

**DETERMINANTS OF GROWTH OF URBAN AGRICULTURAL
PROJECTS: CASE OF LANG'ATA SUBCOUNTY, NAIROBI COUNTY,
KENYA**

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DECLARATION

This research project report is my original work and has not been presented to any other University for academic credit.

Sign.....

Date.....

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This research report has been submitted with my approval as the University Supervisor.

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DEDICATION

I dedicate this research project to my mother Lucy Idiama, my bothers Brian Echakara and Cecil Idiama.

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My special tribute goes to Prof. Harriet Kidombo for her constant assistance in finishing up my Project report. I also thank my lecturers and the entire administration and Management of The University of Nairobi for their cooperation and support. I also deeply appreciate my mother for funding my education at the University of Nairobi, her words of encouragement and the unconditional love she gave me. I extend my gratitude to my siblings Brian and Cecil. I also appreciate my group members and friends at The University of Nairobi, who not only ensured full participation in assignments but also encouraged me to pursue my studies.

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LIST OF ACRONYMS AND ABBREVIATIONS

CSA	Community Supported Agriculture.
DFATD	Foreign Affairs, Trade and Development Canada.
FAO	Food and Agriculture Organization.
FAO-COAG	Food and Agriculture Organization Committee on Agriculture.
IFPRI	International Food Policy Research Institute
NEFSALF	Nairobi Food Security, Agriculture and Livestock Forum.
NGO	Non-governmental Organization.
RUAF	Resource Centre on Urban Agriculture and Food Security.
TUAN	The Urban Agriculture Network
USDA	United States Department of Agriculture.
UNDP	The United Nations Development Program.
UA	Urban Agriculture.
UPA	Peri-Urban Agriculture.

ABSTRACT

In recent years, urban agriculture has flourished in many urban areas. The purpose of this study was to investigate the determinants of growth of urban agriculture in Lang'ata Sub County, Nairobi County. The objectives of this study were to establish the influence of consumer demand for fresh produce on growth of Urban Agricultural Projects in Lang'ata Sub County, Nairobi County, to examine the influence of space availability on growth of Urban Agricultural Projects in Lang'ata Sub County, Nairobi County. To assess the influence of Non-governmental Organizations intervention on growth of Urban Agricultural Projects in Lang'ata Sub County, Nairobi County and to evaluate the influence of technology on growth of Urban Agricultural Projects in Lang'ata Sub County, Nairobi County. The study adopted a descriptive and qualitative design in case and field study. The primary data was collected by use of questionnaires and notes as the data collection instruments to record respondents' responses that in this study were Urban Agriculture producers who dwell in Lang'ata Sub County. The target population was Lang'ata Sub County which has a population of 176,314 but due to time and budgetary constraints the researcher picked a sample of 384 respondents from Karen ward which has four divisions of which three represented the three socio-economic classes. This study showed that the demand on croplands can be reduced by growing crops in urban settings where land is available for cultivation. This does not require the conversion of valuable natural habitats, such as forests or wetlands, but rather uses underutilized, derelict or vacant land. The benefits of urban agriculture have been documented widely, and include environmental, social, economic and structural benefits. Urban Agriculture is the production of food through crops, fruit and nut bearing trees, livestock and bees within a city. Crops are grown in on-ground gardens, in pots, without soil through hydroponics, on green roofs and vertically along walls. Urban Agriculture has appeared in various forms. The research study advocates for policies that promote small-scale urban and peri-urban farming and thereby prepare the next generation of urban farming leaders. The task is to increase public knowledge and support, in order to transform urban agriculture from its cottage industry status into a major instrument against hunger and poverty.

CHAPTER ONE

INTRODUCTION

1.1 Background to the study

According to Project Management Institute (2000), a project can be defined as a temporary endeavor undertaken by people, who work cooperatively together to create a unique product or service within an established period and budget to produce identifiable deliverables.

According to Resource Centre on Urban Agriculture and food Security (2014), Urban Agriculture can be defined shortly as the growing of plants and the raising of animals within and around the cities. 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 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, being influenced by urban policies and plans etc. Urban Agriculture is not a relic of the past that will fade away (urban agriculture increases when the city grows) nor brought to the city by rural immigrants that will lose their rural habits over time. It is an integral part of the urban system.

Hendrickson and Porth (2012) define Urban Agriculture as the growing, processing and distribution of food crops and animal products by and for the local community within an urban environment. Examples of Urban Agriculture include; backyard gardening or edible landscapes which primarily provide food products for an individual household, community gardening which is done communally in a public space, rooftop gardening, bee keeping and Urban production of food crops sold in markets. Urban residents practice Urban Agriculture for various reasons which include; Recreation, Enhance neighborhood attractiveness, provides a significant food source for families or neighbors and earns profits to supplement household income or make a living.

According to the United States Department of Agriculture (2015), city and suburban agriculture takes the form of backyard, roof-top and balcony gardening, community gardening in vacant lots and parks, roadside urban fringe agriculture and livestock grazing in open space.

Hendrickson and Porth (2012) state that the popularity of urban agriculture has increased considerably in the last few years as concerns about the environment have combined with increased interest in health and community-building issues, giving rise to support for food systems in metro areas as an integral part of a sustainable development path for cities. Hendrickson and Porth (2012) state that most common forms of Urban Agriculture surveyed in cities include community gardens, vegetable gardens, Community Supported Agriculture (CSA), Greenhouse Agriculture, Kitchen gardens, Edible landscapes, Berry patches, Vineyards, Greenbelt Agriculture.

1.1.1 Profile of Lang'ata Sub County

Lang'ata Sub County is an electoral constituency in Nairobi County, Kenya. It consists of Southern and Southwestern areas of Nairobi. Lang'ata Sub County has common boundaries with Kibera Division of Nairobi. The entire Sub County is located within Nairobi County. The Sub County has an area of 223 km². Kibera, Kenya's largest slum, borders Lang'ata constituency, and was part of it before the creation of Kibera constituency by the Independent Electoral and Boundaries Commission. The affluent suburb of Karen and the mainly middle class Lang'ata suburb are part of Lang'ata Sub County, along with the Nairobi National Park and Lang'ata Barracks.

1.1.2 Urban Agricultural Projects

The United Nations Development Program (UNDP) in Urban Agriculture: Food, jobs and sustainable cities presents what is perhaps the most comprehensive review of Urban Agriculture to date. This definition includes data from thirty countries compiled over a four-year period, 1991-95. Urban Agriculture in this volume is defined as: 'an industry that produces, processes and markets food and fuel, largely in response to the daily demand of consumers within a town, city or metropolis, on land and water dispersed throughout the urban and peri-urban area, applying intensive production methods, using and reusing natural resources and urban wastes, to yield a diversity of crops and livestock.' (UNDP, 1996)

This is a definition which presents the wide scope and many varied activities that are included as urban cultivation. Irene Tinker remarks that there is a need for urban agriculture researchers to standardize the definitions of the term so that data can be collected and compared quantitatively. (Tinker, forward to Egziabher (1994). Studies of urban agriculture have included animal husbandry, excluded it or studied it exclusively Mlozi (1995), Mvena (1991). According to Egziabher(1994), urban agriculture is more commonly defined as the growing of food crops, fruit trees and the raising of livestock within urban areas. Urban agriculture for the purpose of this study is defined as the practice of growing food crops and fruit trees for individual consumption or resale within an exclusively urban area. The study area was Lang'ata Sub County, Nairobi County.

Traditionally, research on agriculture practices has focused on rural areas and the needs of the rural farming population. However, according to Rakodi (1988), in recent years the phenomenon of urban agriculture has been documented in development literature as an increasingly important 'survival strategy' for urban poor. Faced with high food costs and growing insecurity of food supply, the urban poor in cities around the globe have taken to growing their own crops on vacant land giving rise to 'cities of farmers' Freeman (1991). In spite of the documented contribution of urban agriculture toward hunger and poverty alleviation as well as resource conservation in third world cities, many governments have chosen to discourage it or at best to ignore it. According to Lee- Smith (1994) these governments fail to encourage urban cultivation for many reasons. They include; perceptions that Urban Agriculture is a temporary and transient activity, fears that livestock will spread disease, fears that malaria will increase with changed drainage patterns, concern that fields of maize along roadways will obstruct vision and increasing the likelihood of traffic accidents.

Such beliefs inhibit agricultural production without recognizing that these possible problems can be managed to achieve greater potential benefits that can potentially outweigh the perceived costs. According to Lee-Smith (2013), a decade ago the Nairobi Food Security, Agriculture and Livestock Forum-NEFSALF-began advocating for recognition of urban agriculture. At the time urban farmers were frequently harassed and not provided with any support. The forum located at Mazingira institute, Nairobi, a Kenyan NGO convenes a wide range of stakeholders. It has

trained about three thousand urban farmers. A farmers' network has been organized with youth and women's hub, and a formal mentoring program to train other farmers.

The farmers young and old make the most of limited space in the city to grow food to eat and to keep livestock. According to Lee-Smith (2013), urban farming is being transformed from an illegal and low status activity to a healthy occupation that also makes money- a great business opportunity. Lee-Smith (2013) states that the Nairobi city council that opposed urban farming has also transformed into the city county government that supports it. According to Lee-Smith (2013), for the last few years Rooftops Canada- Abri International, with support from the Canadian government, has been supporting Mazingira program, with an emphasis on building the capacity of youth and women. Together they are exploring how to better plan housing projects and slum upgrading to support urban food production.

1.1.3 Urban Agriculture: The potential in Kenya

Urban Agriculture for the sake of this study is defined as the practice of growing food crops and food trees for individual consumption or sale within an exclusively urban area. Livestock husbandry is excluded to narrow the scope of the study. The study area was Lang'ata Sub County, the city of Nairobi, Kenya, the urban boundaries being those defined by the Nairobi County government. The plots city residents cultivate are called 'shambas' the Swahili term for garden.

According to National Development Plan (1993), the contribution of agriculture to Gross Domestic Product (GDP) declined from 45 percent to 28 percent by 1992. Furthermore, National Development Policy favored agricultural production for export. Farms were increasingly being turned over to the production of tea, fresh flowers and vegetables for export to foreign markets. The decreased food supply coupled with increasing demand was creating an imbalance that threatened national food security. Helmore and Ratta (1995), Mougeot (1994) state that the urban poor, this problem is exacerbated as it is estimated that food costs are up to 60 percent higher in urban areas than in the rural areas.

According to Lee- Smith (2013), new sources of food are required to feed the rapidly increasing urban population at a reasonable cost. Urban Agriculture is a source that is increasingly being recognized for its potential contribution to increasing food security. Many urban residents,

especially rural immigrants, were previously employed in agriculture. This can be advantageous since food cultivation can continue to provide employment and an important point of entry into the informal urban economy. Egziabher (1994), states that it is recognized by international development planners that urban agriculture can contribute significantly to alleviating poverty, encouraging gender and economic equity, generating income, improving health and nutrition and the overall sustainability of urban areas.

Lee-Smith (2013), states that, Nairobi provides an excellent setting to study the growth and development of urban agriculture for several reasons. Nairobi, along with many other East African cities was designed by the British colonial government. The physical design of the city lends itself to the development of a thriving system of urban agriculture. Tracts of open space in the form of parks and boulevards were incorporated into the city plan in attempt to create a healthy, malaria-free city. Freeman (1991) states that residential housing; European clubs and other facilities were constructed on spacious plots of land at a very low population density. The result today is an abundance of vacant or underutilized land that provides an ideal setting for urban agricultural activities.

Lee-Smith and Memon (1993), state that a study conducted by the Mazingira Institute in Nairobi found that approximately 64 percent of urban residents grow their own food contributing an estimated 25.2 million kg of crops to the national economy. According to Freeman (1993), food that is grown within the city is used for home consumption and petty trading. These statistics indicate that urban agriculture is a thriving activity in Kenya. Nairobi can serve as a case to evaluate the extent to which urban residents are meeting their basic needs by engaging in urban cultivation and the extent to which urban agriculture is growing in Nairobi.

