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**FACTORS INFLUENCING URBAN AGRICULTURE  
PERFORMANCE IN MATHARE SUB-COUNTY, NAIROBI CITY  
COUNTY, KENYA**

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**A Research Project Report Submitted in Partial Fulfillment of the Requirement for  
the Award of Degree in Master of Arts in Project Planning and Management of the  
University of Nairobi**

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## DECLARATION

I hereby declare that this project is my original work and has not been presented for a degree at any other university.

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This research project has been submitted for examination with my approval as the candidate's University Supervisor.

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## **DEDICATION**

I dedicate this research project to my family especially my parents and wife for their support and encouragement.

## **ACKNOWLEDGEMENT**

First and foremost, I thank the Almighty God for His love and kindness that have seen me through to this level of education against many odds. I also thank the University of Nairobi for providing an enabling environment for me to gain more academic skills and knowledge and expand my professional expertise and networks.

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## ABBREVIATIONS AND ACRONYMS

<b>ASDS</b>	:	Agricultural Sector Development Strategy
<b>CGIAR</b>	:	Consultative Group on International Agriculture Research
<b>FAO</b>	:	Food and Agriculture Organization
<b>GDP</b>	:	Gross Domestic Product
<b>KARI</b>	:	Kenya Agricultural Research Institute
<b>UA</b>	:	Urban Agriculture.
<b>KNBS</b>	:	Kenya National Bureau of Statistics
<b>SL</b>	:	Sustainable Livelihoods

## ABSTRACT

Agricultural growth and development is crucial for Kenya's overall economic and social development. Agriculture directly contributes 24% to Kenya's GDP and 60% of the export earnings. Government has outlined, in its Vision 2030 policy paper, the key role the agriculture sector will play under the economic pillar and the Agricultural Sector Development Strategy (ASDS) 2009-2020. In Nairobi City, one land use of emerging importance is urban agriculture. While a good number of studies have focused on urban agriculture, its performances' determinants particularly in the changing urban space are largely ignored. The purpose of this study therefore is to investigate the factors influencing urban agriculture performance in Nairobi County? The objectives include: To establish the influence of urban planning on urban agriculture performance; to determine the role gender plays in urban agriculture performance; to explore the relationship between food security and urban agriculture performance and to determine the influence of income on urban agriculture. The study draws upon the Innovation-Diffusion and Sustainable Livelihood Theories and will employ a descriptive survey research design. It will utilize the simple random sampling method and use a household survey, semi-structured interviews, and key informants to collect data. The target population has 5000 households, therefore by use of Krejcie and Morgan's method of determination of a sample size the eventual sample size will be 357 respondents. Primary data will be collected by means of a semi- structured questionnaire. A pilot test will be conducted in order to test the validity of the questionnaire and Expert opinions help to establish content validity. The research will yield both qualitative and quantitative data. The qualitative data collected will be analyzed through content analysis where a thematic framework will be developed, while quantitative data will be analyzed using descriptive statistics with the help of Statistical Package for Social Sciences (SPSS) version 20. The findings will be presented using tables, frequencies and percentages. The study established that that no land use regulations in Mathare Sub-County are in place, and there are no legislations and policies encouraging or inhibiting urban agriculture. It was also found that Mathare Sub-County households have no access to sufficient and nutritious foods supply and households have unreliable food supply. In addition, women have equal access rights to urban farm space as men and more women practice urban agriculture to produce food for the family than for sale as compared to men. The study concludes that the rising food insecurity has had an increase in urban agricultural practices in Mathare Sub-County. Also, it was concluded that urban agriculture can benefit if it is incorporated in urban nutrient recycling (organic waste management in cities), and accessible income opportunities and an unsatisfied demand for agricultural products in quantity and quality pose as a major challenge in urban agriculture. The study recommends that the government should be at the fore front in empowering urban dwellers the benefits of urban green space, creating social frameworks to plan, implement and maintain the urban green space and create a process of method to balance the needs of those living in urban areas with the needs of the larger environmental concerns.

## CHAPTER ONE

### INTRODUCTION

#### 1.1 Background of the Study

The concept of urban agriculture can be defined as the art of growing food crops and non-food crops such as flowers, and rearing livestock within and around urban settings. Urban agriculture is an industry located within (intra-urban) or on the fringe (peri-urban) of a town, city, or metropolis, which grows and raises, processes and distributes a diversity of food and non-food products, re- using largely human and material resources, products and services found in and around that urban area, and in turn supplying human and material resources, products and services largely to that urban area (Smit, 2010). Smit further argues that the most striking feature of urban agriculture, which distinguishes it from rural agriculture, is that it is integrated into the urban economic and ecological system: urban agriculture is embedded in-and interacting with-the urban ecosystem. Such linkages, he notes, include the use of urban residents as laborers, use of typical urban resources (like organic waste as compost and urban wastewater for irrigation), direct links with urban consumers, direct impacts on urban ecology (positive and negative), being part of the urban food system, competing for land with other urban functions and being influenced by urban policies and plans.

Urban agriculture is important around the globe. In the UK, for instance, urban household gardens represent a significant percentage of the total surface of a city, occupying more than ten times the area of protected nature reserves (Lwenya, 2012). The UK is the country with the highest number of private gardens per capita of any nation in Europe (Machinga, 2000) but only 20% of garden owners grew food in 1996 compared to 35%

ten years earlier, with lawn and flowers being the dominant theme (IFPRI, 2000). Thus, it can be argued that a significant potential of food production in terms of quantity lies in household gardens.

Unlike the UK, Cuba and Brazil have also embraced urban agriculture. Cuba has proven that urban farming has the potential to combat major food security issues with little additional resources and appropriate policy (Mlambo, 2011). In Brazil, poverty pushes people to look for self-reliant options and, in this case,, urban agriculture becomes an important option. The underlying requirement, according to Mlambo (2011), is to facilitate proper urban development design which can allow the practice of urban agriculture.

The African continent has increasingly embraced urban agriculture often incorporating it to food security and greening cities. South Africa offers a good case. Here, there is an increase in the number of the poor in urban areas practicing urban agriculture with the goal of increasing food security (Dornbusch & Samuelson, 2010). The increase has not been without challenges. For example, formal economic opportunities often fail to keep pace with increase in urban population and these results in increases in informal but not officially recognized activities (Dornbusch & Samuelson, 2010). Formal urban planning service provision therefore does not enhance the potential of such opportunities. Urban agriculture is viewed as one such an opportunity not sufficiently activated in urban development strategies.

In East Africa, Lee-Smith (2013), shows that Dar-es-Salam (Tanzania) generates 90 per cent of the city's leafy vegetables and at least 60 per cent of its milk via urban agriculture. Furthermore, studies conducted within East and Central Africa showed that

among the households involved, almost all consumed more foodstuffs than they sold, which suggests urban farming not only provides food but also minimizes food related expenditure

Agricultural growth and development is crucial for Kenya's overall economic and social development. Agriculture directly contributes 24% to Kenya's GDP and 60% of the export earnings. The sector has experienced growth from 2002 after a decade long decline. Government has outlined, in its Vision 2030 policy paper, the key role the Agriculture sector will play under the economic pillar and the Agricultural Sector Development Strategy (ASDS) 2009-2020, both of which aim at improving the standard of living of Kenyans by substantially reducing the number of people living below the poverty line.

Until recently, agriculture was considered an exclusive rural activity. However, this has changed due to the rapid increase in urban population especially in the developing countries mainly due to rural-urban migration. Urban agriculture is on the rise because as most people migrate from the rural areas they carry along with them indigenous knowledge on livestock keeping and crop production to the urban areas. East Africa has the highest average rate of urbanization in Africa of 4.5% per annum (UNEP, 2002). Nairobi has an urbanization rate of 3.8% with an urban population of 3.1 million people (KNBS, 2010). This has caused a rapid increase in urban poverty and urban food insecurity (Mougeot, 2005).

Food production in the city is mainly a response of the urban poor to inadequate, unreliable and irregular access to food, and the lack of purchasing power (Foeken & Mwangi, 2009). Urban agriculture also contributes to local economies development, and

poverty alleviation. Urban farmers come from all income groups, but the poor dominate. For the urban poor, urban agriculture is a survival strategy. Urban agriculture contributes to food security and healthy nutrition, helps in managing the urban systems and in micro-climate improvement, allows savings in transportation costs, storage, and in production losses. It also stimulates development of related micro-enterprises.

With the help of flexible, adaptive policies, urban agriculture can be a catalyst for communities by providing access to healthy foods, transforming abandoned lots into thriving community spaces, sharing cultural traditions across generations, and promoting much-needed economic opportunities (Foeken & Mwangi, 2009). The seeds of change are taking root, and with policymakers, advocates, and other stakeholders collaborating, urban farming can spread and flourish in even more communities in Kenya. While some of these policies support low-income communities, there is still room to advocate for policies that focus more on the very communities that stand to greatly benefit from urban farms in their neighborhoods.

### **1.1.1 Urban Agriculture**

Urban agriculture can turn urban wastes into a productive resource through compost production, vermiculture, and irrigation with wastewater (Veeinhuizen, 2011). It reduces climate change by preventing overheating of urban environments due to the creation of urban heat island. It provides indirect economic benefits, such as multiplier effects, creational benefits, economic diversity and stability, and minimizes disposal costs of solid waste. In terms of environmental impact, urban agriculture frequently incorporates practices, which can lead to productive, reusable, self-contained waste and nutrient cycles, contributing towards the development of safe and non-polluting environments.



Evidence has shown that with proper planning and management, urban agriculture can actually be a very effective and safe means of producing food (Lock & Veenhuizen, 2011).

Urban agriculture is linked to the environment at several levels. It demands resources, which may be scarce such as treated domestic water supply. This may lead to serious water resource conflicts in the urban areas and use of unsafe water for farming. Lack of suitable land for various categories of urban farmers may cause farmers to cultivate on hazardous sites with serious health implications and urban agriculture generated wastes that must be efficiently managed to safeguard the lives of the urban residents (Lock & Veenhuizen, 2011). Urban agriculture can also have an impact on energy use, which is a major element in the drive to achieving more sustainable cities. Cultivating produce in close proximity to areas of consumption can result in significant energy savings, by reducing energy expenditure on refrigeration, transport and storage.

Local leaders should ensure that biodiversity and ecosystems are appropriately valued and recognized and that the opportunities and benefits of conservation are realized. The policy implication is that the City Council of Nairobi should strive to reduce Nairobi's scarce resources by using natural resources more efficiently and innovatively. Finding a safe and economical way to recycle some or all of the municipal and agro-industrial waste holds the promise of a "triple win": clean up the urban environment, reduce the threat to health, and increase agriculture production by replacing soil nutrients.

In Kenya, urban agriculture dates back to 1899 when the railway workers mainly from India started the practice in the mainland towns (Mireri et al., 2007). During this time, urban agriculture was restricted and the colonial regime strictly enforced planning

regulations that prohibited urban agriculture, but after independence urban agriculture witnessed rapid growth due to increased urban population despite the restrictive regulations. Urban farmers come from all income groups, but the poor appear to dominate. Majority of the poor urban households turn to urban agriculture for survival and to supplement their diet (Mbiba, 2010). While urban planners and managers have open spaces designated for future development, the urban poor view such land as idle land, an underutilized scarce resource, which could be put into immediate use through such activities as agriculture (Mbiba, 2010). About 13.9% of land in Nairobi is under urban agriculture. By the late 1990's about 30% of the households in Nairobi were involved in urban farming (Foeken & Mwangi, 2009). According to Urban Harvest (2004) a third of urban dwellers in Kenya grows subsistence crops and raise livestock. Over 80-85% of the urban cultivators are women. Urban agriculture is steadily becoming an alternative livelihood in the city (Foeken & Mwangi, 2009). It takes place in backyards, along roadsides, rivers and railways, in parks and industrial areas. The high and middle income households constitute a significant proportion of the urban agriculture practitioners (Mbiba, 2010).

