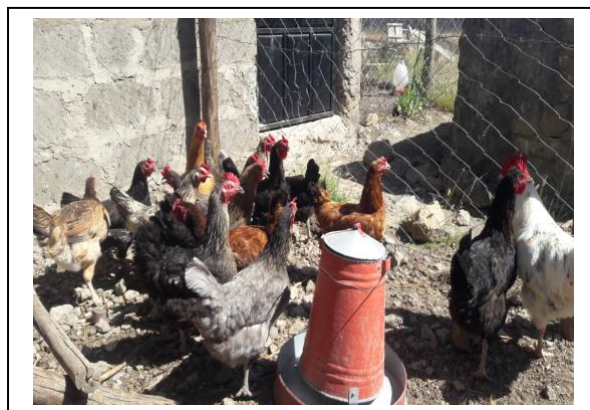


**Figure 2:** Vegetables were displayed along the dusty roads at Malaa shopping Centre in

About 40% of the households' income was used in purchasing foodstuffs exposing them to food deprivation risks. This is consistent with findings in South Africa where food accounts for largest household expenditure at 39% in poor households at Cape Town (Crush & Frayne, 2010). At any given time of the year, the lowest cost of a handful of kales (0.5kg), enough for a family of three, was US\$0.2 compared with US\$0.05 in rural areas. To feed a family of 4-5, vegetable worth at least US\$0.3 was required. During dry seasons, the cost rose to US\$0.7 for a family of 4-5. A kilogram of indigenous vegetables retailed at US\$1 during dry seasons. Sometimes, some foodstuffs, particularly indigenous vegetables, were unavailable in the markets. The prices varied from season to season but remained relatively high throughout the year. Most (96%) of the vegetable and cereal vendors were concentrated in shopping centres. The far-off households would travel up to 5km to access these markets hence deterred from frequent consumption of a variety of vegetables and fruits. Overall, such seasonal unavailability and inaccessibility of food encouraged the establishment of home gardens. On average, it took 1.5 years for the newly settled households to embrace home gardening. However, about 32% of the households were not practicing home gardening citing problems such as inadequate space, water shortage, lack of garden caretaker and that gardening was time-consuming with low return on investment.

### Home Gardening and Households' Food Security

Food security involves both physical and economic access to safe, adequate and nutritious food. The study focused on consumption changes, food expenditure reduction and income expansion as measures of food security. As a measure of food security, consumption changes involved aspects of dietary diversification and food safety. Changes in consumption behaviour were observed in households with home gardens. By intercropping different vegetables, households accessed food with different nutritional values. Similar research has associated urban and peri urban agriculture with increased dietary diversity in developing countries (Zezza & Tasciotti, 2010). The number of households growing varieties of vegetables, including indigenous vegetables, was on the rise. About 15% of the households had planted amaranths and the African Nightshade, which are high nutritional value vegetables. In households where poultry was reared (Fig 3), egg meal (Fig 4) was common either as an accompaniment to ugali or as breakfast meals. Most (96%) of the vegetable and cereal vendors were concentrated in shopping centres where far-off households would travel up to 5km to access these markets. The long distances were deterrent to the consumption of a variety of vegetables and fruits. Far off households consumed what was locally available or non-perishable foodstuffs. With home gardening, food safety both in the garden and at the preparation stage was certain. Households irrigated the crops using clean tap water and at the same time vegetables and fruits were cleaned during food preparation.



**Figure 3:** Poultry farming in peri-urban Kangundo-Tala





**Figure 4:** Egg meals prepared as accompaniment for meals

Food expenditure reduction revolved around quick economic access to foodstuffs. Contrary to Galhena et al. (2013) who observe that home gardening supplements the main source of food, in the peri-urban area of Kangundo–Tala home gardening was the main source of accompaniment foods. This was attributed to its accessibility and availability. Consumption of products from home gardens reduced households' food budgets by up to 30%. While this was largely attributed to non-purchasing of accompaniment foods, transport cost to markets was a factor that led to a reduction in food expenditure. Thus, households were capable of meeting their food needs with limited budgets.

Home gardening expanded households' income through the sale of surplus vegetables and eggs. Omondi et al., (2017) notes that urban agriculture has been found to contribute up to 36% of the household monthly revenue. Income expansion influenced the stability of food availability, accessibility and utilization throughout the year. FAO (2008) asserts that even where food intake is adequate today, a household may be considered food insecure if it experiences periodic inadequate access to food affecting the household's nutritional status. Wagah et al (2018) for example found a periodic low access to food in Kisumu which was proportionately high in January due to financial difficulties associated with the month. Home gardening cushioned households against periodic food insecurity in two ways: (i) it was a direct source of food. Home gardens were irrigated in all the households and thus guaranteed steady supplies and accessibility of vegetables and fruits throughout the year. (ii) The proceeds obtained from the sale of home garden products were used to buy other dietary requirements such as milk, meat and cereals not produced at garden level. For instance, where poultry farming was carried out, households generated a monthly net profit of about US\$3 per bird from the sale of eggs. The monthly cost of feeding one bird ranged from US\$0.72 to US\$1. With each bird producing an average of 20 eggs per month and sold at a market price of US\$0.2 per egg, each generated a gross income of US\$4. Besides, the chicken was fed using food leftovers, waste vegetable leaves and commercial feeds. The use of food leftovers and waste vegetable leaves as poultry feed reduced domestic waste.

## Conclusion

The problem of food insecurity is real and will increase as more people move in and settle in the peri-urban areas of Kangundo –Tala in Machakos County. The adoption of home gardening by the middle-income earners as a strategy against food insecurity was very effective as it reduced households' food budget by half. Besides, the proximity to the home gardens, availability of family labour, sustainability through irrigation and intercropping of vegetables and fruits enhanced not only quick access to sufficient but also safe and nutritious food that met households' dietary needs and food preferences. The diversity of vegetables intercrop was an indicator of success in home gardening as it showed higher vegetable consumption levels which translated to households' higher cumulative of nutritional value. Home gardening cautioned households from consuming unsafe food hence promoting food security. In households where livestock was reared, in addition to having animal proteins, livestock droppings were used as manure that enhanced soil fertility. The need for up-scaling of home gardening by the Ministry of Agriculture through training, therefore, cannot be overemphasized. Specifically, food security policies and programs should be context specific (Battersby, & Watson, 2018) to address place-specific challenges at sub-county levels.

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