1.2 Statement of the Problem

This study sought to assess the determinants of growth of Urban Agricultural Projects in Lang'ata Sub County, Nairobi County. This is because various literatures showed that there has been an increase in the practice of Urban Agriculture in Nairobi County. These determinants that led to the growth of Urban Agriculture in Lang'ata Sub County, Nairobi County include; Increase in consumer demand for fresh produce. This was because the city dwellers access knowledge on healthy living and the fear of lifestyle diseases like cancers.

Another determinant that led to the growth of Urban Agriculture in Lang'ata Sub County, Nairobi County is the availability of land and space. Nairobi being a metropolitan city has limited land because of the infrastructure and these makes it difficult to practice large scale Agriculture. The city residents have taken up the limited space available like balconies, flower beds, back yards, and rooftop; have taken up flower pots to plant vegetables on canvas paper and in manila sacks. This is practiced every place in the city no matter the social class from suburbs to the slum areas. This could also be due to the increase of prices for fresh produce. Most of the ideas on new methods of Urban Agriculture were brought about by Non-governmental Organizations who want to help the poor dwellers in Nairobi to practice sustainable Agriculture and so decide to help them with ideas and resources like finances. The county government also decided to support Urban Agriculture even though there are still by-laws that restrict some types of Urban Agriculture and areas of Urban Agriculture practice.

1.3 Purpose of the study

The purpose of this study was to investigate the determinants of growth of Urban Agriculture in Lang'ata Sub County, Nairobi County.

1.4 Objectives of the study

This project was based on five objectives.

1. To establish the influence of consumer demand for fresh produce on growth of Urban Agricultural projects in Lang'ata Sub county, Nairobi County.
2. To examine the influence of space availability on growth of Urban Agricultural projects in Lang'ata Sub County, Nairobi County.
3. To assess the influence of Non-Governmental Organizations intervention on growth of Urban Agricultural projects in Lang'ata Sub County, Nairobi County.
4. To evaluate the influence of Technology on growth of Urban Agricultural projects in Lang'ata Sub County, Nairobi County.

1.5 Research Questions

1. What is the influence of consumer demand for fresh produce on growth of Urban Agricultural projects in Lang'ata Sub County, Nairobi County?

2. What is the influence of Space availability on growth of Urban Agricultural projects in Lang'ata Sub County, Nairobi County?
3. What is the influence of Non-Governmental intervention on growth of Urban Agricultural projects in Lang'ata Sub County, Nairobi County?
4. What is the influence of Technology on growth of Urban Agricultural projects in Lang'ata Sub County, Nairobi County?

1.6 Significance of the study

This study maybe important because there is physical evidence that Urban Agriculture is growing in Lang'ata Sub County, Nairobi County, there is literature that has reviewed and supported the growth of urban agriculture and media programs and documentaries on the importance and benefits of urban agriculture contribution to healthy living. This study was important to all city and urban area residents because they will get to access fresh produce in abundance and at cheaper prices which enables them to save so much money.

This study will benefit all the city and urban residents because despite the limited space they will learn to use what is available to practice urban agriculture which will lead to food security, availability of food and increase savings. Through this study; society, the country and the government will access information that was not available in any medium and hence lead to rapid growth of Urban Agriculture. The government will also be able to loosen the by-laws and policies that restrict Urban Agriculture practices because through this study it will be able to learn that there are safe practices of Urban Agriculture that will be beneficial to the city and urban residents.

1.7 Delimitation of the study

This study was based on Urban Agriculture that is the determinants of growth of Urban Agricultural Projects in Lang'ata Sub County, Nairobi County. The scope of this study was meant or geared towards the upper class, the upper middle class, the lower middle class and the lower class because Urban Agriculture is not only practiced by the urban poor but all the socio-economic classes in Lang'ata Sub County, Nairobi County are represented. The study was limited to Urban Agricultural projects in each class who practice Urban Agriculture in Lang'ata

Sub County, Nairobi County. The respondents were limited to 384 as the total sample and 128 respondents in each class because it is evident that the target population was more than 100 000.

1.8 Limitations of the study

During this study, the researcher encountered some challenges. The respondents held information because they want to be bribed in order for them to give information. This was a challenge because the researcher did not have resources to give the respondents. Another challenge was the access to the project site because of suspicion by the farmers or the people in charge. This included entry to the residential compounds or houses. This was because of the increase of insecurity in the urban areas especially in Lang'ata Sub County.

Safety of the researcher was also at risk especially in the slum areas. The researcher visited the sites alone and this posed a risk to her safety. It is a known fact that some places in the city are not safe and that could pose as a risk to the people who are not residents of those places. Language barrier was another challenge to the study. This is because some of the respondents were illiterate and caused a problem when it came to reading the questionnaires, answering questions, responding to the interview questions and filling in the questionnaires.

The analysis of determinants of growth of Urban Agricultural Projects was crucial in Lang'ata Sub County. The Urban Agricultural Projects included the projects initiated and financed by local authorities, government; NGOs/faith based institutions and donors.

1.9 Assumptions of the study

This study assumed that the respondents provided reliable and valid data that was analyzed to come up with useful conclusions in relation to the study, that the independent variables remained constant and that any effect in the dependent variable was wholly attributed to independent variables and not to moderating, intervening or extraneous variable.

The sample in this study represented the population that practices Urban Agriculture in Lang'ata Sub County, Nairobi County because all the social classes were represented. The data collection instrument had validity and measured the desired constructs because this research could only be done through the data collection instruments mentioned.

- **1.10 Definition of significant terms**

This is the section that states what the significant terms mean in the context of this study.

Animal husbandry refers to the management and care of farm animals by humans for profit, in which genetic qualities and behavior, considered to be advantageous to humans are further developed.

Aquaculture refers to the breeding, rearing and harvesting of plants and animals in all types of water environments including ponds, rivers, lakes and the oceans.

Backyard gardening refers to the planting of fruits and vegetables at the back of a house common in the suburban developments in the western world.

Community gardening is where by a single piece of land is gardened collectively by a group of people.

Ecological system refers to different life forms and the cohesive form of relationship they create with other living and non-living things.

Greenhouse Agriculture is a greenhouse (also called a glasshouse or if with additional heating, a hothouse) is a structure with walls and roof made chiefly of transparent material such as glass in which plants requiring regulated climatic conditions are grown.

Greenbelt agriculture is a greenbelt is a policy and land use designation used in land use planning to retain areas of largely undeveloped, wild or agricultural land surrounding or neighboring urban areas.

Horticulture refers to a branch of agriculture that deals with the art, science, technology and business of vegetable garden plant growing. It includes the cultivation of medicinal plant, fruits, vegetables, nuts, seeds, herbs, sprouts, mushrooms, algae, flowers, seaweeds and non-food crops such as grass and ornamental trees and plants.

Hydroponics is a method of growing plants using mineral nutrient solutions, in water, without soil. Terrestrial plants may be grown with their roots in the mineral nutrient solution only or in an inert medium, such as perlite or gravel.

Kitchen gardens are highly productive small gardens that produce huge yields.

Metro area is metropolitan area, sometimes referred to as a metropolitan region, metro area or just metro is a region consisting of a densely populated urban core and its less-populated surrounding territories, sharing industry, infrastructure and housing.

Metropolis is a large city or urban area which is a significant economic, political and cultural center for a country or region and an important hub for regional or international connections, commerce and communications.

Rooftop gardens refer to man-made green spaces on the top most levels of industrial, commercial and residential structures. They may be designed to grow produce, provide play space, give shade and shelter or simply be there as a living green area.

Urban and Peri-urban Agriculture refer to Agricultural practices within and around cities which compete for resources- land, water, energy, labor- that could also satisfy other requirements of the urban population (FAO, 1999).

Urban Agriculture refers to a small areas within cities such as vacant lots, garden, verges, balconies and containers that are used for growing crops and raising small livestock or milk cows for own consumption or sale in neighborhood markets.

Urban Ecosystem is every aspect of a city. Within an urban ecosystem, you will find living and non-living things.

Vineyard is a plantation of grape-bearing vines, grown mainly for wine making, but also raisins, table grapes and non-alcoholic grape juice.

1.11 Organization of the study

This project is divided chronologically into five sections. Section one is divided into eleven sub-categories. They are the introductory part of the project namely; background of the study, statement of the study, purpose of the study, research objectives, research questions, significant of the study, basic assumptions of the study, limitations of the study delimitation of the study, definitions of significant terms used in the study and organization of the study.

Chapter two includes Literature review, which presents work done by other scholars on Urban Agriculture and the determinants that influence its growth. It looks at the determinants separately. It also includes the theoretical framework, conceptual framework, explanation of relationships of variables in conceptual framework, gaps in literature and summary of the literature review.

Chapter three contains the research methodology which shows how the research was carried out. It contains research design, target population, sampling or the respondents of the study, research instruments, methods of data collection procedures and methods of data analysis and ethical issues.

Chapter four is the data analysis, presentation, interpretation and discussion. It is to reduce data to intelligible and interpretable form using statistics. Interpretation means: searching for meaning and implication of research results, in order to make inferences and draw conclusions and relate to the theory.

Chapter five is the final chapter of the research project report. It is a wrap up of the research project. It is the summary of findings, conclusions and recommendations. A summary of the findings were drawn from results in chapter four. It contains six subtitles: Introduction which introduced the chapter briefly, summary of the findings, discussions of the findings, conclusions of the study, recommendations of the study and suggested area for further research.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter gave a review of the existing literature on Urban Agriculture and its growth. The chapter specifically focused on the factors that led to the growth of Urban Agricultural projects and narrowed it down to the case of Lang'ata Sub County, Nairobi County. The independent variables included; Consumer demand for fresh produce which is catalyzed by healthy living promotion in the media and humanitarian organizations. Space availability also led to the growth of Urban Agriculture, Non-governmental organizations intervention and their policies, Technology that enabled farmers to practice the Urban Agriculture. These were the independent variables that led to the dependent variable growth of Urban Agricultural projects.

2.2 The concept of growth of Urban Agriculture

According to UNDP (1996), Urban Agriculture is an industry that produces, processes and markets food and fuel, largely in response to the daily demand of consumers within a town, city or metropolis, on land and water dispersed throughout the urban and peri-urban area, applying intensive production methods, using and re-using natural resources and urban wastes, to yield a diversity of crops and livestock.

According to UNDP (1996) Urban Agriculture (UA) is an activity that produces, processes and markets food and other products, on land and water in urban and peri-urban areas, applying intensive production methods and (re) using natural wastes and urban wastes to yield a diversity of crops and livestock. Basing on the broader needs of the urban population, FAO-COAG (1999), states that urban and peri-urban agriculture are agriculture practices within and around cities which compete for resources (land, water, energy and labor) that could also serve other purposes to satisfy the requirements of the urban population. Important sectors of urban and peri-urban agriculture include horticulture, livestock, fodder and milk production, aquaculture and forestry.

An integrated definition by Mougeot (1999) states that urban agriculture is an industry located within (intra-urban) or on the fringe (peri-urban) of a town, an urban center, a city metropolis,

which grows or raises, processes and distributes a diversity of food and non-food products, re-using mainly 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.

According to FAO-COAG (1999), IFPRI (1998) and TUAN (1994), urban food production is practiced by large parts of the urban population in developing countries, and it appears in various forms. In this wider sense urban agriculture refers to not only food crops and fruit trees grown in cities but encompasses different kind of livestock as well as medicinal plants and ornamentals for other purposes .A broad understanding of urban agriculture must take into account the various activities of households to achieve food security and to create income. Urban food production is more than food related. Community- based and individual food production in cities meets further needs of the urban population like sustainable urban development and environmental protection.

Lee-Smith (2013) states that a large part of the people involved in urban agriculture are the urban poor. Contrary to general belief they are often not recent immigrants from rural areas (since the urban farmer needs time to get access to urban land, water and other productive resources). In many cities, one will often find lower and mid-level government officials, school teachers and the like involved in agriculture, as well as richer people who are seeking a good investment for their capital. The urban farmers are men and women coming from all income groups, but the majority of them are low-medium income earners, who grow food for self-consumption or as an income generation. Most of the cultivation is informal with little of any support.