The growth of urban agriculture since the late 1970s is largely understood as a response to escalating poverty and rising food prices or shortages. For example, urban poverty in Nairobi in the mid-1970s was negligible: only 2.9% of the households in Nairobi lived below the poverty line (Smit, 2010). In the 1980s and 1990s, however, the situation changed drastically, due to three, interrelated, circumstances; rapid population growth as a result of both high natural increase and accelerated rural-urban migration, the on-going economic recession; economic growth declined steeply since 1980; and the effects of

structural adjustment policies, such as a reduction of government spending, increased taxation, currency devaluation etc., all measures making life far more expensive for Kenyans and for the poor in particular. The result is that vulnerable groups like the urban poor became/have become more and more marginalized. Partly as a result of this, many people turned to urban farming, to subsidize their income.

Nairobi has an urban population of 3.1 million people (KNBS, 2010) and a high unemployment rate. A substantial proportion of the urban poor, not only lack decent shelter, but are unable to satisfy their food and nutritional requirements (UN-Habitat, 2004). According to urban harvest (2004), a third of Kenyan urban dwellers are involved in urban agriculture. More people are expected to turn to urban agriculture as a means to supplement food supplies and income levels (Mbiba, 2010).

Urban agriculture is a legal situation in Kenya but most urban dwellers assume it is illegal. Kenya's Physical Planning Act authorizes the local government to lease, transfer or allocate land for temporary use (sec 144), while sec 144c prohibits cultivation by unauthorized persons on land that is not occupied or enclosed to private persons, governments and local authorities. The Physical Planning Act (Sec 16) on the other hand does not identify urban agriculture as an urban land use (Bryld, 2012).

In Nairobi, the urban poor populations in the informal settlements are the major actors in the sub sector. Vulnerable groups such as female-headed households, children, retired people, widows, and people with limited formal education are particularly involved in urban agriculture. Studies carried at Dagoretti Division in Nairobi on Characterization of Benefits and Health Risks in Urban Smallholder Dairy Production (Kangethe et al, 2009), as quoted in the draft national urban and peri-urban agriculture and livestock policy

(2010), has brought to light that urban dairy production has potential to increase availability of food and income for the households. Farmers use manure to grow crops like maize, beans and vegetables and they are able to increase their yields and there is significant income from keeping dairy animals. According to Maingi (2010), Nairobi experienced a shift from rain fed agriculture to irrigated agriculture from year 2000 to year 2009, but contemporary environmental changes continue to accelerate water shortages.

## **1.2 Statement of the Problem**

Urban agriculture has the potential to play a significant role in national development by contributing towards food security, creating employment, income generation and environmental conservation. Already the growth of urban agriculture around cities has been linked to growing poverty, hunger, lack of formal employment, increasing demand for food, proximity to markets, cheap labour, and resources such as urban organic wastes and wastewater (Lee-Smit, 2010). Many households in Nairobi are facing a serious decline in their purchasing power and poverty levels are on the rise (Harvoka, 2009). In Nairobi City therefore, urban agriculture becomes one of the most important land use patterns. The study has selected Mathare sub county because Many households in the area are facing a serious decline in their purchasing power and poverty levels are on the rise. The poorer the household the more they depend on farming to supplement their food requirements.

Hagey (2010) looked at growing urban agriculture and found that in many low-income communities, the only places to buy food are fast food and convenience stores that sell

fatty, sugary, processed foods. Nyambura (2010), investigated the status of urban agriculture and its implication for policy changes in urban land use in Nairobi. Githunguni (2014), did an assessment of the contribution of urban agriculture to households' livelihoods in Roysambu Ward, Nairobi County and found that the trend of UA in Nairobi County showed a decline of 28% of the area under forests and crops compared to an increase of 35% of the area under built up areas over the last 20 years. This shows that all the hitherto agricultural areas in the County will soon be taken up by the built-up areas.

Urban agriculture in Nairobi has attracted considerable attention in the last few decades. Some studies, as discussed above, have looked at growing urban agriculture by low-income communities, others have focused on factors influencing food security of farmers practicing peri-urban agriculture crop production. Moreover, some scholars have looked at urban agriculture and its implication for policy changes

With its ever increasing population, limited employment opportunities and the high inflation, with high prices for food stuffs being one of the largest contributors', Nairobi County has not utilized the large potential in urban agriculture. Lee-Smith (2010) asserts that household garden food production has the potential to shift both perceptions and practices about food, home and the urban environment as it provides direct access to fresh and nutritious food, within the household environment, that can be harvested, prepared and fed to family members, often on a daily basis. This can play a pivotal role is supplementing the dietary need of most households, cut expenses on food purchases and ensure people have access to fresh healthy food items. This study therefore seeks to look at the factors influencing urban agriculture performance in Nairobi County in both

contexts of those that have assisted and continue to assist in its growth and adoption by the county dwellers as well as those determinants inhibiting the great potential that lies in this practice.

### **1.3 Purpose of the Study**

The purpose of this study was to establish the factors influencing urban agriculture performance in Mathare sub-county, Nairobi County.

### **1.4 Research Objectives**

The study was guided by the following objectives:-

- i. To establish how urban planning influence urban agriculture performance in Mathare Sub County;
- ii. To examine how food security influence urban agriculture performance in Mathare Sub County;
- iii. To establish how income factor, influence urban agriculture performance in Mathare Sub County; and
- iv. To explore how gender factor, influence urban agriculture performance in Mathare Sub County;

### **1.5 Research Questions**

The study sought to answer the following research questions: -

- i. How does urban planning influence urban agriculture performance in Mathare Sub County?

- ii. What is the influence of food security in determining urban agriculture performance in Mathare Sub County?
- iii. What role do income factor play in determining urban agriculture performance in Mathare Sub County?
- iv. How does the gender factor determine urban agriculture performance in Mathare Sub County?

### **1.6 Significance of the Study**

As discussed, urban agriculture is growing as populations increase. By 2030, almost half of Kenya's population will live in the urban environments and it remains to be seen how urban agriculture will play out in highly populated settings already receiving massive infrastructure developments (e.g. expansion of road networks). Urban planning then becomes a critical area of concern in the hope of creating sustainable cities of the future. This study therefore hopes to contribute knowledge needed for urban planning. It is the belief that the findings increased awareness of the potential and constraints inherent in urban agriculture not only in Nairobi but across other cities and towns as well.

The study also sought to inform policy on the development of urban agriculture, and to assist stakeholders, financiers, entrepreneurs and investors in formulating and planning areas of intervention and support. Furthermore, it is the hope that findings of the study informed farmers on the strengths and weaknesses of the existing activities in urban agriculture. The study also contributed to the existing literature. For academicians and researchers, they do an in-depth investigation on the degree to which the urban agriculture would affect the residents' poverty rate in Kenya. Through studying the

degree or the quantitative measurements of the impact, the study enabled them to carry out further studies as they progress in advancing their education levels.

### **1.7 Limitations of the Study**

This study comprised of the households from Mathare slums in Nairobi County in Kenya who engage in urban agriculture, this made the research limited in the sense that the findings may not be generalized to other urban centres in the country. The study faced limited research time that limited a comprehensive investigation into the nature and practice of urban agriculture. The researcher worked extra time to ensure the task is complete on time. The study was not be able to look into the details of the quantities of food produced or livestock reared across time to be able to have an objective analysis of the role of urban agriculture in food security discourses. The study involved relevant authorities and stakeholders related to agriculture and food security and gather information from them.

### **1.8 Delimitations of the Study**

This study targeted households within Nairobi who practice urban agriculture. This ensured that the research population was identified faster, more easily and accurately. Data was specifically collected from the households practicing urban agriculture in Nairobi County. The aim was to collect accurate data from the respondents with a view to establish factors influencing urban agriculture performance in Nairobi City County.



## **1.9 Assumptions of the Study**

The study assumed that all respondents were honest, cooperative and provided reliable responses. Since a specific research sample was used, it was assumed that the sample used was representative across Nairobi urban area.

The researcher assumed that the sample population is a representative of the general population. The researcher also assumed that respondents were aware of determinants of urban agriculture in Nairobi and that they were not barred by their contractual agreement to talk on the topic of study in a way that affected them. It also assumed that the respondents were honest in their reporting and in answering the research instruments.

## **1.10 Definition of Significant Terms**

**Food security**- is a condition related to the supply of food, and individuals' access to it.

**Gender** – it's the social ascription of being male or female. For this study we shall define it as the state of being male or female carrying out urban agriculture

**Household** -A household consists of one or more people who live in the same dwelling and also share at meals or living accommodation and may consist of a single family or some other grouping of people. In the context of the study, a household may not necessarily include persons who are related by blood or marriage, but the definition is broad to include friendship acquaintances among others.

**Income** - is money that an individual receives in exchange or for selling products from the urban agriculture

**Livelihood-** A livelihood is a means of making a living. It encompasses people's capabilities, assets, income and activities required to secure the necessities of life

**Urban Agriculture:** is the practice of cultivating, processing, and distributing food in or around a village, town, or city

**Urban Planning** - is a technical and political process concerned with the development and use of land, protection and use of the environment, public welfare, and the design of the urban environment, including air, water, and the infrastructure passing into and out of urban areas such as transportation and communications

### **1.11 Organization of the Study**

The study is divided into five chapters. Chapter one of the study contains introduction, giving a background of the study while putting the topic of study in perspective. It gives the statement of the problem and outlines the objectives, limitations, delimitations, assumption of the study and the significance of the study. Chapter two outlines the theories guiding the study. It reviews the relevant literature on factors influencing urban agriculture performance. Chapter three consists of research methodology which is used in the study. It covers the research design, target population, sample design, data collection, validity and reliability of data collection instruments, data analysis techniques, and ethical considerations. Chapter Four consists of data analysis, presentation and interpretations and discussions. Chapter Five consists of summary, conclusion and recommendation based on the study.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

In this chapter, the study will highlight some studies that relate to the factors influencing urban agriculture performance in Nairobi City County. The main sections covered in this chapter include; factors influencing urban agriculture performance, theoretical framework, conceptual frame work, and brief literature review and research gaps.

#### **2.2 Urban Agriculture Performance**

Urban Agriculture is emerging strongly in Sub-Saharan Africa, where the fastest urban growth will occur in countries least equipped to feed their cities (Mbaye & Moustier, 2012). The basic determinants or preconditions, which are essential for the consideration of urban agriculture as a survival strategy, have to be met to allow agriculture to be practiced. These include: urban planning, food security, income and gender factor.

According to Garrett (2010), urban agriculture contributes to local economic development. It is more than merely food-related: it provides agricultural as well as non-agricultural employment opportunities. In the latter category is the commercialization of urban agriculture products. Urban food production has an advantage compared to rural agriculture since it is located close to consumers with purchasing power. Furthermore, ready-to-eat foods and beverages sold on streets represent an alternative for the marketing of urban agricultural production. Urban agriculture plays a role in improving the urban environment. Urban food production in cities also addresses non-alimentary needs of the urban population such as sustainable development and environmental protection. It

contributes to the greening of the city by maintaining green open spaces and enhancing vegetation cover thus reducing the cities carbon dioxide footprint. It may also be a source of innovation and learning about new strategies/technologies for land and water-efficient food production which often include the productive recycling of urban wastes. Moreover, urban agriculture seldom makes use of chemical fertilizers or pesticides because of the hazard to health these products entail, especially in densely populated areas.