According to Mougeot (1999), women constitute an important part of urban farmers, since agriculture and related processing and selling activities, among others, can often be more easily combined with their other tasks in the household. It is however more difficult to combine it with urban jobs that require travelling to the town center, industrial areas or to the houses of the rich. Women tend to dominate certain components of urban cultivation (backyard gardening and small scale animal husbandry). Women are still disadvantaged in the formal sector of the urban economy and therefore get involved in and micro-scale production. Urban food production offers opportunities to be integrated into other household activities and women uphold the responsibility for household food security. Men tend to dominate the commercial urban food

production. In some countries children are involved mainly in watering and weeding. According to Mougeot (1999), different urban farmers engage in different production systems co-operate with one another: they may use each other's plots for different purposes and at different times and they exchange wastes or products.

Resource Centre on Urban Agricultural and Food Security (2014) states that Urban Agriculture may take place in locations inside the cities (intra-urban) or in the peri-urban areas. The activities may take place on the homestead (on-plot) or on land away from the residence (off-plot), on private land (owned, leased) or on public land (parks, conservation areas, along roads, streams and railways), or semi-public land (schoolyards, grounds of schools and hospitals).

Urban Agriculture includes food products, from different types of crops (grains, root crops, vegetables, mushrooms, and fruits) and animals (poultry, rabbits, goats, sheep, cattle, pigs, guinea pigs, fish etc.) as well as non-food products (like aromatic and medicinal herbs, ornamental plants, tree products etc. or combinations of these. Often the more perishable and relatively high-valued vegetables and animal products and by-products are favored. Production units in urban agriculture in general tend to be more specialized than rural enterprises, and exchanges are taking place across production units. FAO-COAG (1999) state that urban agriculture links farm cultivation with small scale enterprises, such as street food stands, fresh milk outlets and maize roasters but also to fencing industry, pumping, irrigation, processing and transportation industries.

Example of Urban Agricultural projects: In Santa Cruz, 'The Homeless Garden project' raise vegetables, herbs and flowers on 3.5 acres. Daily, 25 garden workers eat lunch freshly made from the garden's produce. The remaining vegetables are sold wholesale, distributed to their Community Supported Agriculture (CSA) subscribers and donated to a soup kitchen and an Aids Project. Their estimated annual income from all sales, including dried flowers and other crafts as well as fresh produce is \$ 26, 000. In Holyoke, Fresh market Aquafarm raises tilapia fish in tanks. The company projects a market goal of 100 000 pounds of live fish per year sold regionally through ethnic markets, fish markets and groceries. In Buffalo, New York village Farms, owned and operated by a New Jersey – based for-profit corporation sold 7-8 million pounds of tomatoes grown off-soil on 35 acres of 'brownfields' contaminated industrial land, using hydroponic techniques and greenhouses. In Chicago, youth with the Ivy Crest Garden

Project cleared away 3000 tires on nine contiguous vacant lots to build an organic flower and vegetable market garden where 30 ducks provide pest control and fertilizers.

2.3 Consumer demand for fresh produce and growth of urban agricultural projects

Part of the reason for the growth of Urban Agriculture is the consumer demand for fresh food which is guided by desire for healthy living and food security. According to Food and Agriculture Organization (1999) on Nutrition, Urban Agriculture can contribute to food security in several ways: it increases the amount of food available and enhances the freshness of perishable food reaching urban consumers.

FAO (1999) also states that consumer demand for fresh produce is due to Efficiency of production. Vegetable production has expanded in and around cities in many developing countries and therefore consumers will prefer fresh vegetable straight from the gardens compared to the ones in supermarkets. The rapid growth of cities in the developing world is placing enormous demand on urban food supply systems. Agriculture including horticulture, fisheries, forestry, and fodder and milk production is increasingly spreading to cities and towns. Urban agriculture provides fresh food, generates employment, recycles urban wastes, creates greenbelts and strengthens cities' resilience to climate change.

According to FAO (2015), Urban and Peri-urban Agriculture (UPA) can be defined as the growing of plants and raising of animals within and around the cities. Urban and peri-urban agriculture provides food products from different types of crops (grains, root crops, vegetables, mushrooms and fruits) animals (poultry, rabbits, goats, sheep, cattle, pigs, guinea pigs and fish e.t.c) as well as non-food products (aromatic and medicinal herbs, ornamental plants, tree products). UPA includes trees managed for producing fruit and fuelwood as well as tree systems integrated and managed with crops (agroforestry) and small size aquaculture.

FAO (2015), states that across North America, city dwellers have increasing access to a variety of foods raised all manner of urban sites. Urban Agriculture includes greenbelt around cities, farming at city's edge, vegetable plots in community gardens and food production in thousands of vacant inner-city lots. Further, urban agriculture comprises fish farms, farm animals at public housing sites, municipal compost facilities, schoolyard greenhouses, restaurant-supported salad gardens, backyard orchards, rooftop gardens and beehives, window box gardens and much more.

Urban farming includes: horticulture, aquaculture, arboriculture and poultry and animal husbandry. The potential for food production in cities is great and dozens of model projects are demonstrating successful that urban agriculture is both necessary and viable.

RUAF (2014) states that, new citywide coalitions are emerging on behalf of urban food security. Health and nutrition advocates are joining with community gardeners, university extension services, emergency food distributors and faith communities. Community economic development organizers, as well as environmentalists concerned with urban waste reduction and recycling, see the potential in urban farming. A growing consumer demand for fresh, local and organic food in its turn creates new markets for urban food production. With growing momentum in the past years, individuals, organizations, communities and governments have participated in a variety of creative efforts to develop the capacity to raise food in and around cities. Many of these efforts specifically address the needs of urban residents who are living in poverty and consequently at grave risk for food insecurity- that is, threatened with hunger, poor nutrition and frequent anxiety about not having enough to eat.

FAO (2015), states that Urban and Peri-Urban Agriculture (UPA) can make an important contribution to household food security, especially in times of crisis or food shortages. Produce is either consumed by the producers or sold in urban markets, such as the increasingly popular weekend farmers' markets found in many cities. According to FAO (2015), because locally produced food requires less transportation and refrigeration, it can supply nearby markets with fresher and more nutritious products at competitive prices. Consumers especially low-income residents enjoy easier access to fresh produce, greater choice and better prices.

FAO (1999), states that many Asian and African cities are likely to double their populations within a decade. In particular, the number of low- income urban consumers will increase. Their food security will depend upon the level and stability of the cost of food access as well as on the variety and quality of food available to them. A very effective way of enhancing urban consumers' food security is to improve the efficiency of all activities that bring food into cities and distribute it within urban areas like assembling, handling, sorting, packaging, storing, transporting, processing, wholesaling, retailing and cooking for sale as street food. City and local authorities can do a great deal to enhance the food security of low-income urban consumers by

supporting the development of efficient private-sector food marketing systems. However, their actions face a number of constraints.

FAO (2015) states that vegetables have a short production cycle some are harvested within 60 days of planting so they are well suited for urban farming. According to Dennery (1996) Kibera is the largest informal settlement in Nairobi and is located not far from the city center. Most of the mud and wattle dwellings are located along a wide slope opposite the Motoine River and Nairobi dam. Many of the food producers in Kibera have their plots in a large open space across from the river and the dam. This open space includes slopes ranging from gentle to moderate and several soil types. If rain is adequate, there are two cropping seasons from October to December and April to July. Maize is generally grown during the long rains but some fast maturing varieties can be grown during the short rains. Beans are grown during both seasons. Aside from these two staples, sweet and Irish potatoes, kale and cow peas are common crops. Flood-prone areas are planted with cocoyam, bananas and sugarcane. A small number of producers irrigate their plots with sewage water. Within the settlement of Kibera, there are chicken, ducks and goats as well as pigs and sheep. Animal production can be a challenge due to disease and theft.

2.4 Space availability and growth of urban agricultural projects

Challenges to urban agriculture include physical and social factors. Urban Agriculture may be met with reluctance, due to associated negative perceptions and stigmas. According to Goodwin (2002), Land may be unavailable due to its intensive use for buildings or maybe unsustainable for cultivation due to physical conditions, including soil quality, soil contamination or lack of rain and sunlight. There is currently no literature available that summarizes the amount of land available for agriculture in the urban areas. To begin to understand the potential for food production in urban areas, it is necessary to estimate how much land is available, in terms of surface area and access to sunlight.

There are alternative methods of growing crops in areas where land is not available or the soil is not suitable. Planters and pots can contain uncontaminated soil, and can be moved around to appropriate areas. According to Saunders (2009), raised beds are permanent fixtures that separate the growth soil from contaminated soil by building up from the ground. Impermeable layers can also be placed as separation from contaminated soil. Grow bags, seeds and soil placed in slit

bags, can be partially buried in the ground. Hydroponic gardens, growing plants without soil in a nutrient solution can be built on the ground, rooftops, balconies and other structures. According to Bradley (2000), Hydroponics compared to on-ground gardens, can use fewer resources, increase yield per unit area and reduce water use by 90%. Kohler (2003) and Oberndorfer (2007) state that modern green roofs, rooftops with vegetable growth, emerged in Germany at the turn of the twentieth century. Porsche (2003) states that green rooftops can lengthen the lifespan and lower the life cycle costs of roofs and may also improve sound isolation.

The legal status of food production in Nairobi is not clear. According to Dennery (1995), it appears that cultivation is acceptable but is not well viewed by local policy makers. The legal status of those who use open space plots but do not own them is even more ambiguous. In the Kenyan countryside, traditional laws gave squatters the right to harvest their crop before the rightful owner resumed occupation. For low-income producers, loss of access of land can have devastating consequences, producing one's own food provides for livelihood in a way in which casual or regular earnings cannot.

According to Dennery (1995), it is expected that the frequency of evictions will increase as the legally recognized owners start building housing in the area. Evictions usually take place without prior notice with the construction crew slashing down the crops and bringing in building materials from one day to the next. Dennery (1995), states that Kibera producers are aware of the fact that they can lose their crop and an integral part of their livelihood at any time. This is the main reason why the majority of producers plant fast maturing crops and avoid planting trees and other perennials. Furthermore, insecurity of land tenure tends to limit producer incentive to protect soil from erosion.

Dennery (1995) also states that there is also the social aspect to access to land. The usual method for securing access to land is via friends and relatives. If the potential producer knows of a friend or a relative who desires to cease cultivating, he or she will approach this person and offer a gift (usually cash or a kg of sugar) in order to secure the plot. Newcomers to the urban setting or to a particular community must always wait for several years until they have the appropriate contacts before attempting to secure a plot by social means.

2.5 Non- Governmental Intervention and the growth of Urban Agriculture

Due to the cross cutting and multi-dimensional nature of urban agriculture, policy development and action planning on urban agriculture should involve various sectors and disciplines: agriculture, health, waste management, community development, parks and nature management. Moreover, urban farmers and NGOs supporting them, have to be involved in the planning process. An important aspect of strategic urban planning is related to the situation, in the definition of priorities and in action planning and implementation.

Nairobi has a number of actors in the food and marketing chain. According to FAO (1996) they become involved in areas such as planning, technology transfer, technical assistance and advocacy and assistance in overcoming legal and regulatory obstacles. Many of these NGOs and CBOs operate in slum areas and have urban farming as part of their livelihood and poverty eradication components. Mazingira (meaning environment in English) Institute, one such organization, works to create awareness about, among others, urban agriculture, while also training communities to learn better skills to increase income generation and well-being. As sourced from their website, the institute has an initiative known as the Nairobi and Environs Food Security, Agriculture and Livestock (NEFSALF) which is a network consisting of farmers (individuals and groups) practicing urban agriculture and livestock keeping in the city of Nairobi and environs. This is an initiative to train the urban farming community after observing that there was a lack of knowledge and skill among urban farmers.

NEFSALF bulletin (2014) reports that training initially included group dynamics, record keeping, gross margins, crop husbandry, livestock husbandry and on-site visits. Currently, training framework includes, farming practice; (Farming management and operations namely production, processing, distribution and consumption), farming resources; (farming spaces, farming capital and farming entrepreneurship), farming community; (farming households, groups, organizations, enterprises, platforms and networks) and trainee strategy development. The course content takes into consideration the agri-food components and relations with the social, built and natural environments. The training course is supported by Rooftops Canada/Abri International with the assistance of Foreign Affairs, Trade and Development Canada (DFATD).

According to FAO (1996), the government, while engaging in city planning, can accommodate, rather than forbid, the needs of urban farmers. Planning should be done in collaboration with

government entities; particularly those responsible for energy, water supply, infrastructure, transportation and water sectors. When it comes to the government's role with regards to information technology, it should develop clearly defined objectives and outline their strategy for information technology for the agriculture sector. Agricultural ministries must recognize the opportunities from information technology and should take action to realize these benefits. A good example of such action is ensuring appropriate access to the technology at reasonable costs for the agricultural sector.

Policy makers substantially contribute to the development of safe and sustainable urban agriculture by creating a conducive policy environment and formal acceptance of urban agriculture as an urban land use, enhancing access to vacant open urban spaces and the security of agricultural land use, enhancing the productivity and economic viability of urban agriculture by improving access of urban farmers to training, technical advice and credit and supporting the establishment and strengthening of urban farmer organizations and taking measures that prevent/reduce health and environmental risks associated with urban agriculture.

2.6 Technology and growth of Urban Agricultural Projects.

According to FAO (1996), technology in farming is very important. Technology transfer could make available hardy and healthy seed varieties, assist in establishing cooperatives for acquiring inputs and marketing products and provide new systems such as biological wastewater treatment processes.

According to Policy Horizons Canada, there are advances in information communications technologies. Data, methods and technologies are rebuilding societies, workplaces and value chains and enshrining a digital-based economy with the potential for innovative and transformative applications global interconnectedness and the emergence of trade in tasks through networking and engagement. In the agricultural sector, according to FAO (1996), new IT applications are becoming increasingly commonplace. They further provide that information technology can provide education and skills upgrading such as the position of management of advice and use of online distance education techniques. Another important application is the access to information especially those of a time-sensitive nature.

Hydroponics is another technology that is growing in urban areas that do not have quality soil. Hydroponics is a subset of hydroculture and is a method of growing plants using mineral nutrient solutions, in water, without soil. Terrestrial plants may be grown with their roots in the mineral nutrient solution only or in an inert medium, such as perlite or gravel. With hydroponics, the plants are grown in an inert growing medium and a perfectly balanced, PH adjusted nutrient solution is delivered to the roots in a highly soluble form. This allows the plant to uptake its food with very little effort as opposed to soil where the roots must search out the nutrients and extract them.

According to animal smart (2012), farmers use technology to make advances in producing more food for a growing world. Technology has enabled farmers make improvements in agriculture due to the use of motorized equipment, modified housing for animals and biotechnology. Better technology has allowed farmer to feed more people and requires fewer people to work on farms to feed their families. The website further and explains that biotechnology is the use of technology to make advances in crop production and in animals. Seed technology has changed where crops are able to withstand harsh weather conditions and even take shorter time to mature.

Geographic Information System (GIS) is a valuable tool for examining land- use potential. It has been used for a broad variety of analyses, such as technology adoption and land use on dairy farms in Kenya Staa (2002), Land available for development in the Beirut Metropolitan Area Abed (1994), and future land use in the Netherlands Schotten (2001). GIS has been recommended for identification of potential land for Urban Agriculture. This has been done in Rosario in Argentina, where ownership of land, land-use regulations, soil quality and contamination and accessibility were studied in part through GIS.

GIS work has also been conducted in Cagayan de Oro in the Philippines Veenhuizen (2006) and in Accra in Ghana Larbi (2005) and Veenhuizen (2006). In the city of Governador Valadares in Brazil, urban development plans recognized urban agriculture as a legitimate use of urban land and urban agricultural areas were included in GIS databases Veenhuizen (2006).

GIS is an important tool for land scape analysis. Veenhuizen lists methods for governments to enhance access to land for urban agriculture, such as designating vacant lots for urban gardening groups, encouraging owners of vacant land to lease land to urban food growers, the creation of

inventories of available land and testing of sustainability of land for urban agriculture. In Cienfuegos, Cuba, Piura, Peru and Dar es Salaam, Tanzania, GIS and participatory methods were used to assess suitability of vacant land for Agriculture and to create an inventory of vacant land (2006). Rasmussen et al. (1999) demonstrated the use of GIS as a means of recognizing grazing limitations. Suitable grazing grounds were mapped from topographic maps and land cover maps from satellite images, in order to aid Mongolian pastoralists in sustainable management of common pastures.

2.7 Theoretical Framework

A theoretical framework is a structure of concepts that exists (tested) and is ready-made map for study.

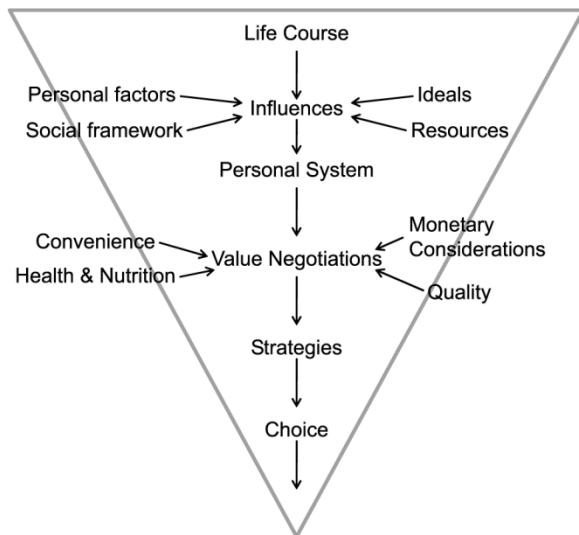
2.7.1 Theory of food choice

Furst et al. (1996) state that interviews examining the food choice process were conducted on 29 adults, primarily individuals making grocery store food choice decisions, which were sampled for their diversity. These people were asked about how they chose food when shopping and in other setting, and what influenced their choices. Transcripts of the interviews were analyzed using qualitative methods that included constant comparison, concept mapping and case summaries, and a conceptual model. People's life course experiences affected major influences on food choice that included ideals, personal factors, resources, social contexts and the food context. These influences informed the development of personal systems for making food choices that incorporated value negotiations and behavioral strategies. Value negotiations weighed sensory perceptions, monetary considerations, health and nutrition beliefs and concerns, convenience, social relationships and quality of food choice decisions. Strategies employed to simplify the food choice process developed over time. The conceptual food choice process model represents the rich and complex bases of food practices, and provides a theoretical framework for research and practice in nutrition.

This model represents three main components of factors involved in food choice: Life course, influences and personal system. Life course includes personal roles and social, cultural and physical environments to which a person has been and is exposed to. Life courses generates a set of influences- ideals, personal factors, resources, social framework and food context which form

and shape people's personal systems including conscious value negotiations and unconsciously operationalized strategies that may occur in a food-related choice situation.

The funnel shape indicates several attributes of the food choice process: one is that a single food choice event results from the mixing and separating of the diverse set of personal and environmental inputs. Life course gives rise and shapes the influences that emerge in a food choice situation as well as the manner and extent to which the social and physical settings affect how people construct and execute personal systems of food choice. The model represents a process that may either be more deliberate or more automatic.



Source: Furst *et al.* (1996, p. 251)

Figure 1: The theory of food choice

Life course: Past influences of personal experiences and historical eras, current involvement in trends and transitions and anticipations of future events (e.g. upbringing, characteristics of an age or generation, past life roles affected respondents relationship with food. People coordinated the demand of current life roles and activities through their food choices.

Influences: The influences are: Ideals, personal factors, resources, social framework and food context. These influences mutually shape one another as well as reinforce, interact and compete with one another. Ideals include: expectations, standards, hopes and beliefs that are points of

reference and comparisons by which people judged and evaluated food choices. Personal factors include: likes /dislikes, individual food styles, food centeredness (pleasure, health, safety or symbolism) and emotions (emotional cues, moods and feelings); as well as characteristics like gender, age, health status, sensory preferences (or taste sensitivities) and state of hunger; incorporates cravings, preferences for particular foods or food types and aversions; physiological factors such as allergic response and hunger.

Tangible resources such as money, equipment (e.g. freezer, pantry space) and space; intangible resources such as skills, knowledge and time; perceived as available or unavailable depending on individual outlook and situation. Social framework include nature of interpersonal relationships, social roles and meaning; families and households provided one of the most important sets of interpersonal relationships influencing food choice (e.g. the mother who is trying to provide for her fussy eater; another mother trying to shape the food choices of her family; the husband who gets the list from his wife; shopper who sacrifices her own priorities to meet the family's needs); entertaining and workplace were other interpersonal relationships. Food context include the environment that food choices occur, physical surroundings, social climate of the choice setting, and specific food supply factors in the environment such as types of food, food sources and availability of foods in the food system, including seasonal or market factors. Food context can offer expanded or constrained choice possibilities or establish a choice or ambiance that influences the food choice process.

Personal system: These are value negotiations that involved weighing of different considerations in making choices and strategies that involved choice patterns based on previously resolved deliberations that had become habitual. Six values came up the most: sensory perceptions, monetary considerations, convenience, health/ nutrition, managing relationships and quality. Others discussed less frequently: ethics, tradition and familiarity. Sensory perceptions: the dominant value, driven mostly by taste varies widely. The limiting factor is food choice, less negotiable than other values; included dimension of texture, odor or appearance. Sensory perceptions especially taste and monetary considerations were frequently in conflict. Taste is weighed against convenience. Tolerance for food aversions and willingness to accept particular foods were influenced by the foods available and the social setting.

Monetary considerations: price and perceived worth of food is another very salient value; price always conflict with other values especially taste and quality. Convenience: Time often spoken as a commodity to be spent or saved; weighing the value of convenience in terms of time in negotiation with other values; ease of preparation. Health and Nutrition: factors relating to disease avoidance or control, bodily well-being-nutrition were spoken of in terms of value while health was spoken of in terms of avoidance. Managing relationships: Maintaining harmony in the household Quality: Usually mentioned in reference to comparing food products in meat and produce. Strategies: Well established rules or habits.

2.7.2 Economic model of food consumption

According to Rose et al. (2010), this theoretical framework is based on an economic model of food consumption, adapted to include neighborhood effects. Economists view individuals as attempting to maximize their utility (or satisfaction) from goods given their tastes and preferences and subject to a budget constraint determined by their income, food prices and prices of other goods. Food demand or purchases is a function of income and prices, as well as taste and preferences. We use 'food cost' instead of 'price' because the actual price that a consumer pays is a function of the in-store price and travel cost to the store where the food is purchased. These travel costs are a function of the availability of food stores, such as supermarkets or small groceries in a consumer's vicinity, and the in-store availability of specific foods. Even though a small grocery might be very close to an individual, if there is no in-store availability of fresh fruits e.g. a consumer who wants those might have to travel to a distant supermarket. Car ownership could lower overall travel costs if it shortens travel time to stores.