Families are typically motivated by Urban agriculture livelihood strategy because of the security and sustainability of access to food, and its potential contribution in meeting other household basic needs. Indeed, home-based agricultural production represents for many urban farmers a significant source of extra income. According to Ayaga (2013), the productive space may experience seasonal variations but, in general, it yields an important proportion of total income for many urban farmers these have the possibility of marketing their surplus vegetable and animal products but also save in food and medical expenses.

Garrett (2010), claimed urban agriculture exercise is an inherently strong intervention to quantitatively increase and qualitatively improve urban nutrition. Moreover, it is easy to reproduce successfully since even households with little access to income or land can grow food and raise small animals on their rooftops, in cellars, on small patches of land or idle lots. Bryld (2012), adds that this mode of production is in fact accessible and viable to poor households in as much as it relies on low-cost, low-risk technology and may be adapted to hostile environments. Gagnon (2010), proved that urban agriculture on small lots of land can significantly contribute to food security by supplying families with

an important percentage of daily recommended intakes of proteins, calories, vitamins and minerals.

### **2.3 Urban Planning**

For urban agriculture to perform well it has to be incorporated in government urban planning process. The role of urban planning falls under the National government and respective county governments where an urban center falls. Freeman (2011), noted that currently there are no urban planning policies that specifically address the issue of urban agriculture as means for food security yet new concepts continue to dominate the field of urban planning. The planning approach has led to dense residential areas with little space left over for other food production activities i.e. urban agriculture. The regulations regarding crop cultivation, however, are still forbidding save for agricultural land that came to be located within the recently urban boundaries after their expansions such as areas in Dagoretti, Ruai, Kangemi and Kabete.

A number of studies have been carried out on the role of urban planning in the practice of urban agriculture. Petra (2011), investigated urban agriculture justification and planning guidelines in urban vegetable promotion project in Tanzania, the study found that urban development coupled with scarcity of resources often accelerates environmental degradation, leading to loss of quality of urban living conditions, especially for the urban poor. There is an increasing awareness about the urgent need to harmonize urban development with environmental protection. Much closer home, Githungunyi (2014) did an assessment of the contribution of urban agriculture to households' livelihoods in Roysambu Ward, Nairobi County and found that the trend of UA in Nairobi County showed a decline of 28% of the area under forests and crops compared to an increase of

35% of the area under built up areas over the last 20 years. This shows that all the hitherto agricultural areas in the County will soon be taken up by the built up areas. Health and environmental concerns were noted especially in the low income areas of Mathare, Ruaraka and Njathaini which reinforces the fact the UA should be controlled if not outlawed in these areas.

On the other hand Nyambura (2010), investigated the status of urban agriculture and its implication for policy changes in urban land use in Nairobi, Kenya. The study found that the trend of urban agriculture in Nairobi showed it was on the decline due to competition of land by other land uses particularly urban development. The river line area declined by 36.6% and rain fed agriculture declined by 42.1%, although there was an emergence of irrigated agriculture which occupied an area of 542.4 ha. Over 73.6% of urban dwellers engaged in urban farming. Urban agriculture remains popular due to its contribution to food security, income generation and employment creation.

The Constitution of Kenya (2010) also points out that the State may regulate the use of any land, or any interest in or right over any land, in the interest of defence, public safety, public order, public morality, public health, or land use planning. This means that the state has powers to regulate use of land for agriculture in the interest of public health. This study showed that urban agriculture exposed people to a lot of health risks especially in low income areas and the State should come in to protect people's lives and safety. Agriculture Act, Cap 318 has since been repealed, resulting to The Agriculture, Fisheries and Food Authority Act (2013) and The Crops Act (2013). Though these two new acts are not very explicit on urban agriculture, they have given a lot of leeway for its development (Rees, 2013).

According to Ng'ang'a (2008), it is recommended that urban agriculture in Kenya ought to be improved and integrated into formal city planning. This can be done at individual level, city level and at the level of central government with the Nairobi City Council (now Nairobi county government) drawing up an urban food policy for Nairobi and updating its physical development plan. There is need to amend the city council by-laws, enabling legislation as well as various Acts of Parliament such as Local Government Act (Cap 265) and Public Health Act (Cap 242) to facilitate and enhance urban agriculture practice.

Although many poor households benefit from urban agriculture, land cultivation and livestock production are actually illegal in many cities. Often, farmers lack legal rights and thus have less incentive to make costly improvements. For example, instead of installing costly irrigation systems farmers often use wastewater irrigation that, if polluted, can pose health risks to consumers (Rees, 2013). Given the potential benefits of urban agriculture, government policies for urban planning need to address land tenure for farmers and provide access to clean irrigation water, while also protecting public health. Murphy (2009) posits that urban agriculture can benefit if it is incorporated in urban nutrient recycling (organic waste management in cities).

In the 20th century, because of a dominant view on urban planning and a lack of access to research data, among other reasons, policy-makers often had a misconceived view of urban agriculture as a temporary phenomenon or a remnant from migration of rural farmers to the city that would fade overtime. Urban agriculture was seen as incompatible with urban development, a nuisance and risk factor; for that reason, legislations and policies on urban agriculture were mainly restrictive and at best, agriculture was

temporarily tolerated (mainly peri-urban) as a reserve area for future urban expansion (Mbiba, 2010).

According to Pascal and Mwendu (2009), the government of Kenya has legalized the situation on urban agriculture. However, a close look at the Local Government and Public Health Acts, as well as the Nairobi by-laws, indicates that urban farming may be practiced under restrictions. Amidst the uncertainty however, farming activities have continued to thrive in urban centers in Kenya often with little regard for associated health issues such as contamination from pathogens and toxic materials among the waste materials used in farming systems and disease transmission from animals kept in unhygienic conditions. Experiences gained from other cities of the world where urban and peri-urban agriculture is legalized and is better regulated through incorporation into the urban planning process indicate the beneficial effect of farming in cities towards the provision of better nutrition, poverty alleviation and employment creation.

## **2.4 Food Security**

Food is one of the most basic human needs for mankind and it's therefore no surprise that all human beings strive to ensure access to sufficient, reliable and safe food for their survival. According to Garrett (2010), food security exists when all people, at all times, have physical and economic access too sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life. Food and Agriculture Organization (FAO, 2010) in its definition of food security highlights availability, accessibility of food at all times to all members of a household as the key factors in food security. FAO adds that food production in cities is in many cases a response of the urban poor to inadequate, unreliable and irregular accesses to food and the lack of purchasing



power. Strategies that increase access and availability of food in households are important in ensuring food security in households. Urban agriculture is now an important livelihood option in urban settings.

In his study Hagey (2010) looked at growing urban agriculture and found that in many low-income communities, the only places to buy food are fast-food and convenience stores that sell fatty, sugary, processed foods. Some communities have no food vendors of any kind. This lack of access to healthy foods makes it difficult for families to eat well, fueling the country's growing obesity epidemic and the severe health problems that accompany it. On the other hand, Mougeot (2010) noted that food self-reliance is not self-sufficiency, but it can go a long way towards reducing the food insecurity of vulnerable groups. He however highlighted that urban agricultural practices cannot be expected to satisfy the urban demand for staple crops like cereals and tubers, which can easily be stored and transported with limited losses from rural areas.

The contribution of urban agriculture to food security and nutrition is probably its most important asset. In his study Githungunyi (2014) found that some middle and upper income people prefer growing their own food for food safety reasons. Renewed interest in looking at alternative strategies for improving urban livelihoods, for income generation and for urban food security and nutrition among others has arisen with the increase in urban poverty, food insecurity and malnutrition now seen as shifting from rural to urban areas (Rees, 2013). Many urbanites have turned to urban agriculture as a livelihood strategy and source of income and in most countries complements rural agriculture and increases the efficiency of national food system.

Experiences gained from many cities of the world where urban agriculture is legalized and is better regulated indicate the beneficial effect of farming in cities towards the provision of better nutrition, poverty alleviation and employment creation (Mougeot, 2010). Urban conditions are conducive for intensive production of perishable foods (fruits, vegetables, fish, meat and dairy products), according to local ecological conditions and habitat. These foods, which are rich in essential nutrients, are consumed by urban dwellers. Some are consumed by the households involved in production, processing and distribution and therefore contribute directly to their food security. However, in order to improve household food security and nutrition, it is important that this food is safe and adequately selected, prepared and distributed within the family.

Urban agriculture, up to the present has offered households the means of survival while relying almost exclusively on underutilized urban land and under employed urban labour, while at the same time making contribution towards food self-reliance for Africa's cities. According to Freeman (2011), urban farmers produce substantial amounts of food for urban consumers. In the late 90s it was estimated about 800 million urban dwellers were actively engaged in urban agriculture in one way or another.

## **2.5 Income Factor**

The practice of urban agriculture especially among the low income households is largely an economic adaptation either to supplement the low income earnings by either reducing the burden of food stuff purchase or providing an extra source of income through the sale of the UA products. Economic conditions in urban agriculture refer to the urban labour market and the shortage of adequate and accessible income opportunities and an unsatisfied demand for agricultural products in quantity and quality. A number of studies

carried out by various organizations such as the World Bank and IMF in the recent past show that unemployment and underemployment are characteristics of urban economies, and that the populations which are growing most in urban areas are those which cannot access the formal labour market. Furthermore, amenities and infrastructure of most cities in developing countries cannot meet the increased demands for services. This has led to increased crowding and a deteriorating urban environment evident in the mushrooming and expansion of slum dwellings in Nairobi County.

Income levels play an important role in determining the extent to which UA can be enhanced to facilitate better productivity. The availability of inputs, access to formal or informal credit and urban extension services are important aspects in support of urban agriculture (Murphy, 2009). Households with better income levels are more likely to have better access to sufficient land (especially house backyards) and water to carry out UA. The quality of water and land not only refers to the general suitability for urban agricultural use (usability), but also to the influence infrastructure can have on the value of production plots (e.g. availability of tap water, fenced and therefore secure plots, and drainage would translate to better UA practices). At the same time households with good economic conditions will be in a much better position to adopt advanced technologies such as modern irrigation systems and hydroponic technology to improve their urban farms productivity.

Large family sizes are a common characteristic of households practicing UA. Foeken and Mboganie (1998) found that urban farmer households were quite large compared with the average size of a Nairobi household. This they realized could in a way confirm the hypothesis stated by Dennery (1995) saying that "the more mouths to feed, the more time

is devoted to food production". Large family sizes may be an indicator of the poor economic conditions of some households (which may result from inability to afford use of family planning) and UA acts as a means to supplement the low income by providing food to feed the many members (lessening the food item budget) as well as acting as a source of that important income to the households through sale of the surplus.

According to Murphy (2009), the economic importance of urban agriculture is as great as the nutritional and environmental benefits. Food is the largest single element of the urban economy in the majority of towns and cities in the developing world, and one of the top three elements in high-income countries. Adding to the economic base of a city with agricultural production and processing provides it with a solid foundation. For instance it is estimated that crops worth over US\$ 3.2 million are produced each year from irrigated urban agriculture in the city of Rosario, Argentina (Ayaga, 2013). Urban farming is a competitive economic activity and the industry of choice for millions of urban entrepreneurs the world over. It provides income-generating opportunities for people with low skills and little capital, as well as for people with limited mobility, including women with children and the elderly. Urban agriculture often exploits unused resources in the city wastewater, solid waste, vacant lots, bodies of water, and rooftops. It puts idle land to productive use, either by paying competitive rent or through usufruct use, and maintains the land in good condition for the owner. For countries with foreign exchange problems, urban agriculture can be an import-substituting industry that should be encouraged and supported.