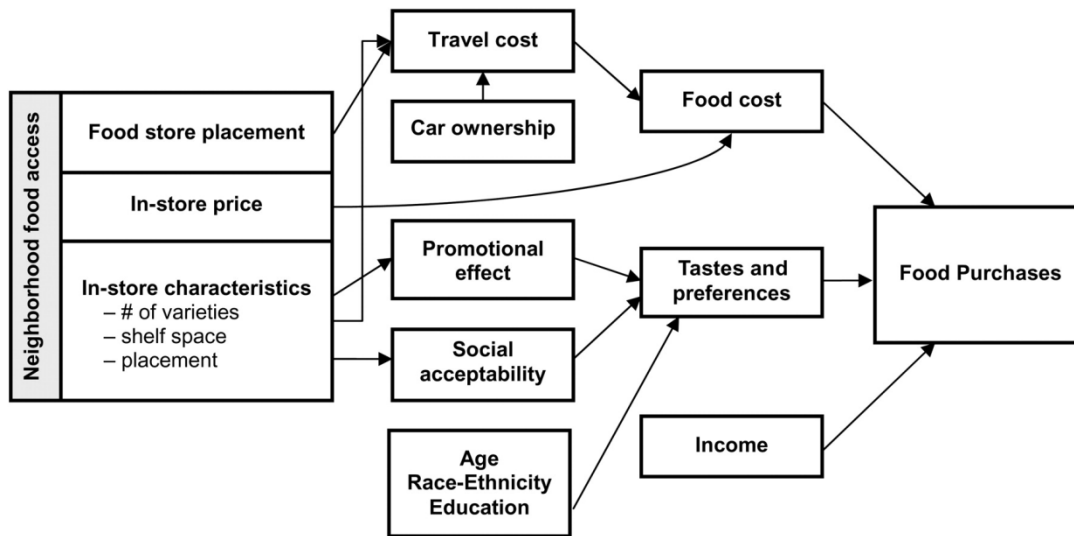


Figure 2: The economic model of food consumption

A detailed specification of demographic characteristics including age, race-ethnicity, schooling and other variables is useful for capturing unobserved information on consumers' tastes and preference. Such tastes and preferences might be based on knowledge and concern of the consumer regarding diet and health outcomes. In- store food availability including shelf space and placement of foods near registers, has a promotional effect that can influence consumers' preferences. A high concentration, or relative shelf space availability, of certain foods e.g energy-dense snack foods in corner groceries, could make these foods appear more socially acceptable and thus also influence consumers' preferences.

2.7.3 Theory of food access

According to Freedman et al. (2011), this conceptual is based on work in access to healthcare and provides a framework for understanding food access. This model showing access to healthful food is the result of the relationship between the retail food environments and potential consumers. And suggests food choice and healthy eating are influenced by available (potential access) and utilized shopping opportunities.

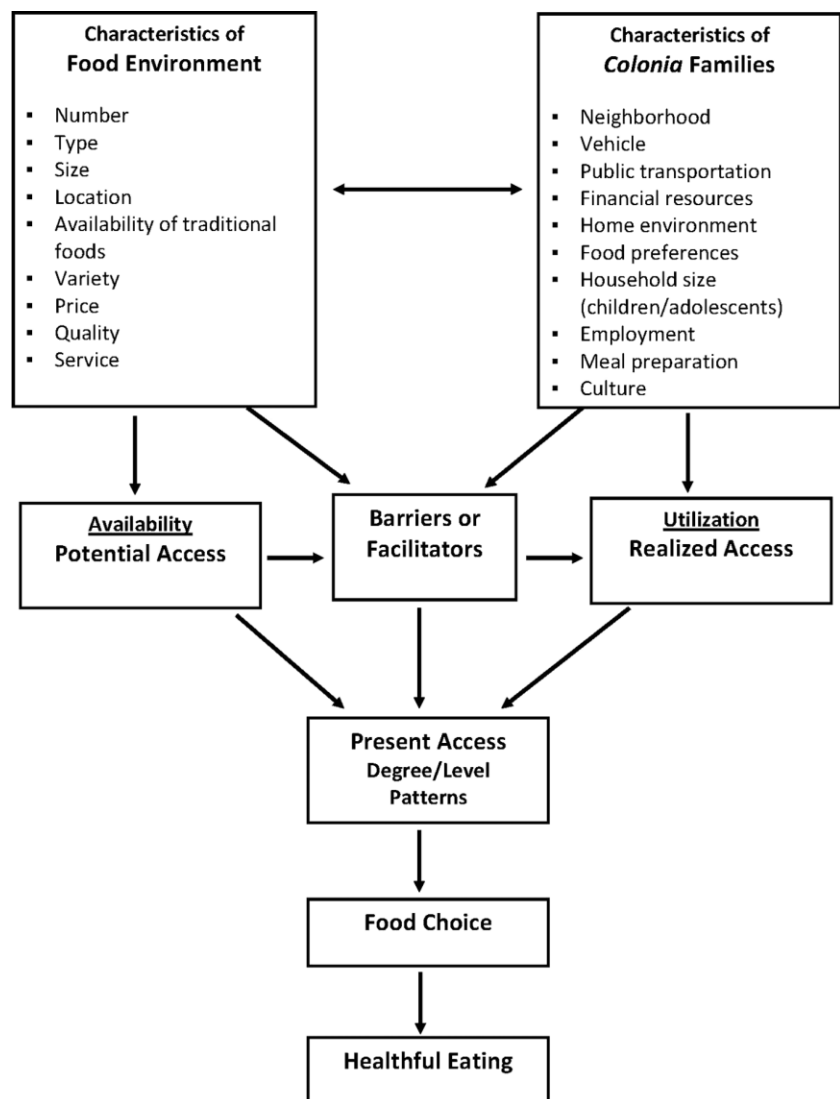


Figure 3: The theory of food access

Characteristics of the food environment include: number, type, size and location of food stores, availability (supply) of food categories e.g. fresh fruits, and variety of different items within a category e.g. different types of fresh fruits, price and quality of food items. Characteristics of potential consumers include neighborhood of residence, availability of a vehicle, public transportation, financial resources (type, amount and timing), home environment (food storage, meal preparation area and refrigeration), food preferences, meal preparation knowledge and skills, household size, employment, culture and health. Barriers or facilitators associated with the food environment and/ or consumer influence the selection of food purchase opportunity at a given time. For example; limited household refrigeration may require frequent, costly trips for

perishable food items, or purchase of more expensive or less healthy food items from a retail store closer to home. As a result, proximity to food stores may influence food choice through food cost and availability.

2.8 Conceptual Framework

The following conceptual framework guided this study;

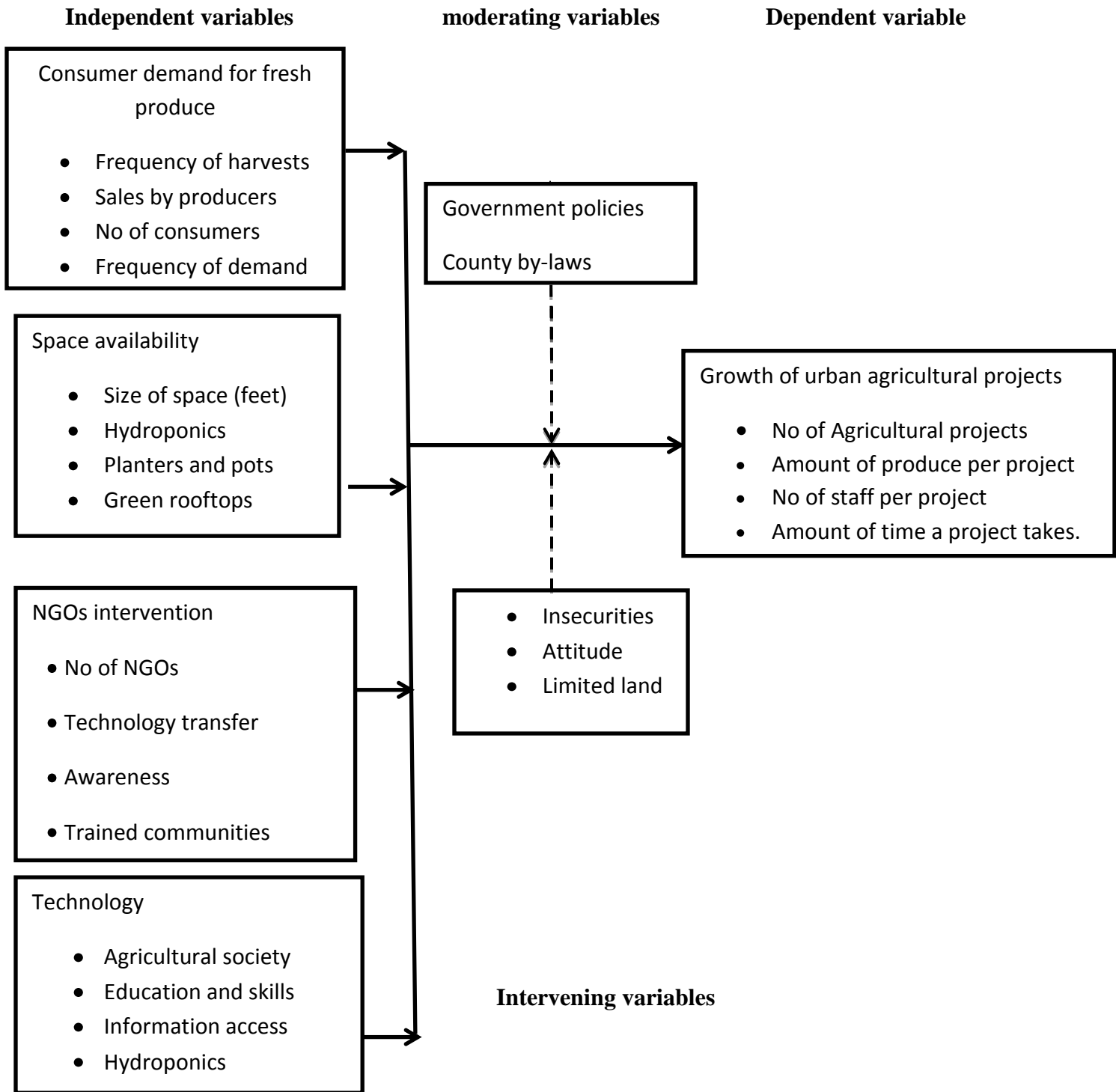


Figure 4: Conceptual framework

Growth of Urban Agricultural projects is the dependent variable which depends on the independent variable for its existence. The independent variable are consumer demand for fresh produce which is catalyzed by the following indicators: Frequency of harvests increases the amount of food available, sales by producers enhances the freshness of perishable food reaching urban consumers, number of consumers improves greater choice and better prices and the low-income urban consumers will increase. The other independent variable is space availability for the practice of Urban Agriculture which has the following indicators: size of land available, adequate knowledge on hydroponics, adequate planters and pots for planting and residents use green rooftops. NGOs and government intervention is another independent variable which has the following indicators: NGOs have to be involved in the planning process, technology transfer and advocacy and assistance can easily overcome legal and regulatory obstacles, NGOs always create awareness about urban agriculture and NGOs train communities better skills. Technology used in Urban Agriculture is another independent variable which has the following indicators: Better technologies tend to build agricultural society; technology can provide education and skills, access to information is essential to those of a time- sensitive nature and hydroponics is entirely used by participants. County by-laws is an important moderating variable and have the following indicators: local institutions, policies, regulations, training, job creation and land accessibility in Urban Agricultural projects.

2.9 Summary of knowledge gaps

There is a gap in the academic literature where there is little data on the long-term benefits that urban agriculture can provide. Many of the benefits are assumed, as interest in this chapter provides insights into various factors influencing the growth of Urban Agricultural projects. The increase in consumer demand for fresh produce has been highlighted as being one of the most important factors in the growth of Urban Agriculture.

Agriculture generally increases during times of economic uncertainty and then decreases when stability is restored, leading to a dearth of research on the long-term impacts. However, simply collecting data at the city or metropolitan level could help cities make good decisions about the best ways to incorporate urban agriculture into overall plans.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter deals with the research design and methodology used in the collection and analysis of the data in this study. These include; Research design, target population, sample size and sampling procedures, data collection instrument, data collection procedures, data analysis techniques, ethical considerations and operational definition of the variables. It provides adequate reasons as to why these methods and techniques were used. Descriptions of the sample and instruments that were used in the research are also dealt with.

3.2 Research design

This study used descriptive survey. The study aimed at collecting information from respondents on their opinions in relation to determinants of growth of Urban Agricultural projects in Lang'ata Sub County, Nairobi County. The descriptive design was found advantageous as it not only enabled the researcher to carry out fact finding but also resulted in the formulation of important principles of knowledge and solutions to the study problems. This method involved measurement, classification, analysis and interpretation of data as relates to factors that determine growth of Urban Agricultural projects in Lang'ata Sub County, Nairobi County.

The choice of this approach is because the study relied on a detailed description of events or peoples experiences. The aim of this study was to recognize the determinants of the growth of Urban Agricultural projects and compare them with theory. It sought to develop a detailed, intensive knowledge about a number of related cases. This strategy was useful for gaining knowledge of individual, organizational, social and real life occurrences thereby allowing retention of the holistic and meaningful characteristics of real life events here being Urban Agriculture and consumption processes.

The data was collected from the field through description. Urban Agriculture practices around Lang'ata Sub County; Nairobi County was observed and recorded in the field.

3.3 Target population

A population can be referred to as the entire set of relevant units' analysis or data. Target population refers to all people who possess the characteristics of interest. The target population in this study was the Lang'ata Sub County residents. Target population as defined by Mugenda and Mugenda (1999), is that population is to which a researcher wants to generalize the results of the study. The target population comprised of Lang'ata Sub County residents numbering 176,314. The study focused on Karen ward due to the proximity to the researcher, time available for research and budgetary constraints.

Table 3.1: Target population

Ward	Population
Karen	24, 507
Nairobi West	33, 366
Mugumoini	47, 037
South C	47, 202
Nyayo Highrise	24, 191
Total	176,314

2009 census

3.4 Sample size and sampling procedures

Sample refers to the number of people or things taken from a large group and used in tests to provide information about the group. Sampling is the process of selecting a sample. This study applied the cluster sampling procedure and purposive sampling. Cluster sampling is a form of random sampling where the entire population is divided into groups, or clusters and a random sample of these clusters are selected. All observations in the selected clusters may be included in the sample or simple random sampling techniques may be used to pick out the individuals to be included from each cluster. According to Caswell (1989), when all units of the selected cluster are interviewed, this is referred to as one-stage cluster sampling. If the subjects to be interviewed are selected randomly within the selected clusters, it is called two-stage cluster sampling. This research used the two-stage cluster sampling type of interview. All individuals in the clusters

chosen filled the questionnaires and responded to the interview. Purposive sampling is a sampling method in which elements are chosen based on purpose of the study. The researcher also used purposive sampling where she picked three divisions out of from Karen ward to investigate the determinants of growth of urban agricultural projects: case of Lang’ata Sub County, Nairobi County, Kenya. This method of sampling is useful in this study because it is difficult to know the exact number of individuals in Lang’ata Sub County who practice Urban Agriculture.

3.4.1 Sample size

According to sample distribution table advanced by Krejce and Morgan (1970), if the target population is more than 100 000 the sample size then is 384. Thus with a population likely to be more than 100 000, the desirable sample size will be 384. This was the total number of respondents.

Table 3.2 Sample size

Karen ward	Sample size
Karen	128
Lang’ata	128
Hardy	128
Total	384

3.4.2 Sampling procedure

The population that was studied was categorized into clusters that practice Urban Agriculture. Therefore the three clusters constituted the sampling frame. The researcher used purposive sampling and picked Karen ward which has four divisions: Karen, Lang’ata, Hardy and Lenana. The researcher sampled three clusters to represent Lang’ata Sub County. Two-stage cluster sampling was applied and in that case the individuals in the clusters were selected randomly

within the selected clusters. All the chosen respondents chosen in the three socio-economic classes filled the questionnaires.

3.5 Data collection instruments

Instrument refers to tools used to collect information from respondents. The researcher used observation, questionnaires and interviews as they were appropriate for a case study design. These methods enabled the researcher apart from getting the types of Urban Agriculture and the determinants that contribute to the growth of Urban Agriculture. Through the use of this method, the researcher was able to understand how the various Urban Agricultural practices around Lang'ata Sub County.

Discussion questions were used in this study to further probe the participant to give valuable information for documentation of the growth of urban agriculture in Lang'ata Sub County. The discussion questions focused on the determinants of growth of Urban Agricultural projects in Lang'ata Sub County, Nairobi County; Types of Urban Agricultural Projects in Nairobi County and the stakeholders involved in the growth of Urban Agricultural Projects in Lang'ata Sub County. Through this method, first-hand information was obtained.

I. Interview guide

According to Yin (2003) no source of information is better than others. In fact they should be considered complementary and therefore a good case study will rely on as many sources as possible. By using several sources of evidence means that the researcher has the opportunity to obtain multiple measures of the same phenomenon that adds validity to the scientific study. Much of the work was based on the Urban Agriculture producers and hence will be survey oriented.

It is with the above understanding that this study used the structured interview so as to facilitate following the theme and seek clarification where necessary. The instruments of data collection were interviews and specifically open ended interview schedules. Using unstructured interviews facilitated getting full data in this area and helped get as much insight to the subject as possible. The study specifically zeroed in on the Urban Agricultural projects team members for the interview purpose. The interview will be conducted by the researcher at the selected projects.

II. Observation checklist

Observation was partially used. This is because the respondents were not active every time the researcher carried out the research. Marshall and Rossman (1989) define observation as the systematic description of events, behaviors and artifacts in the social setting chosen for study. Observations enable the researcher to describe existing situations using the five senses, providing a 'written photograph' of the situation under study (Erlandson, Harris, Skipper and Allen 1993). Demunck and Sobo (1998) describe participant observation as the primary method used by anthropologists during fieldwork. Fieldwork involves "active looking, improving memory, informal interviewing, writing detailed field notes and perhaps most importantly, patience". According to Dewalt and Dewalt (2002), participant observation is the process enabling researchers to learn about the activities of the people under study in the natural setting through observing and participating in those activities. It provides the context for development of sampling guidelines and interview guides. Schensul and LeCompte (1999), define participant observation as "the process of learning through exposure to or involvement in the day-to-day or routine activities of participants in the research setting".

Any data collection tool worth its purpose has to be fit to measure what it intends to measure and should also be capable of generating the same results on repeat measurements. The two properties are validity and reliability of the data collection instruments.

3.5.1 Pilot testing of the instruments

Basically, pilot testing means finding out if the survey, key informant interview guide, questionnaire or observation form will work in the 'real world' by trying it out first on a few people. The researcher carried out a pilot test to find out how well the questionnaire would work in practice. The study administered 10 questionnaires to respondents out of the target population. The researcher was able to identify and correct problems with the length of the questions, wording, structure, coding and instructions. The refined questionnaire was then tested for validity and reliability.

3.5.2 Validity of the instrument

Saunders and Thornhill (2000), refer to validity as the appropriateness, meaningfulness and usefulness of the inferences a researcher makes. Validity is concerned with whether the findings are really about what they appear to be about. Chisnal (1997), states that it refers to how well a specific research method measures what it claims to measure.

Construct validity is one major consideration in this study to improve on this validity there are three tactics that will be include: use of multiple sources of evidence that will generate a chain of evidence that is employed in this study. Key respondents will be helpful in criticizing schedule offering their advice on whether it will cover the area under study adequately.

Other than relying on and using interviews, questionnaire and documents in this study, literature on the subject was also used as sources of evidence. But the documents and literature are not included in the analysis but were used extensively as complementary sources. According to Yin (2003), establishing a chain of evidence is to allow the derivation of any evidence from initial research question to ultimate case study conclusion. This study made references to all sources from which evidence was collected.

The researcher used discussion questions and observation therefore the researcher used face validity to validate these instruments. This is concerned with the extent to which the research instrument measures what it appears to measure according to the researcher's subjective assessment. The validity of the instrument was determined with the help of the supervisor.

3.5.3 Reliability of the instrument

This is a test of sound measurement that determines the consistency of results of the instrument (Kothari, 2004). It is the ability of research instrument to yield consistent results or data after repeated trials (Ngechu, 2004). By using the split-half method (Gakuu, 2013), the researcher scored two halves of the test separately of 10 selected respondents from sample. SPSS was used to compute the reliability coefficients. The Cronbach's alpha obtained was 0.745 and the Spearman-Brown's coefficient was 0.802, indicating high internal consistency of the questionnaire items. A measure of 0.7 or higher is considered acceptable

3.6 Data collection procedures

Observation method and questionnaires was used to collect data for this research. This section outlines the data collection procedures used. In this study, primary data was collected through anonymously filled questionnaire distributed to respondents. Secondary data was obtained from the library research. Prior to commencing data collection; the researcher obtained a letter of introduction from the university. Permission was sought from the Sub County office in Lang'ata Sub County before data is collected to reassure them that the research is academic in nature. This facilitated data to be collected in the shortest time possible.

3.7 Data analysis techniques

The analysis is based on Determinants of growth of Urban Agriculture projects in Lang'ata Sub County. The data was collected directly from the farmers through discussion, questionnaires and participation. The farmers fell under three categories; the upper class, the middle class and the lower class. The relevant notes were taken to capture first-hand information. The information was collected and then compiled later based on relevance to the study.

3.8 Ethical considerations

Ethical considerations are an integral part of the research planning and implementation process and not viewed as an afterthought or a burden. The researcher upheld respect for the respondents. She treated them with respect and courtesy no matter the age, social class, and level of education or place of residence. The researcher also made sure that the procedures of sampling and research were reasonable, non-exploitative, carefully considered and fairly administered.

The research design was valid because it added value to the participants, the researcher and the society at large. The researcher was competent to carry out the research with permission from the relevant authority like the NACOSTI, County government and the school. The researcher also ensured respect of privacy and confidentiality requested by the participants. She also ensured that she maximized benefits and minimized the risks to the participants.

The sample selection was appropriate for the purpose of the study. That means that the representative of the population benefited the study and was sufficient in number.

The respondents agreed to participate through voluntary informed consent without threat. The researcher also ensured that the participants have been informed about all the necessary information and whether there was any harm involved.

3.9 Operational definition of the variables

Operational definition is a set of procedures that describe the activities to be performed to empirically establish the existence or degree of existence of a phenomenon described as a concept.

Table 3.3 Operational definition of the variables

Objectives	Independent variable	Indicators	Measurements	Data collection	Data analysis
Influence of consumer demand for fresh produce on growth of Urban Agricultural Projects	Consumer demand for fresh produce	-Frequency of harvests -Sales by producers -No of consumers -Frequency of demand	-Nominal -Interval	Questionnaire	Descriptive
Influence of Space availability on growth of Urban Agricultural Projects	Space availability	-Size of space -knowledge on hydroponics -Adequate planters and pots -green rooftops	-Nominal -Interval	Questionnaire	Descriptive

Influence of Non-Governmental Organizations intervention on growth of Urban Agricultural Projects	NGOs intervention	-No of NGOs -Awareness -No of training	- Nominal -Interval	Questionnaire	Descriptive
Influence of Technology on growth of Urban Agricultural Projects	Technology	-Better technologies -Education and skills -Access to information -Hydroponics	- Nominal -Interval	Questionnaire	Descriptive
Growth of Urban Agricultural Projects	Dependent variable	-No of Agricultural Project -Amounts of Produce per Project -No of staff per Project -Amount of time a project takes	-Nominal -Interval	Questionnaire	Descriptive

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION AND INTERPRETATION

4.1 Introduction

This chapter presents analysis, findings and discussion of the study. Data analysis is the process of systematically applying statistical and logical techniques to describe and illustrate, condense, recap and evaluate data.

4.2 Response Rate

The study targeted 384 respondents from Lang'ata sub county, Nairobi. The respondents were from the three socio-economic classes represented by Karen as the upper class, Lang'ata as the middle class and Hardy as the lower class. All of them practiced urban agriculture. Of the 384 questionnaires distributed, 305 were filled and returned. This represents a response rate of 79% which is above the 50% statistical significance, according to Mugenda and Mugenda (2003).