## 2.6 Gender Factor

Gender factor falls under the social-cultural factors also referred to as socio-cultural factors which are the larger scale forces within cultures and societies that affect the thoughts, feelings and behaviors. They represent the belief and value systems, attitudes, norms and acculturation levels. They can be quite wide in scope, but some of the most notable ones that influence the performance of urban agriculture includes; gender, family size, religion, ethnicity, education, and governance/politics. Each one of these areas are wide and can form a basis for study as an independent social cultural factor; thus the reason for the focus on gender for this study and its role in influencing performance of Urban agriculture.

Urban farming is an important means for the integration of disadvantaged people or social groups (for instance, immigrants, indigent or left women, unemployed, elders, disabled, etc.) since it promotes and ease their participation in the social texture and provides them with better living conditions (Novo and Murphy 2000). Urban agriculture favors social improvement since the poor spend up to 85 % of their income in food purchase and most urban farmers belong to poorest populations: sociologically urban farming favors both social inclusion and reduction of gender inequalities ((Francesco et al 2013).

Worldwide, it is estimated that about 65 % of urban farmers are women (van Veenhuizen 2006). The majority of the urban farmers in Nairobi are women and this is not unique for Nairobi only, but reflects a general pattern throughout Sub-Sahara Africa (Foeken and Mboganie 1998). Particularly among the low-income farmers, the percentage of female-headed households is relatively high. Hasna (1998) reported that Ghanaians, “assert

categorically that women do not own land either in their marital or natal ancestral home” and implied that women are not able to cultivate as much as men because they do not own the land. His study revealed that a slightly different situation prevailed with respect to urban open-space farming whereby even though some communities disallow women from owning land, especially communal lands in peri-urban and rural areas, this has little or no effect on access to land for farming in the open spaces within the cities. Most of the lands being cultivated in the urban areas belong to the government or local authorities and access to these lands is not based on gender differences. This may imply that the urban situation somehow rules out culture and traditions or lessens their importance in regard to land access. One other interesting finding by Hasna was that in many cases, women use their land primarily for subsistence crops to feed their families while men cultivate cash crops for income.

## **2.7 Theoretical Framework**

This section examines the various theories used to inform the study on factors influencing urban agriculture performance in Mathare slums in Nairobi City County. The study is guided by the Innovation-Diffusion Theory and Sustainable Livelihood theory

### **2.7.1 Innovation-Diffusion Theory**

Innovation-Diffusion theory was developed by Everett Rogers, a professor of communication. It's composed of four basic theoretical approaches with each focusing on a different element of the innovation process. They are then combined to create meta-theory of diffusion consisting of four components: the innovation decision process, the

perceived attributes of the technology and the rate of adoption and individual innovativeness (Rogers, 1995).

The innovation decision process is characterized by five stages: knowledge, persuasion, decision, implementation and confirmation. In the knowledge stage, the individual, household or institution (in our case this can be the national/county government policy makers) gets knowledge of the innovation's existence and functionality. Knowledge about an innovation does not necessarily translate to an adoption of the same and therefore individuals may need to be persuaded. The outcome of the persuasion stage is either adoption or rejection of the innovation. The implementation stage results when an individual adopts and puts an innovation into use. The final stage is confirmation during which the individual seeks reinforcement for the decision made.

The works of Rogers (1995) identified five attributes upon which an innovation is rated. These attributes are; relative advantage, compatibility, complexity, triability and observability. Relative advantage is often expressed in terms of economic, socio-cultural or other benefits and it refers to the degree to which an innovation is perceived to be better than the practice its replacing. On the other hand compatibility refers to the degree to which an innovation is perceived by potential adopters to be consistent with their existing values, norms and practices. An innovation that is compatible with what is already in place ensures that the new practice gains trust easily and thus becomes easier to adopt. Complexity refers to the degree to which an innovation is considered as a difficulty to understand and use. If potential adopters perceive an innovation as complex, its adoption rate is low. Triability refers to the extent to which an innovation may be

subjected to limited experimentation. Finally, observability refers to the degree to which the results of an innovation are visible to others.

This theory posits that innovation spreads gradually over time and within a particular social system resulting in various adopter categories. Rogers (1995) attributes this distribution of adoption to the role played by availability of information, which reduces uncertainty in the diffusion process. He classified adopters into five categories: innovators, early adopters, early majority, late majority and laggards. Innovators are described as individuals who are adventurous and risk takers. Early adopters are described as the society opinion shapers who serve as role models. They are quick to see the value of an innovation. Early majority represent the largest category of adopters. This particular category only makes a decision when they are convinced of the benefits from an innovation. On the other hand late majority are the people who tend to be cautious and skeptical and will not adopt an innovation until the early majority has done so. They are usually relatively poor compared to other members of the society. Finally, the laggards group is suspicious of innovations and even change agents. They are usually poor and seldom take risks.

The innovation diffusion model has several limitations. One of the major shortcomings of the model is that it generally assumes that the most important variable is information and the willingness of the individual to change. An individual is characterized by his behavior without considering factors that influence his behavior. In reality many other factors are known to influence the adoption of an agricultural innovation. These include the farmer's objectives, the level of resource endowments of the individuals, access to resources, availability of support systems and the characteristics of the innovation. For example,



farmers in low income areas such as Mathare slum may be hindered from accessing certain urban farming innovations due to lack of land or monetary resources necessary to acquire the innovation. The theory also does not provide information on how to assess innovation characteristics of urban agriculture especially in developing countries. Furthermore, this theory has been criticized for its lack of specificity, Gagnon, (2010).

### **2.7.2 Sustainable Livelihoods Theory**

Sustainable Livelihoods (SL) theory also referred in some studies as the Sustainable livelihoods framework is attributed to the work of Robert Chambers in the mid-'80s in a 1987 paper presented to The Institute of Development Studies (IDS). The SL framework is a tool for development work, by highlighting how to understand, analyse and describe the main factors that affect the livelihoods of the poor people. According to this framework, a livelihood comprises people, their capabilities and their means of living, including food, income and assets –both tangible and intangible assets. Tangible assets include resources and stores while intangible assets include such aspects as claims and access. A livelihood is considered to be environmentally sustainable when it maintains or enhances the local and global assets on which livelihoods depend, and has net beneficial effects on other livelihoods. A livelihood is socially sustainable which can cope with and recover from stress and shocks, and provide for future generations (Chambers & Conway 1991). A livelihood strategy refers to the range and combination of activities and choices that people make/undertake in order to achieve their livelihood goals including productive activities, investment strategies, reproductive choices etc. (DIFD, 1999). The SL approach owes its roots and development to research institutions (e.g. Institute of

Development Studies), NGOs (CARE, OXFAM), and donors (DFID, UNDP) (Ashley & Carney, 1999: 5).

Carney explains the assumption behind the framework: that people pursue a range of livelihood outcomes (food supply, health, income, reduced vulnerability etc.) by drawing on a range of assets to pursue a variety of activities. Their priorities, preferences and influences of different vulnerability, including shocks (such as unemployment), overall trends and structures (such as the roles of government) and processes (such as institutional, policy and cultural factors) determine the livelihood options they pursue. The combined factors determine access to assets and livelihood opportunities as well as the way in which they can be converted into important outcomes (Carney et al., 1999: 3).

Krantz (2001) has highlighted some Strengths and weaknesses of the SL approach. By drawing attention to the multiplicity of assets that people make use of when constructing their livelihoods, the SL Approach produces a more holistic view on what resources, or combination of resources, are important to the poor, including not only physical and natural resources, but also their social and human capital. The approach also facilitates an understanding of the underlying causes of poverty by focusing on the variety of factors, at different levels, that directly or indirectly determine or constrain poor people's access to resources/assets of different kinds, and thus their livelihoods. It also provides a more realistic framework for assessing the direct and indirect effects on people's living conditions than, for example, one dimensional productivity or income criteria.

The sustainable livelihood theory has been criticized for failing to deal with the issue of how to identify the poor that need assistance. Also the basic idea of the SL approach is to start with a broad and open-ended analysis, but this strategy requires a highly flexible

planning situation which rarely exists. The best hope is to ensure that already identified/decided sectors of development initiatives fit with people's livelihood strategies and make them better at responding to the constraints and opportunities affecting the poor. Finally, the SL approach, if applied consistently, might be beyond the practical realities of many local development administrations, with the risk that this approach remains an initiative of donors and their consultants. One measure to counteract this would be to ensure that counterpart staff are involved from the beginning when discussing how and if such a strategy should be applied, and to train them to use the approach, and/or start with a simplified version of the approach.

### **2.7.3 Synthesis of the two Theories**

The theories of Innovation-Diffusion and Sustainable Livelihoods complement each other in highlighting the Factors that influence the performance of urban agriculture. The Innovation-Diffusion theory is relevant to the study because it explains the steps and process of adoption and diffusion of an innovation in urban agriculture. In the innovation decision process at the knowledge stage the urban farmer get the opportunity to learn of the existence of an innovation in urban farming and depending on various factors, such as availability of resources, makes decision to adopt it to enhance production. For the policy makers and other stakeholders, such as government and donors, understanding how to persuade the late adopters and laggards' category is important to ensure they equally benefit from any invention in urban agriculture as their early adopters counterparts. Sustainable Livelihoods theory on the other hand plays an important role in ensuring that any innovation brought forward is sustainable to the environment and takes cognizance of the various factors at play to the intended urban farmers beneficiaries such as ; their

priorities, preferences , overall trends and cultural factors which may determine the overall livelihood options they pursue. This is the compatibility attribute of an innovation. SL approach is also important in highlighting the issues of access and rights to resources to the urban agriculture participants in relation to the use of innovations in their practice.