Table 4.1: Response Rate

Responses	Frequency	Percentage
Karen	99	26
Lang'ata	102	27
Hardy	104	27
Total non-responses	79	20
Total	384	100

4.3 Demographic Information

The study sought to establish the information on the respondents involved in the study concerning the gender, marital status, age, level of education, years of practice and housing type.

4.3.1 Gender of the Respondents

The study requested the respondents to state their gender type. The results are tabulated in table 4.2

Table 4.2: Gender Response Rate

Responses	Frequency	Percentage
Female	183	60
Male	122	40
Total	305	100

From the findings, the majority of the respondents were female at 183 (60%), while 122 (40%) were male. The findings indicate that the number of females involved in urban agricultural projects in Lang'ata Sub County is higher when compared with that of males.

4.3.2 Housing type of the respondents

The study sought to establish the type of housing of the respondents. Table 4.3 shows the responses.

Table 4.3: Housing type of the Respondents

Responses	Frequency	Percentage
Single family house	34	11
Row/Town housing	151	50
Apartment housing	66	22
Temporary housing	54	17
Total	305	100

From the findings, majority of the respondents 151 (50%) indicated that they live in row/town housing, 66 (22%) live in apartment housing, 54 (17%) live in temporary housing while 11% live in single family house. The findings therefore indicate that most residents in Lang'ata Sub County live in row/town houses thus leading to growth of urban agricultural projects.

4.3.3 Marital Status of the Respondents

The study also sought to establish the marital status of the respondents. Table 4.4 shows the responses.

Table 4.4: Marital Status of the Respondents

Responses	Frequency	Percentage
Married	250	82
Single	55	18
Total	305	100

According to the study, majority of the respondent were married at 250 (82%) and the single respondents were at 55 (18%). The findings suggested that married participants encompassed above average percentage of the total residents in Lang’ata Sub County.

4.3.4 Age of the Respondents

The study sought to establish the age of the respondents. Table 4.4 shows the responses.

Table 4.5: Age of the respondents

Responses	Frequency	Percentage
19 and below	8	4
20-29	25	8
30-39	94	31
40-49	50	16
50 and above	126	41
Total	305	100

From the table above, majority of the respondents 126 (41%) indicated that they were aged 50 and above years, 94 (31%) were between 30-39 years old, 50 (16%) were between 40-49 years old, 25 (8%) of the respondents were 20-29 years while 8 (4%) were 19 years and below. The findings revealed that most of the residents were aged 50 and above years of age and thus had experience in urban agricultural projects.

4.3.5 Level of Education

The study further asked the respondents to indicate their level of education. Table 4.6 indicates the education levels attained by the respondents.

Table 4.6: Level of Education

Responses	Frequency	Percentage
None	78	25
Primary	30	10
Secondary	42	14
Tertiary	60	20
University	95	31
Total	305	100

From the findings, most of the respondents 95 (31%) indicated that they were University degree holders, 78 (25%) of the respondents had no formal education, 60 (20%) were tertiary and college graduates, 42 (14%) had attained Kenya Certificate of secondary education and 30 (10%) of the respondents had attained Kenya Certificate of Primary Education. The findings implied that most residents in Lang'ata Sub County had obtained university degree as their highest education level thus possessed sufficient information on urban agricultural projects.

4.3.6 Urban Agriculture

The study sought to establish whether the respondents practiced Urban Agriculture as employees or as owners of the projects. Table 4.7 shows the results.

Table 4.7: Urban Agriculture

Respondents	Frequency	Percentage
As employees	192	63
As owners of the projects	113	37
Total	305	100

From the findings, majority of the respondents 192 (63%) indicated that they practiced urban agriculture as employees while 113 (37%) practiced urban agriculture as the owners of the projects. The findings therefore reveal that most residents in Lang'ata Sub County practice agriculture as a source of their living.

4.3.7 Years of Practice in Urban Agriculture

The study also sought to establish the number of years the respondents practiced urban agriculture. Table 4.8 shows the findings.

Table 4.8: Years of experience in Urban Agriculture

Respondents	Frequency	Percentage
1-3 years	115	38
4-6 years	74	24
7-9 years	60	19
10-12 years	51	17
13 and above	5	2
Total	305	100

From the findings, most participants 115 (38%) had practiced Urban Agriculture for between 1 and 3 years, 74 (24%) had practiced Urban Agriculture for between 4 and 6 years, 60 (19%) had practiced Urban Agriculture for between 7 and 9 years, 51 (17%) had practiced urban agriculture for between 10 and 12 years while 5 (2%) had practiced urban agriculture for 13 years and above. The findings therefore showed that most of the residents had practiced Urban Agriculture for a period of 1 and 3 years and thus may have little experience on growth of urban agricultural projects.

4.3.9 Reasons for practicing urban agriculture

The study sought to establish the reasons for practicing urban agriculture. Table 4.10 below showed the results

Table 4.10: Reasons for practicing urban agriculture

Respondents	Frequency	Percentage
Most of my friends were practicing	31	10
My family and relatives were already practicing	82	27
It was an idea given to me and had to use it	102	33
Most of my neighbors or business associates practice it	90	30
Total	305	100

The table above shows that the most respondents practice urban agriculture because it was an idea given to them and had to use it. The results were: most of my friends were practicing at 10%; my family and relatives were already practicing it at 27%; it was an idea given to me at 33% and most of my neighbors or business associates practice it at 30%.

4.3.10 Monthly income bracket from urban agriculture

The study also sought to find out the monthly income bracket from urban agriculture. Table 4.11 showed the response

Table 4.11: Monthly income bracket

Respondents	Frequency	percentage
19 000 and below	121	40
20 000-49 000	109	36
50 000-79 000	52	17
80 000-109 000	13	4
110 000 and above	10	3
Total	305	100

The result from the respondents was: 40% earned 19 000 and below from urban agriculture;36% earned between 20 000 and 49 000; 17% earned between 50 000 and 79 000; 4% earned between 80 000 and 109 000 while 3% earned 110 000 and above.

4.3.11 Personal interest in gardening

The study sought to find out what gardening activities the respondents engaged in. table 4.12 showed the results.

Table 4.12: Personal interest in gardening

Respondents	Frequency	Percentage
General landscaping or home yard care	51	17
Home/personal gardening	35	11
Balcony gardening or planters	42	14
Community gardening or yard shares	21	7
Commercial gardening	156	51
Total	305	100

The table above shows that most respondents engaged in commercial gardening at 51%; general landscaping or home yard care at 17%; home or personal gardening at 11%; balcony gardening or planters at 14% while community gardening or yard shares at 7%,

4.3.12 Description of interest in gardening

This study also sought to find out the respondents interest in gardening. The result is shown in table 4.13.

Table 4.13: Interest in gardening

Respondents	Frequency	Percentage
Not at all interested	0	0
Not very interested	0	0
Neither interested or disinterested	0	0
Somewhat interested	4	1
Very interested	301	99
Total	305	100

The table above shows that all the respondents were interested in gardening. Only 1% was somewhat interested while the 99% was very interested in gardening.

4.4 Community gardens

Community gardens are generally understood as pieces of land used collectively which can be used to grow food for personal use or individual use.

4.4.1 Relationship with community gardens

The study asked the respondents to indicate their relationship with community gardens. Table 4.17 showed the results.

Table 4.14: Community gardens

Respondents	Frequency	Percentage
I am currently a member	0	0
I would like to be a member	200	66
Have been a member previously but am currently not a member	0	0
I have no interest in community gardens	4	1
I am unfamiliar with community gardens	101	33
Total	305	100

The table above shows that majority of the respondents were interested in community gardens at 66%; 1% of the respondents have no interest in community gardens while 33% of the respondents were unfamiliar with community gardens.

4.4.2 Community garden for personal use

Respondents were asked to select where community gardens for personal use would be appropriate. Table 4.18 gives the results.

Table 4.15: Community garden for personal use

Respondents	Frequency	Percentage
Agricultural areas	35	11
Residential areas	122	40
Commercial areas	110	36
School sites	5	2
Public parks	18	6
Utility corridors	15	5
Total	305	100

The table above shows the results. 11% of the respondents wanted community gardens for personal use to be at agricultural areas; 40% at residential areas; 36% at commercial areas; 2% at school sites; 6% at public parks while 5% at utility corridors.

4.4.3 Community garden for commercial use

Respondents were asked to select where community gardens for commercial use would be appropriate. Table 4.19 gives the results.

Table 4.16: Community garden for commercial use

Respondents	Frequency	Percentage
Agricultural areas	107	35
Residential areas	84	28
Commercial areas	107	35
School sites	0	0
Public parks	4	1
Utility corridors	3	1
Total	305	100

From the table above, respondents selected where community gardens for commercial use would be appropriate. 35% wanted community gardens for commercial use to be at agricultural

areas;28% at residential areas;35% at commercial areas; 0% at school sites;1% at public parks while 1% at utility corridors.

4.4.4 Land for urban agriculture

Respondents were asked to select the statement that most closely resembles their opinion. Table 4.20 gives the results of the respondents.

Table 4.17: Land for urban agriculture

Respondents	Frequency	Percentage
Land being used for urban agriculture should be specifically zoned for agricultural use	137	45
Urban agriculture should be allowed on any vacant lots, regardless of their zoning	60	20
Urban agriculture should be allowed on some vacant lots	108	35
Total	305	100

Table 4.17 shows: 45% of the respondents said that land being used for urban agriculture should be specifically zoned for agricultural use; 20% said that urban agriculture should be allowed on any vacant lots, regardless of their zoning while 35% said that urban agriculture should be allowed on some vacant lots.

4.4.5 Sale of urban agriculture produce

The respondents were asked to select the statement that most closely resembled their opinion on sale of urban agriculture produce. Table 4.21 shows the results.

Table 4.18: Sale of urban agriculture produce

Respondents	Frequency	Percentage
Gardens being used for urban agriculture should be allowed to sell produce on site with no restrictions	153	50
Gardens being used for urban agriculture should only be allowed to sell produce offsite at farmers' markets or grocery stores	96	32
Gardens being used for urban agriculture should be allowed limited onsite sales, restricted to within the neighborhood and only at certain times	56	18
Total	305	100

From the table above, 50% of the respondents said that gardens being used for urban agriculture should be allowed to sell produce on site with no restrictions; 32% said gardens being used for urban agriculture should only be allowed to sell produce offsite at farmers' markets or grocery stores while 18% said gardens being used for urban agriculture should be allowed limited onsite sales, restricted to within the neighborhood and only at certain times.

4.4.6 Operation of urban and community gardens

The respondents were asked questions that relate to both community gardens and urban agriculture. They were asked to indicate the types of garden structures or activities they felt appropriate for use within their neighborhood. The results are shown in table 4.22.

Table 4.19: Types of garden structure

Respondents	Frequency	Percentage
Greenhouses	56	18
Tool sheds	10	3
Farm stands-limited sales on site	22	7
Market gardens- continual sales on site	15	5
Production facilities	5	2
Compost bins or storage	70	23
Motorized gardening equipment	2	1
Fertilizer use	30	10
Pesticide use	52	17
Herbicide use	43	14
Total	305	100

The findings indicated that 18% of the respondents thought greenhouses were appropriate within their neighborhood; 3% preferred tool sheds; 7% preferred farm stands-limited sales on site; 5% preferred market gardens-continual sales on site; 2% preferred production facilities; 23% preferred compost bins or storage; 1% preferred motorized gardening equipment; 10% preferred fertilizer use; 17% preferred pesticide use while 14% preferred herbicide use.

4.4.7 Making decisions regarding gardening

The respondents were asked to give their top priority opinion regarding decision making regarding gardening within their neighborhood. The results are shown in table 4.23.

Table 4.20: Making decisions regarding gardening

Respondents	Frequency	Percentage
Establish a local food supply	93	30
Support the local economy	95	31
Protect local food security	86	29
Utilize vacant lots	19	6
Limit noise	5	2
Limit odour	4	1
Limit operating hours	3	1
Total	305	100

From the responses above, 30% of the respondents gave priority to establish a local food supply; 31% gave priority to support the local economy; 29% gave priority to protect local food security; 6% gave priority to utilize vacant lots; 2% gave priority to limit noise; 1% gave priority to limit odor while 1% gave priority to limit operating hours.