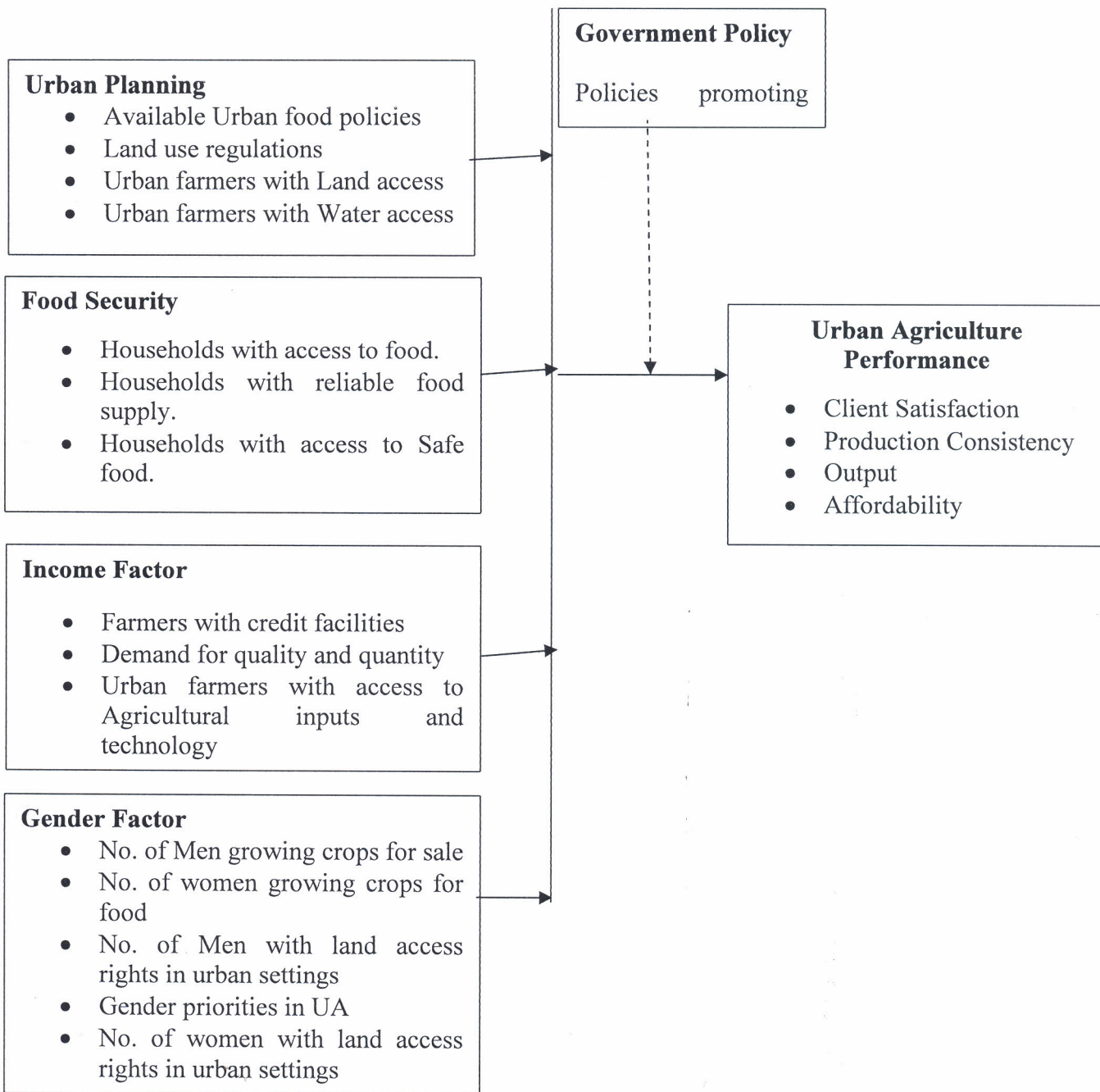
## **2.8 Conceptual Frame Work**

The conceptual framework is a diagrammatical presentation of variables in the study. The framework illustrates the interrelationship between dependent and independent variables. The independent variables for the study are urban planning, food security, income factor and gender factor while the dependent variable is the urban agriculture performance. Government policy is the moderating variable.

**Independent Variable**

**Moderating Variable**

**Dependent Variable**



**Figure 1: Conceptual Framework of Factors influencing urban agriculture performance in Nairobi City County.**

## 2.9 Research Gap

**Table 2.1: Research Gap**

Variable	Author and Year	Findings	Knowledge gap
Urban Planning	Freeman (2011) Ng'ang'a, (2008) (Mbiba, 2010).	The regulations regarding crop cultivation, however, are still forbidding save for agricultural land that came to be located within the recently urban boundaries after their expansions. Urban agriculture in Kenya is ought to be improved and integrated into formal city planning	The study only concentrated on urban planning. The study should have incorporated other factors influencing urban agriculture performance such as income, gender and food security as covered by this study.
Food Security	(Rees, 2013)  Garrett (2010)	Urban agriculture contributes to food security and nutrition improving urban livelihoods food security exists when all people, at all times, have physical and economic access too sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life	This study narrowed down to looking into food security and nutrition and therefore failed to cover the other factors that play a role in influencing urban agriculture performance.
Income Factors	(Ayaga, 2013).  Freeman (2011)	For countries with minimum wage problems, urban agriculture can be an import-substituting industry. The income factors of urban agriculture are as great as the nutritional and environmental benefits  Urban agriculture provides income-generating opportunities for people with low skills and little capital, as	There is need to investigate the income factors influencing urban agriculture performance, however these studies should have expanded to look into other factors that are important in urban agriculture performance.

		well as for people with limited mobility, including women with children and the elderly	
Gender Factor	(van Veenhuizen 2006). Pascal and Mwende (2009) (Rees, 2013).	The majority of the urban farmers are and reflects a general pattern throughout Sub-Sahara Africa The study revealed that a slightly different situation prevailed with respect to urban open-space farming whereby even though some communities disallow women from owning land	The study only looked at role of urban agriculture in employment creation. Study needs to be done to incorporate gender factor of urban agriculture performance

### 2.9.1 Summary of Literature Review

In summary, Urban Agriculture is emerging strongly in Sub-Saharan Africa, where the fastest urban growth will occur in countries least equipped to feed their cities. Freeman (2011), noted that currently there are no urban planning policies that specifically address the issue of urban agriculture as means for food security yet new concepts continue to dominate the field of urban planning. Petra (2011), on the other hand, found that urban development coupled with scarcity of resources often accelerates environmental degradation, leading to loss of quality of urban living conditions, especially for the urban poor. On the other hand, Nyambura (2010), found that the trend of urban agriculture in Nairobi showed it was on the decline due to competition of land by other land uses particularly urban development. Similarly, Garrett (2010), noted that food security exists when all people, at all times, have physical and economic access too sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life.

## CHAPTER THREE

### RESEARCH METHODOLOGY

#### 3.1 Introduction

This chapter detailed the overall methodology that was used in the study. This included the research design, population of the study, sampling procedures, data collection methods, research procedures, method of data analysis and ethical considerations.

#### 3.2 Research Design

Research design forms the blue-print or maps that details how the research is going to collect information that is relevant to addressing the research questions. It is a general blue-print for the collection, measurement and analysis of data, with the central goal of solving the research problem. It includes the outline of what the research will do, from writing the hypothesis and its operational application to final analysis of data

The study employed a descriptive survey research design. A descriptive survey (Mugenda & Mugenda, 2003) enables the researcher to describe the characteristics of the variables of interest due to its suitability in data collection to answer the research questions. This study was about factors influencing urban agriculture performance in Nairobi City County. It therefore justified that descriptive design was most suited and justifiably adopted in this study. Surveys are useful in describing the characteristics of a large population. Additionally, high reliability is easy to obtain by presenting all subjects with a standardized stimulus which ensures that observer subjectivity is greatly eliminated.



### **3.3 Target Population**

A study population can be defined as the entire collection of cases or units about which the researcher wishes to draw conclusions. One of the major steps in formulating a research design is to define the population according to the objectives of the study. According to Nairobi Planning Innovations (2015), there are over 5000 household's heads from Mathare slums Nairobi County in Kenya who engage in urban agriculture. This study focused on a population of 5000 urban agriculture farmers who also represent the households they head from Mathare slums Nairobi County in Kenya who engage in urban agriculture for both consumption and/or commercial purposes.

### **3.4 Sample Size and Sampling Procedures**

This section details the systematic selection of the population

#### **3.4.1 Sample Size**

A sample size is finite part of a statistical population whose properties are studied to gain information about the whole. Orodho (2003), defined sampling as selecting a given number of subjects from a defined population as representative of that population. The sample size will be determined by using Krejcie and Morgan's method of determination of a sample size for a given population size. The target population has 5000 households (Nairobi Planning Innovations, 2015), therefore by use of Krejcie and Morgan's method of determination of a sample size the eventual sample size obtained was composed of 357 respondents.

### **3.4.2 Sampling Procedure**

A sample design is the architecture or the strategy used to select study participants or respondents (Creswell & Clark, 2007). Sampling refers to the systematic selection of a limited number of elements out of a theoretically specified population of elements. The basis is to draw conclusions about the entire population using the sample drawn.

The sample size was determined by using Krejcie and Morgan's method of determination of a sample size for a given population size. The target population has 5000 households (Nairobi Planning Innovations, 2015), therefore by use of Krejcie and Morgan's method of determination of a sample size the eventual sample size obtained will be composed of 357 respondents as indicated in appendix II

### **3.5 Research Instruments**

Primary data was collected by means of a semi-structured questionnaire. The questionnaires were self-administered via drop and pick later method to the respective households. The questionnaire allowed greater uniformity in the way questions were asked, ensuring greater compatibility in the responses. According to Cooper and Schindler (2006) the use of structured questions on the questionnaire allows for uniformity of responses to questions; while unstructured questions gave the respondent freedom of response which helped the researcher to gauge the feelings of the respondent, he or she used his or her own words. The structured questions were in form of a five-point Likert scale, whereby respondents were required to indicate their views on a scale of 1 to 5. The study also used observation as a data collection instrument.

### **3.5.1 Pilot Study**

A pilot test was conducted in order to test the validity of the questionnaire and it was carried out with the help of research assistants. The main reasons for the pilot study was to identify any potential deficiencies, omissions and errors in the questionnaire and eliminate them before it was used to collect the actual data (Kothari, 2004). The researcher intended to select a pilot group of 25 households from the target population to test the reliability of the research instrument. According to Cooper and Schindler (2003), the pre-test group can range from 25 to 100 subjects, but it does not need to be statistically selected. The respondents were conveniently selected since statistical conditions are not necessary for the pre-test, (Cooper & Schindler, 2003).

The pilot study allowed pre-testing of the research instrument. The clarity of the instrument items to the respondents was established so as to enhance the instrument's validity and reliability. The pilot study enabled the researcher to be familiar with the research and its administration procedure as well as identifying items that require modification. The result helped the researcher to correct inconsistencies arising from the instruments, which ensured that they measure what is intended.

### **3.5.2 Validity of Instruments**

Validity measures the accuracy of the research instruments, in this case, the questionnaire. According to Kothari (2004), validity determines whether the research truly measures that which it was intended to measure or how truthful the research results are. Researchers generally determine validity by asking a series of questions, and often look for the answers in the research of others.

The researcher used content validity to examine whether the instruments answered the research questionnaire. Adjustments and additions to the research instruments consultations and discussions with the supervisor were done to establish content validity. According to Denscombe (2008), content validity of an instrument is improved through expert judgment. Content validity refers to whether an instrument provides adequate coverage of a topic. Expert opinions help to establish content validity.

### **3.5.3 Reliability of Research Instruments**

Denscombe, (2008), defined reliability as a measure of the degree to which a research instrument yields consistent results or data after repeated trial. In order to improve the reliability of the instrument, an assessment of the consistency of the responses on the pilot questionnaires were made to make a judgement on their reliability.

For reliability, the researcher used internal consistency measure known as Cronbach's Alpha ( $\alpha$ ) which indicated the extent to which a set of measurement items could be treated as measuring a single latent variable. Reliability provided a measure of the internal consistency and homogeneity of the items comprising the scale. According to Kothari (2004), a Cronbach's Alpha ( $\alpha$ ) of 0.7 is considered adequate.

### **3.6 Data Collection Procedures**

Appointments were made with the households on appropriate days to carry out the interviews. The researcher attached a transmittal letter in each questionnaire. The researcher visited each household at different times and sought for permission to collect data as pertains the different ways discussed. The respondents were assured that strict

confidentiality would be maintained in dealing with the responses. The filled-in questionnaires were collected after one week.

### **3.7 Data Analysis Techniques**

Data analysis, according to Sekaran (2005), involves a number of closely related operations which are performed with the purpose of summarizing the collected data and organizing them in such a manner that they answer the research questions. The operations include editing, coding, classifying and tabulating. It also entails categorizing, ordering, manipulating and summarizing data, to find answers to the research questions.

The research yielded both qualitative and quantitative data. The qualitative data collected was analyzed through content analysis where a thematic framework was developed. The quantitative data generated was analyzed using descriptive statistics with the help of Statistical Package for Social Sciences (SPSS) version 20. The findings were presented using tables, frequencies and percentages.

### **3.8 Ethical Considerations**

According to Orodho and Kombo (2003), ethical considerations represent a moral stance that involves conducting research to achieve not just high professional standards of technical procedures, but also respect and protection for the people actively consenting to be studied. Professional ethical standards should be noted during all phases of the research process.

Throughout this study the researcher strived to adhere to ethical research considerations and professional guidelines. This involved avoiding acts of misconduct in research, such as data fabrication, falsification and plagiarism. Permission to conduct the study was

obtained from the relevant authorities before commencement of data collection. During data collection the researcher explained the aim and significance of the study to the respondents, and consent for participating in the interviews and focus group discussions was sought from them. The researcher ensured that the information collected was treated with due confidentiality and was used purely for research work.

### **3.9 Operationalization of Variables**

This section analysed the operational definition of variables of factors influencing urban agriculture in rapidly changing environment in Nairobi County. The operation of the variables is shown below.

**Table 3.1: Operationalization of Variables**

<b>Objectives</b>	<b>Variables</b>	<b>Indicators</b>	<b>Measurement</b>	<b>Measurement scale</b>	<b>Type of Analysis</b>	<b>Tool of Analysis</b>
To establish the influence of government policy on urban agriculture performance in Nairobi-Mathare sub-county.	Government Policy-Moderating variable	Policies promoting AU	Number of policies promoting AU	Nominal	Content analysis	Spss
		Public health policy	effectiveness of Health status outcome	Ordinal	Descriptive	Spss
		The crops act	Level of Crop yields	Ordinal	Descriptive	Spss
To establish the influence of urban planning on urban agriculture performance in Nairobi-	Urban Planning-Independent variable	Available Urban food policies	Number of policies	Interval	Content analysis	Spss
		Land use regulation	Number of regulations	Ordinal	Descriptive	Spss

Mathare Sub-county.		Urban farmers with Land access	Number of farmers with land access	Interval	Content analysis	Spss
To determine the influence of food security on urban agriculture performance in Nairobi-Mathare sub-county.	food security-Independent variable	Households with access to food	Number of households with access to food	Nominal	Descriptive	Spss
		Households with access to food	Number of households with access to food	Nominal	Descriptive	Spss
		Households with reliable food supply.	Number of households with reliable food supply.	Interval	Descriptive	Spss
To determine the influence of the income factor on urban agriculture performance in Nairobi-	Income factors-Independent variable	Farmers with credit facilities	Level of resource mobilization	Nominal	Descriptive	Spss
		Demand for quality and quantity	Level of produce	Nominal	Content analysis	Spss



Mathare sub-county.		Urban farmers with substantial income	Number of farmers with substantial income	Nominal	Descriptive	Spss
To determine how gender factor, determine urban agriculture performance in Nairobi-Mathare sub-county.	Gender factors- Independent variable	No. of women growing crops for food	Number of women	Interval	Content analysis	Spss
		Genders engaging in UA	Male to female ratio engaging in UA	Interval	Content analysis	Spss
		Male and female engaging in UA	Number of Male and female	Interval	Descriptive	Spss
urban agriculture performance	urban agriculture performance- Dependent variable	No of households practicing UA	No of households	interval	descriptive	Spss
		Volume of products from UA	Quantity of products	interval	Descriptive	Spss

## CHAPTER FOUR

### DATA ANALYSIS, PRESENTATION, INTERPRETATIONS AND DISCUSSIONS

#### 4.1 Introduction

This chapter discusses the interpretation and presentation of the findings obtained from the field. The chapter presents response rate, background information, Descriptive analysis, and inferential statistics that have been used to discuss the findings of the study.

##### 4.1.1 Response Rate

The study targeted a sample size of 357 respondents from which 320 responded which constituted 89.6%. This response rate was satisfactory to make conclusions for the study. The response rate was representative. According to Mugenda and Mugenda (2003), a response rate of 50% is adequate for analysis and reporting; a rate of 60% is good and a response rate of 70% and over is excellent. Based on the assertion, the response rate was considered to excellent.

**Table 4.1: Questionnaire Return Rate**

	<b>Questionnaires Administered</b>	<b>Questionnaires filled &amp; Returned</b>	<b>Percentage</b>
Respondents	357	320	89.6

#### 4.2 Demographic Characteristics of the Respondents

The study sought to establish the demographic data of the respondents: which included; gender, level of education and period of the respondent have been involved in urban agriculture.

### 4.2.1 Gender Distribution

The study sought to establish the gender distribution of the respondents in the sample households

**Table 4.2: Gender of the respondents**

<b>Gender</b>	<b>Frequency</b>	<b>Percentage</b>
Male	206	64.4
Female	114	35.6
<b>Total</b>	<b>320</b>	<b>100</b>

Table 4.4 shows that majority of the respondents were male as shown by 64.4% while 35.6% were female. This is an indication that both genders were equitably engaged in this research and therefore the findings of this research did not suffer from gender biasness.

The study sought to establish the education level of the respondents in the companies.

### 4.2.2 Age Distribution

The study sought to establish the age bracket of the respondents in the households.

**Table 4.3: Age Bracket**

<b>Age Bracket</b>	<b>Frequency</b>	<b>Percentage</b>
Below 18 years	16	5.00
19-30 years	40	12.5
31-40 years	98	30.62
41-50 years	75	23.44
51-60 years	37	11.56
61-70 years	22	6.87
Above 70 years	32	10
<b>Total</b>	<b>320</b>	<b>100</b>

The study sought to determine the respondent's age bracket, from the research findings, the study established that most of the respondents as shown by 30.62% were aged between 31 and 40 years, 23.44% were aged between 41 and 50, 12.5% of the respondents aged between 19 and 30, 11.56% aged between 51 and 60, 6.87% aged between 61 and 70, 10% aged above 70 years whereas 5% of the respondents were aged below 18 years. This implies that majority of the respondents' are middle aged and therefore they were in a position to respond to the research question with ease.

#### **4.2.3 Education Level**

The study sought to establish the education level of the respondents in the sample households

**Table 4.4: Level of Education**

<b>Education level</b>	<b>Frequency</b>	<b>Percentage</b>
Certificate	127	39.7
Diploma	111	34.7
Undergraduate	76	23.7
Masters	6	1.9
Total	320	100

The study sought to determine the respondent's highest level of education attained, from the research findings, the study established that most of the respondents as shown by 39.7% had attained certificates, 34.7% had college diploma certificates, 23.7% of the respondents indicated to have attained undergraduate, whereas 1.9% of the respondents indicated to have attained masters level. This implies that majority of the respondents

were literate and therefore they were in a position to respond to the research question with ease.

#### 4.2.4 Period engaged in Urban Agriculture

The study sought to establish the period which the respondents had practiced urban agriculture.

**Table 4.5: Period which the Respondents had engaged in urban agriculture**

<b>Education level</b>	<b>Frequency</b>	<b>Percentage</b>
Less than 3 years	51	15.9
3 to 5 years	64	20.0
5 to 7 years	98	30.6
Over 7 years	107	33.4
Total	320	100

Respondents were requested to indicate the period which they had engaged themselves in urban agriculture. From the research findings, the study revealed that most of the respondents as shown by 33.4% had engaged themselves in urban agriculture for more than 7 years, 30.6% of the respondents had engaged themselves in urban agriculture for a period of 5 to 7 years, 20% of the respondents had engaged themselves in urban agriculture for a period between 3 to 5 years whereas 15.9% of the respondents had engaged themselves in urban agriculture for not more than 3 years. This is an indication that significant number of the participants had engaged themselves in urban agriculture for a considerable period of time and therefore they were in a position to give credible information relating to this research.

#### 4.2.5 Purpose for agriculture

The study sought to establish which classification of urban agriculture was practiced by the respondents.

**Table 4.6: Type of Agriculture**

<b>Agriculture</b>	<b>Frequency</b>	<b>Percentage</b>
Subsistence	289	90.31
Commercial purposes	10	3.12
Both subsistence and commercial purposes	31	6.57
<b>Total</b>	<b>320</b>	<b>100</b>

Respondents were requested to indicate which type of urban agriculture in which they practiced. From the research findings, the study revealed that most of the respondents as shown by 90.31% had engaged themselves in subsistence urban agriculture, 6.57% of the respondents had engaged themselves in urban agriculture for both commercial and subsistence purposes whereas 3.12% of the respondents had engaged themselves in urban agriculture for commercial purposes. This is an indication that significant number of the participants had engaged themselves in urban agriculture for subsistence purposes and therefore they were in a position to give credible information relating to this research.

#### 4.3 The influence of Urban Planning on Urban Agriculture Performance in Mathare Sub County

Respondents were asked to indicate the influence of urban planning on urban agriculture performance in Mathare Sub County. Findings are shown in table 4.7.

**Table 4.7: Urban Planning**

<b>Urban Planning</b>	<b>Strongly disagree</b>	<b>Disagree</b>	<b>Moderately Agree</b>	<b>Agree</b>	<b>Strongly Agree</b>	<b>Mean</b>	<b>Std Deviation</b>
There are available urban food production policies in Mathare Sub-County	129	101	57	21	12	2.01	0.15
Land use regulations in Mathare Sub-County are in place	165	95	49	6	5	1.72	0.21
Every urban farmer in Mathare Sub-County has land access	108	139	41	15	17	2.04	0.17
Urban farmers in Mathare Sub-County have access to clean water	111	145	36	16	12	1.97	0.18
In Mathare Sub-County there are legislations and policies encouraging or inhibiting urban agriculture	91	200	17	3	9	1.87	0.26

The study sought to determine the extent to which urban planning influence urban agriculture performance in Mathare Sub County, from the research findings, majority of the respondents strongly disagreed that land use regulations in Mathare Sub-County are in place as shown by a mean of 1.72, In Mathare Sub-County there are legislations and policies encouraging or inhibiting urban agriculture as shown by a mean of 1.87, urban farmers in Mathare Sub-County have access to clean water as shown by a mean of 1.97. Others disagreed that there are available urban food production policies in Mathare Sub-County as shown by a mean of 2.01, and every urban farmer in Mathare Sub-County has land access as shown by a mean of 2.04. The above findings are in line with Ng'ang'a

(2008), who stated that urban agriculture in Kenya ought to be improved and integrated into formal city planning. This can be done at individual level, city level and at the level of central government with the Nairobi City Council (now Nairobi county government) drawing up an urban food policy for Nairobi and updating its physical development plan.

#### 4.4 The influence of Food Security on Urban Agriculture Performance in Mathare Sub County

Respondents were asked to indicate the influence of food security on urban agricultural performance in Mathare Sub County. Findings are shown in table 4.8

**Table 4.8: Food Security**

<b>Food Security</b>	<b>Strongly disagree</b>	<b>Disagree</b>	<b>Moderately Agree</b>	<b>Agree</b>	<b>Strongly Agree</b>	<b>Mean</b>	<b>Std Deviation</b>
In Mathare Sub-County households easily access food	200	87	17	7	9	1.55	0.25
Mathare Sub-County households have reliable food supply	72	194	36	9	9	2.02	0.24
Mathare Sub-County households have access to Safe foods	101	200	11	5	2	1.76	0.27
Mathare Sub-County households have access to Sufficient and nutritious foods supply	132	129	26	15	18	1.93	0.19
The food production in Mathare Sub-County is good	250	69	1	0	0	1.22	0.33



The study sought to establish the extent to which respondents agreed with the above statements relating to effects of food security on urban agriculture performance, from the research findings, majority of the respondents strongly disagreed that the food production in Mathare Sub-County is good as shown by a mean of 1.22, in Mathare Sub-County households easily access food as shown by a mean of 1.55, Mathare Sub-County households have access to safe foods as shown by a mean of 1.76, Mathare Sub-County households have access to sufficient and nutritious foods supply as shown by a mean of 1.93. Others disagreed that Mathare Sub-County households have reliable food supply as shown by a mean of 2.02. The above findings concur with findings by Kutiwa *et al.* (2010) who stated that urban agriculture is one way to escape the food insecurity and poverty cycle in a cash intensive environment. Mougeot (2010) also noted that food self-reliance is not self-sufficiency, but it can go a long way towards reducing the food insecurity of vulnerable groups.

#### **4.5 The influence of Income Factor on Urban Agriculture Performance in Mathare Sub County**

Respondents were asked to indicate how their income factor influences urban agricultural performance in Mathare Sub County. Findings are shown in table 4.9

**Table 4.9: Income Factor**

<b>Income Factor</b>	<b>Strongly disagree</b>	<b>Disagree</b>	<b>Moderately Agree</b>	<b>Agree</b>	<b>Strongly Agree</b>	<b>Mean</b>	<b>Std Deviation</b>
Accessible income opportunities and an unsatisfied demand for agricultural products in quantity and quality pose as a major challenge in urban agriculture	27	52	55	87	99	3.55	0.09
The availability of inputs, access to formal or informal credit, urban extension services are important aspects in support to urban agriculture	9	10	85	96	120	3.96	0.16
The quality of water and land refers to the general suitability for urban agricultural land use	2	5	67	89	157	4.23	0.20
Urban agriculture can benefit if it is incorporated in urban nutrient recycling (organic waste management in cities).	10	24	81	101	104	3.82	0.13
The economic importance of urban agriculture is as great as the nutritional and environmental benefits	5	15	64	117	119	4.03	0.16
Urban farming is a competitive economic activity and the industry of choice for many of urban entrepreneurs	12	29	55	95	129	3.93	0.14

The study sought to determine the extent to which income factor influence urban agriculture performance. From the research findings, majority of the respondents agreed that the quality of water and land refers to the general suitability for urban agricultural land use as shown by a mean of 4.23, the economic importance of urban agriculture is as great as the nutritional and environmental benefits as shown by a mean of 4.03, the availability of inputs, access to formal or informal credit urban extension services are important aspects in support to urban agriculture as shown by a mean of 3.96, urban farming is a competitive economic activity and the industry of choice for many of urban entrepreneurs as shown by a mean of 3.93. Others agreed that urban agriculture can benefit if it is incorporated in urban nutrient recycling (organic waste management in cities) as shown by a mean of 3.82, accessible income opportunities and an unsatisfied demand for agricultural products in quantity and quality pose as a major challenge in urban agriculture as shown by a mean of 3.55. These findings are in line with Murphy (2009) who indicated that income levels play an important role in determining the extent to which UA can be enhanced to facilitate better productivity. The availability of inputs, access to formal or informal credit and urban extension services are important aspects in support of urban agriculture.

#### **4.6 The influence of Gender Factor on Urban Agriculture Performance in Mathare Sub County**

Respondents were asked to indicate how gender factor affects urban agricultural performance in Mathare Sub County. Findings are shown in table 4.10

**Table 4.10: Gender Factor**

<b>Gender Factor</b>	<b>Strongly disagree</b>	<b>Disagree</b>	<b>Moderately Agree</b>	<b>Agree</b>	<b>Strongly Agree</b>	<b>Mean</b>	<b>Std Deviation</b>
More women practice urban agriculture to produce food for the family than for sale as compared to men in Mathare sub county	7	12	35	140	126	4.14	0.20
Women have equal access rights to urban farm space as men in Mathare sub county	1	10	19	98	192	4.46	0.25
Women have equal access to farm inputs as men in Mathare sub county	0	0	1	18	301	4.93	0.41
In Mathare sub county the percentage of female-headed households is relatively high	4	2	18	97	199	4.51	0.26
More men practice urban agriculture than women in Mathare sub county	59	83	31	65	82	3.78	0.23

The study sought to determine the extent to which gender factor influence urban agriculture performance in Mathare Sub County. From the research findings, majority of the respondents strongly agreed that women have equal access to farm inputs as men in Mathare Sub County as shown by a mean of 4.93, In Mathare Sub County the percentage of female-headed households is relatively high as shown by a mean of 4.51. Others agreed that women have equal access rights to urban farm space as men in Mathare Sub County as shown by a mean of 4.46, and more women practice urban agriculture to produce food for the family than for sale as compared to men in Mathare Sub County as shown by a mean of 4.14. From the findings a small number of respondents agreed that

men practice urban agriculture than women in Mathare Sub County by a mean of 3.78. These findings concur with Hasna (2011) who asserted that women use their land primarily for subsistence crops to feed their families while men cultivate cash crops for income. Particularly among the low-income farmers, the percentage of female-headed households is relatively high.

The findings also indicated that gender has other effects on urban farming namely; providing food security in the homes, promoting good diet, and minimizing idleness. The study highlighted the importance of food security to majority number of people in urban areas. Women participating in urban agriculture for domestic use ensure food security in the homes as well as a good diet for the family. Both men and women in Mathare participate in urban agriculture, hence reducing the rate of idleness. The findings were consistent with the results obtained by Novo and Murphy, (2000) that concluded that urban agriculture improves the lives of people.

#### **4.7 Factors affecting Urban Agriculture Performance in Mathare Sub County**

Respondents were asked to indicate factors affecting urban agriculture performance in Mathare Sub County. Findings are shown in table 4.11

**Table 4.11: Urban Agriculture Performance**

<b>Urban Performance</b>	<b>Agriculture</b>	<b>Strongly disagree</b>	<b>Disagree</b>	<b>Moderately Agree</b>	<b>Agree</b>	<b>Strongly Agree</b>	<b>Mean</b>	<b>Std Deviation</b>
There are many households practicing urban agriculture in Mathare sub county		96	85	10	59	70	2.75	0.10
Volume of products from urban agriculture in Mathare sub county are sustainable		100	53	19	50	98	2.97	0.10
Mathare sub county households rely on urban agriculture fully		100	77	11	90	42	2.67	0.11
In Mathare sub county a large percentage of households sell products for cash		92	61	48	64	55	2.77	0.05

The study sought to establish the extent to which respondents agreed with the above statements relating to urban agriculture performance. From the research findings, a fair number of the respondents disagreed that the volume of products from urban agriculture in Mathare sub county are sustainable as shown by a mean of 2.97, Mathare sub county has a large percentage of households that sell products for cash as shown by a mean of 2.77. Others disagreed that there are many households practicing urban agriculture in Mathare Sub County as shown by a mean of 2.75, and Mathare sub county households rely on urban agriculture fully as shown by a mean of 2.67.

According to urban harvest (2004), a third of Kenyan urban dwellers are involved in urban agriculture. More people are expected to turn to urban agriculture as a means to supplement food supplies and income levels. Lee-Smith (2010) asserts that household garden food production has the potential to shift both perceptions and practices about food, home and the urban environment as it provides direct access to fresh and nutritious food, within the household environment, that can be harvested, prepared and fed to family members, often on a daily basis. This can play a pivotal role in supplementing the dietary need of most households, cut expenses on food purchases and ensure people have access to fresh healthy food items.

#### **4.8 Urban Agriculture as a Reliable Venture**

The study sought to establish if urban agriculture was a reliable venture. Majority of the respondents agreed it was a reliable venture as it can supplement the inadequate, unreliable and irregular access to food supplies. They further stated that urban agriculture is thus an instrument geared towards tackling household food insecurity, increasing urban employment, and encouraging productive participation in local and urban development. However, they mentioned concerns on the success of the continued practice of urban agriculture in their area as there are no longer amenities to facilitate it such as land, clean water, farm inputs and modern farming technology.

## **CHAPTER FIVE**

### **SUMMARY OF FINDINGS CONCLUSION AND RECOMMENDATIONS**

#### **5.1 Introduction**

From the analysis and data collected, the following discussions, conclusion and recommendations were made. The responses were based on the objectives of the study. The study sought to establish the factors influencing urban agriculture performance in Mathare sub-county, Nairobi County, to establish how urban planning influence urban agriculture performance, how food security influence urban agriculture performance, establish how income factor influence urban agriculture performance and to explore how gender factor influence urban agriculture performance in Mathare sub-county, Nairobi County.

#### **5.2 Summary of the Findings**

This section presents the key findings as considered under each objective.

##### **5.2.1 Urban Planning**

From the findings the study established that no land use regulations in Mathare Sub-County are in place, and there are no legislations and policies encouraging or inhibiting urban agriculture. In addition, farmers in Mathare Sub-County have minimal access to water. Also, there are unavailable urban food production policies and not every urban farmer in Mathare Sub-County has land access. The findings are in line with Ng'ang'a (2008) who stated that urban agriculture in Kenya ought to be improved and integrated into formal city planning. This can be done at individual level, city level and at the level



of central government with the Nairobi City Council (now Nairobi county government) drawing up an urban food policy for Nairobi and updating its physical development plan.

### **5.2.2 Food Security**

On food security, it was found that the food production in Mathare Sub-County is not good; households have no access to food and also they have no access to safe foods. It was also found that Mathare Sub-County households have no access to sufficient and nutritious foods supply and households have unreliable food supply. The above findings concur with findings by Kutiwa *et al.* (2010) who stated that urban agriculture is one way to escape the food insecurity and poverty cycle in a cash intensive environment. Mougeot (2010) also noted that food self-reliance is not self-sufficiency, but it can go a long way towards reducing the food insecurity of vulnerable groups.

### **5.2.3 Income Factor**

On income factor, the study revealed that the quality of water and land refers to the general suitability for urban agricultural use; the economic importance of urban agriculture is as great as the nutritional and environmental benefits. The availability of inputs, access to formal or informal credit urban extension services are important aspects in support urban agriculture, urban farming is a competitive economic activity and the industry of choice for many of urban entrepreneurs. The study also established that urban agriculture can benefit if it is incorporated in urban nutrient recycling (organic waste management in cities), and accessible income opportunities and an unsatisfied demand for agricultural products in quantity and quality pose as a major challenge in urban agriculture. These findings are in line with Murphy (2009) who indicated that income

levels play an important role in determining the extent to which UA can be enhanced to facilitate better productivity. The availability of inputs, access to formal or informal credit and urban extension services are important aspects in support of urban agriculture.

#### **5.2.4 Gender Factor**

Relating to gender factor, it was found that women have equal access to farm inputs as men; the percentage of female-headed households is relatively high. Women have equal access rights to urban farm space as men and more women practice urban agriculture to produce food for the family than for sale as compared to men. These findings concur with Hasna (2011) who asserted that women use their land primarily for subsistence crops to feed their families while men cultivate cash crops for income. Particularly among the low-income farmers, the percentage of female-headed households is relatively high. Other effects of gender on urban agriculture included reduction of idleness, promotion of food security and the practice of good dieting, which ultimately improves the lives of the people of Mathare. The findings were similar to the results of Novo and Murphy, (2000) that opined, urban agriculture improves the lives of people.

#### **5.2.5 Factors affecting Urban Agriculture Performance**

From the findings the study revealed that the volume of products from urban agriculture in Mathare Sub County are fairly sustainable, Mathare Sub County does not have large percentage of households that sell products for cash. There are fewer households practicing urban agriculture in Mathare Sub County, and some of Mathare sub county households rely on urban agriculture fully. According to urban harvest (2004), a third of Kenyan urban dwellers are involved in urban agriculture. More people are expected to

turn to urban agriculture as a means to supplement food supplies and income levels. Lee-Smith (2010) asserts that household garden food production has the potential to shift both perceptions and practices about food, home and the urban environment as it provides direct access to fresh and nutritious food, within the household environment, that can be harvested, prepared and fed to family members, often on a daily basis. This can play a pivotal role in supplementing the dietary need of most households, cut expenses on food purchases and ensure people have access to fresh healthy food items.

### **5.3 Conclusions**

From the analysis and summary, the study established that no land use regulations in Mathare Sub-County are in place, and legislations and policies encouraging or inhibiting urban agriculture are also lacking. In addition, farmers in Mathare Sub-County have minimal access to safe water that can be used in urban farming. Also, it was found that there are no available urban food production policies in place and not every urban farmer in Mathare Sub-County has access to land to carry out urban farming.

The study concludes that food production in Mathare Sub-County is not very good; most households generally have no access to food and also the foods available are not safe. From the study also it can be deduced that majority of Mathare Sub-County households have no access to a reliable, sufficient and nutritious foods supply.

The study further concludes that economic importance of urban agriculture is as great as the nutritional and environmental benefits. The availability of inputs, access to formal or informal credit urban extension services are important aspects in support of urban agriculture, urban farming is a competitive economic activity and the industry of choice

for many of urban entrepreneurs. The study also concludes that urban agriculture can benefit if it is incorporated in urban nutrient recycling (organic waste management in cities), and accessible income opportunities and an unsatisfied demand for agricultural products in quantity and quality pose as a major challenge in urban agriculture.

The study revealed that women have equal access to farm inputs as men; the percentage of female-headed households is relatively high. Women have equal access rights to urban farm space as men and more women practice urban agriculture to produce food for the family than for sale as compared to men. Therefore it can be concluded that women use their land primarily for subsistence crops to feed their families while men cultivate cash crops for income.

From the findings it can be concluded that the volume of products from urban agriculture in Mathare Sub County are fairly sustainable, Mathare Sub County does not have large percentage of households that sell products for cash. There are fewer households practicing urban agriculture, and some of the households rely on urban agriculture fully for their dietary needs and economic well-being.

#### **5.4 Recommendations**

Based on the study findings, the study recommends that; the government of Kenya should increase awareness of the potential and constraints inherent in urban agriculture not only in Nairobi but across other cities and towns as well. This is because urban agriculture is growing as populations increases in the urban settings and the cost of living become increasingly high to the majority especially in the informal settlement and low income earners.. A number of studies have shown that by 2030, almost half of Kenya's

population will live in the urban environments and it remains to be seen how urban agriculture will play out in highly populated settings already receiving massive infrastructure developments.

The government should be at the fore front in empowering urban dwellers to practice sustainable urban farming and reap the benefits of an urban green space. It should have a framework that will enable it to plan, implement and maintain the urban green space and create a method to balance the needs of those living in urban areas with the needs of the larger environmental concerns, thus sustainable livelihoods. Also, it should promote and encourage innovative and out of the box ways to practice urban agriculture such as hanging gardens, vertical gardens, stacked greenhouses, greenways and use of hydroponic agriculture as opposed to the conventional methods of farming which require larger space and resources such water which are increasingly becoming scarce with time.

The policy makers should start formulating and planning areas of intervention and support on the development of urban agriculture. It is important that they note that local production of food allows savings in transportation costs, storage, and in product loss, which results in food cost reduction. Local food production also improves the quality of the urban environment through greening and thus, results in the reduction of the cities carbon footprint and a reduction in ozone and particulate matter. It is worth noting that the Nairobi City County Urban Agriculture Promotion and Regulation Bill, 2014 (and the revised 2015 edition) has been drafted. It seeks to provide for the promotion of urban agriculture within the Nairobi City County; provide the necessary regulatory framework for the practice of urban agriculture in the county and to establish the Nairobi City county urban agriculture promotion advisory board. It should be in the interest of the government

concerned to ensure that the full mandate of this bill is realized through its full implementation.

### **5.5 Recommendation for Further Studies**

The study sought to establish the factors influencing urban agriculture performance in Mathare sub-county, Nairobi County. This study comprised of the households from Mathare sub-county in Nairobi County in Kenya who engage in urban agriculture, this made the research limited in the sense that the findings may not be generalized to other urban centers in the country. Therefore, another study should be done in other areas of the city to cover both the affluent areas as well as other low-income areas such as Kibra slums and other informal settlements. Comparative studies should also be carried out in other emerging towns in the country to check out how the aspect of urban agriculture is playing out. This will in turn assist to come up with a comparative analysis which will enable to come up with measures that will help the city dwellers in better urban agriculture practices.

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**APPENDICES I: LETTER OF TRANSMITTAL**

**Michael Mugo**

**P.O. Box 30197**

**NAIROBI**

**July 18, 2018**

**To whom it may Concern**

*Dear Respondent,*

**RE: FILLING OF QUESTIONNAIRE**

My name is Michael Mugo and I am currently pursuing a Master's Degree in Project Planning and Management of the University of Nairobi. I have obtained permission from the University Management to carry out research as part of the requirements for the award of the degree. As part of my study, it requires me to administer a questionnaire designed to generate some insights and equally offer support to my research proposal on the study topic, **“factors influencing urban agriculture performance in nairobi county, Kenya: a case of Mathare sub-county**

Participation in the study is voluntary. Whatever information provided will be treated with confidentiality and will not be used for any other purpose other than the objectives of this study.

Your assistance in providing the required information will be highly appreciated. Thank you.

Yours faithfully,

Michael Mugo

## APPENDICES II: INDIVIDUAL QUESTIONNAIRE

This questionnaire is to collect data for purely academic purposes. All information will be treated with strict confidence. Do not put any name or identification on this questionnaire. *Answer all questions as indicated by either filling in the blank or ticking the option that applies.*

### SECTION A: DEMOGRAPHIC INFORMATION

1. What is your Gender?

Male [ ] Female [ ]

2. Kindly indicate your age bracket

Below 18 years [ ]

19-30 years [ ]

31-40 years [ ]

41-50 years [ ]

51-60 years [ ]

61-70 years [ ]

Above 70 years [ ]

3. Indicate your level of education

Certificate [ ]

Diploma [ ]

Undergraduate [ ]

Masters [ ]

Other..... (Specify)

4. Indicate your job title

.....

5. How long have you engaged in urban agriculture?

Less than 3 years [ ]

3 to 5 years [ ]

5 to 7 years [ ]

Over 7 years [ ]

6. Is the agriculture for

Subsistence [ ]

Commercial purposes [ ]

Both subsistence and commercial purposes [ ]

### SECTION B: Factors Influencing Urban Agriculture Performance

Indicate your level of agreement with the following statements relating to Urban Planning. Key Use a scale of 1-5, where (1= strongly disagree, 2= disagree, 3= moderately agree, 4= Agree and 5= strongly Agree)

<b>Urban Planning</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
There are available urban food production policies in Mathare Sub-County					
Land use regulations in Mathare Sub-County are in place					
Every urban farmer in Mathare Sub-County has land access					
Urban farmers in Mathare Sub-County have access to clean water					
In Mathare Sub-County there are legislations and policies encouraging or inhibiting urban agriculture					

Indicate your level of agreement with the following statements relating to Food Security. Key Use a scale of 1-5, where (1= strongly disagree, 2= disagree, 3= moderately agree, 4= Agree and 5= strongly Agree)

<b>Food Security</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
In Mathare Sub-County households easily access food					
Mathare Sub-County households have reliable food supply					
Mathare Sub-County households have access to Safe foods					
Mathare Sub-County households have access to Sufficient and nutritious foods supply					
The food production in Mathare Sub-County is good					

Indicate your level of agreement with the following statements relating to Income Factors. Key Use a scale of 1-5, where (1= strongly disagree, 2= disagree, 3= moderately agree, 4= Agree and 5= strongly Agree)

<b>Income Factor</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
Accessible income opportunities and an unsatisfied demand for agricultural products in quantity and quality pose as a major challenge in urban agriculture					
The availability of inputs, access to formal or informal credit, urban extension services are important aspects in support urban agriculture					
The quality of water and land refers to the general suitability for urban agricultural use					
Urban agriculture can benefit if it is incorporated in urban nutrient recycling (organic waste management in cities).					
The economic importance of urban agriculture is as great as the nutritional and environmental benefits					
Urban farming is a competitive economic activity and the industry of choice for many of urban entrepreneurs					

Indicate your level of agreement with the following statements relating to Gender Factor. Key Use a scale of 1-5, where (1= strongly disagree, 2= disagree, 3= moderately agree, 4= Agree and 5= strongly Agree)

<b>Gender Factor</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
More women practice urban agriculture to produce food for the family than for sale as compared to men in Mathare sub county					
Women have equal access rights to urban farm space as men in Mathare sub county					
Women have equal access to farm inputs as men in Mathare					



sub county					
In Mathare sub county the percentage of female-headed households is relatively high					
More men practice urban agriculture than women in Mathare sub county					

How else does gender influence urban agriculture performance in Mathare sub county

.....

Indicate your level of agreement with the following statements relating to Urban Agriculture Performance. Key Use a scale of 1-5, where (1= strongly disagree, 2= disagree, 3= moderately agree, 4= Agree and 5= strongly Agree)

<b>Urban Agriculture Performance</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
There are many households practicing urban agriculture in Mathare sub county					
Volume of products from urban agriculture in Mathare sub county are sustainable					
Mathare sub county households relay on urban agriculture fully					
In Mathare sub county a large percentage of households sell products for cash					

Is urban agriculture a reliable venture? Explain

.....

**APPENDIX III: SAMPLE SIZE DETERMINATION TABLE**

N	S	N	S	N	S	N	S	N	S
10	10	100	80	280	162	800	260	2800	338
15	14	110	86	290	165	850	265	3000	341
20	19	120	92	300	169	900	269	3500	246
25	24	130	97	320	175	950	274	4000	351
30	28	140	103	340	181	1000	278	4500	351
35	32	150	108	360	186	1100	285	5000	357
40	36	160	113	380	181	1200	291	6000	361
45	40	180	118	400	196	1300	297	7000	364
50	44	190	123	420	201	1400	302	8000	367
55	48	200	127	440	205	1500	306	9000	368
60	52	210	132	460	210	1600	310	10000	373
65	56	220	136	480	214	1700	313	15000	375
70	59	230	140	500	217	1800	317	20000	377
75	63	240	144	550	225	1900	320	30000	379
80	66	250	148	600	234	2000	322	40000	380
85	70	260	152	650	242	2200	327	50000	381
90	73	270	155	700	248	2400	331	75000	382
95	76	270	159	750	256	2600	335	100000	384

Source: (Krejcie& Morgan, 1970)

## APPENDIX VI: LETTER OF AUTHORIZATION



### NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY AND INNOVATION

Telephone +254-20-2213471,  
2241349,3310571,2219420  
Fax: +254-20-318245,318249  
Email: [dg@nacosti.go.ke](mailto:dg@nacosti.go.ke)  
Website: [www.nacosti.go.ke](http://www.nacosti.go.ke)  
When replying please quote

NACOSTI Upper Kabete  
Off Wajyaki Way  
P.O. Box 30623-00100  
NAIROBI-KENYA

Ref. No. **NACOSTI/P/18/53654/24959**

Date: **30<sup>th</sup> August, 2018**

Michael Mugo Kinyanjui  
University of Nairobi  
P.O Box 30197-00100  
NAIROBI.

#### RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on "*Factors influencing urban agriculture performance in Nairobi City County, Kenya: A case of Mathare Sub-County,*" I am pleased to inform you that you have been authorized to undertake research in Nairobi County for the period ending **30<sup>th</sup> August, 2019**.

You are advised to report to **the County Commissioner and the County Director of Education, Nairobi County** before embarking on the research project.

Kindly note that, as an applicant who has been licensed under the Science, Technology and Innovation Act, 2013 to conduct research in Kenya, you shall deposit a **copy** of the final research report to the Commission within **one year** of completion. The soft copy of the same should be submitted through the Online Research Information System.

  
**BONIFACE WANYAMA**  
**FOR: DIRECTOR-GENERAL/CEO**

Copy to:

The County Commissioner  
Nairobi County.

The County Director of Education  
Nairobi County.

National Commission for Science, Technology and Innovation, P.O. Box 30623-00100, Nairobi, Kenya