4.5 Level of Agreement on Consumer Demand for Fresh Produce

The respondents were asked to indicate their level of interest with the following statements that relate to consumer demand for fresh produce in relation to urban agriculture projects. The responses were rated on a five point Likert scale where: 1= Not at all interested, 2= Not very interested, 3= neither interested nor disinterested, 4= somewhat interested and 5 = Very interested. The findings are given in table below.

Table 4.21: Consumer Demand for Fresh Produce

Consumer Demand for Fresh Produce	Mean	Std. Deviation
Frequency of harvests increases the amount of food available	3.59	0.650
Sales by producers enhances the freshness of perishable food reaching urban consumers	4.09	0.620
Number of consumers improves greater choice and better prices	4.60	0.894
The number of low- income urban consumers will increase	3.11	0.656

From the findings, majority of the respondents were somewhat interested with the statement that number of consumers improves greater choice and sales by producers enhances the freshness of perishable food reaching urban consumers with mean scores of 4.60 and 4.09 respectively. Majority of respondents were also neither interested nor disinterested with the statements that frequency of harvests increases the amount of food available the number of low- income urban consumers will increase with mean scores of 3.59 and 3.11 respectively. The findings therefore stipulate that most of the residents in Lang'ata Sub County were somewhat interested with the statement that number of consumers improves greater choice and sales by producers enhances the freshness of perishable food reaching urban consumers. These can make an important contribution to household food security, especially in times of crisis or food shortages.

4.6 Statements on Space Availability

The study sought to establish the extent to which the respondents considered the following factors regarding space availability when making decisions to practice urban agriculture. The responses were rated on a five point Likert scale where: 1= Not at all interested, 2= Not very interested, 3= Neither interested or disinterested, 4= Somewhat interested and 5 = Very interested. The mean and standard deviations were generated from SPSS and are as illustrated in table below.

Table 4.22: Influence of space availability

Influence of space availability	Mean	Std. Deviation
Size of land available is large	3.09	0.884
There is adequate knowledge on hydroponics	4.27	0.607
There are adequate planters and pots for planting	4.59	0.493
Most residents use green rooftops	4.01	0.871

From the findings, majority of the respondents were somewhat interested with the statements that there are adequate planters and pots for planting, there is adequate knowledge on hydroponics and most residents use green rooftops with mean scores of 4.59, 4.27 and 4.01 respectively. Majority of respondents were also neither interested nor disinterested with the statement Size of land available is large with a mean score of 3.09. The findings therefore insinuate that most residents in Lang’ata Sub County, Nairobi were somewhat interested that there are adequate planters and pots for planting, there is adequate knowledge on hydroponics and most residents use green rooftops.

4.7 Statements on Non-Governmental Organizations Intervention

The respondents were requested to indicate the extent to which they compared with the following statement regarding Non-Governmental Organizations Intervention. The responses were rated on a five point Likert scale where: 1= Not at all interested, 2= Not very interested, 3= neither interested nor disinterested, 4= somewhat interested and 5 = Very interested. The findings are illustrated in table below.

Table 4.23: Influence of Non-governmental Organizations intervention

Non-governmental Organizations intervention	Mean	Std. Deviation
NGOs have to be involved in the planning process	3.05	0.924
Technology transfer and advocacy and assistance can easily overcome legal and regulatory obstacles	4.33	0.760
NGOs always create awareness about urban agriculture	3.10	0.555
NGOs train communities better skills	4.71	0.871

From the findings, majority of the respondents were somewhat interested with the statements that NGOs train communities' better skills and technology transfer and advocacy and assistance can easily overcome legal and regulatory obstacles with mean scores of 4.71 and 4.33 respectively. Furthermore, majority of the respondents were neither interested nor disinterested with the statements that NGOs always create awareness about urban agriculture and NGOs have to be involved in the planning process with mean scores of 3.10 and 3.05 respectively. The findings therefore show that most residents in Lang'ata Sub County were somewhat interested with the statements that NGOs train communities' better skills and technology transfer and advocacy and assistance can easily overcome legal and regulatory obstacles.

4.8 Statements on Technology

The respondents were requested to indicate the extent to which they agreed with the following statement regarding technology. The responses were rated on a five point Likert scale where: 1= Not at all interested, 2= Not very interested, 3= neither interested nor disinterested, 4= somewhat interested and 5 = Very interested. The mean and standard deviations were generated from SPSS and are as illustrated in table below.

Table 4.24: Influence of technology

Influence of technology	Mean	Std. Deviation
Better technologies tend to build agricultural society	4.09	0.657
Technology can provide education and skills	4.11	0.351
Access to information is essential to those of a time-sensitive nature	3.59	0.888
Hydroponics is entirely used by participants	1.59	0.249

From the findings, majority of the respondents were somewhat interested that technology can provide education and skills and better technologies tend to build urban agricultural society with mean scores of 4.11 and 4.09 respectively. Majority of the respondents also were neither interested nor disinterested with the statement that access to information is essential to those of a time-sensitive nature with a mean score of 3.59. However, some respondents were not at all interested with the statement that hydroponics is entirely used by participants with a mean score of 1.59. The findings therefore reveals that majority of residents living in Lang’ata Sub County were somewhat interested that technology can provide education and skills and better technologies tend to build urban agricultural society.

4.9 Inferential Statistics

4.9.1 Correlation Analysis

The researcher used Pearson correlation coefficient to examine presence or absence of correlation between consumer demand for fresh produce, space availability, Non-Governmental Organization intervention and technology as determinants of growth of urban agricultural projects of Lang’ata Sub County in Nairobi County, Kenya. The table below illustrates the findings.

Table 4.25: Correlation Analysis

	Y	X1	X2	X3	X4
Y	1				
X1	0.522	1			
X2	0.288	0.061	1		
X3	0.311	0.166	0.104	1	
X4	0.503	0.313	0.301	0.204	1

*. Correlation is significant at the 0.05 level (2-tailed).

Key:

Y = Growth of urban agricultural projects

X1 = Consumer demand for fresh produce

X2 = Space availability

X3 = Non-Governmental Organization intervention

X4 = Technology

From the findings, there was a strongly positive relationship between growth of urban agricultural projects and consumer demand for fresh produce having a correlation coefficient of 0.522. This indicates that consumer demand for fresh produce plays a major role in growth of urban agricultural projects in that for growth of urban agricultural projects to be effective, the consumer demand for fresh produce must increase.

The results show that technology is strongly related to growth of urban agricultural projects with a correlation coefficient of 0.503. This implies that an increase in technology advancement leads to the growth of urban agricultural projects through provision of management advice and use of online distance education techniques.

Furthermore, the results show a positive relationship between growth of urban agricultural projects and Non-Governmental Organization intervention having a correlation coefficient of

0.311. These results meant that the high the level of Non-Governmental Organization intervention, the higher the number of urban agricultural projects.

The results further indicated that there was a positive relationship between urban agricultural projects and space availability with a correlation coefficient of 0.288. This result indicates that availability of space in urban places like Lang’ata can lead to an increase in number of urban agricultural projects.

4.9.2 Regression Analysis

Regression model was used during the study to predict the magnitude to which consumer demand for fresh produce, space availability, Non-Governmental Organization intervention and technology has determined growth of urban agricultural projects of Lang’ata Sub County in Nairobi County, Kenya. The table below presents the results of the regression model summary.

Table 4.26: Regression Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.837 ^a	0.701	0.475	6.571

a Predictors: (Constant), Growth of urban agricultural projects

The results from the table above designated that a combination of consumer demand for fresh produce, space availability, Non-Governmental Organization intervention and technology had 70.1% (R square= 0.701) predictive likelihood for growth of urban agricultural projects. $R^2=70.1\%$ means that the predictor variable explains 70.1% of the variation in growth of urban agricultural projects which was attributed to consumer demand for fresh produce, space availability, Non-Governmental Organization intervention and technology. From the findings, 29.9% of the variance is unexplained.

Table 4.27: Analysis of Variance (ANOVA)

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	6.217	1	1.2434	4.214	.002 ^b
	Residual	80.431	303	0.5123		
	Total	86.648	304			

a) Dependent Variable: Growth of urban agricultural projects

b) Predictors: (Constant) Consumer demand for fresh produce, Space availability, Non-Governmental Organization intervention and Technology

The P value in the study is less than 5% (0.05) level of significance as indicated by sign < 002. This meant that the regression model was significant and therefore fit for the study. The regression model is:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + e$$

Where;

Y= Growth of urban agricultural projects

α = Constant Term

β_1 = Beta coefficients

X_1 = Consumer demand for fresh produce

X_2 = Space availability

X_3 = Non-Governmental Organization intervention

X_4 = Technology

e= Error Term

The coefficients of the regression model are illustrated in the table below.

Table 4.28: Regression Model Coefficients

Model		Unstandardized		Standardized		t	Sig.
		Coefficients		Coefficients			
		B	Std. Error	Beta			
1	(Constant)	.399	.212			1.241	.017
	X1	.340	.189	.164		1.217	0.001
	X2	.389	.314	.191		1.719	0.005
	X3	.354	.342	.161		1.311	0.011
	X4	.355	.369	.224		1.287	0.007

a Dependent Variable: Growth of urban agricultural projects

The regression equation is:

$$Y=0.399+0.340X_1+0.389X_2+ 0.354X_3 + 0.355X_4$$

The equation above inferred that growth of urban agricultural projects was highly influenced by better consumer demand for fresh produce, space availability, Non-Governmental Organization intervention and technology. Given all the predictor variables constant at zero (0), growth of urban agricultural projects will be 0.399.

The regression coefficient for consumer demand for fresh produce is 0.340. This means that the relationship between consumer demand for fresh produce and growth of urban agricultural projects is positive. This implies that an increase in consumer demand for fresh produce lead to growth of urban agricultural projects and vice versa.

The regression coefficient for space availability is 0.389. This means that the relationship between space availability and growth of urban agricultural projects is positive. This denotes that for an increase in space availability, the number of urban agricultural projects across Lang'ata Sub County will go up and vice versa.

The regression coefficient for Non-Governmental Organization intervention is 0.354. This means that the relationship between Non-Governmental Organization intervention and growth of urban agricultural projects is positive. This indicates that effective Non-Governmental Organization intervention methods in regard to project evaluation will result to a boom in growth of urban agricultural projects and vice versa.

The regression coefficient for technology is 0.355. This means that the relationship between technology and growth of urban agricultural projects is positive. This infers that the better the technology, the higher the chances are for the growth of urban agricultural projects and vice versa.

CHAPTER FIVE

SUMMARY OF FINDINGS, DISCUSSIONS, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the discussions on key data findings, conclusions drawn and recommendations. These discussions, conclusions and recommendations were focused on the four objectives of the study. These were: to establish the influence of consumer demand for fresh produce on growth of urban agricultural projects in Lang'ata Sub County, Nairobi County; to examine the influence of space availability on growth of urban agricultural projects in Lang'ata Sub County, Nairobi County; to assess the influence of Non-governmental Organizations intervention on growth of urban agricultural projects in Lang'ata Sub County, Nairobi County and to evaluate the influence of Technology on growth of urban agricultural projects in Lang'ata Sub County, Nairobi County. The study was carried out in three wards in Lang'ata Sub County which include Karen which represents the upper class, Langa'ata which represents the middle class and hardy which partly represents the lower class.

5.2 Summary of findings

In this section, summary of findings follow the order of research objectives and data as presented in chapter four. The purpose of the study is to establish the determinants of growth of urban agriculture in Lang'ata Sub County, Nairobi County.

5.2.1 Influence of consumer demand for fresh produce

From the findings, majority of the respondents were somewhat interested with the statement that number of consumers improves greater choice and sales by producers enhances the freshness of perishable food reaching urban consumers with mean scores of 4.60 and 4.09 respectively. Majority of respondents were also neither interested nor disinterested with the statements that frequency of harvests increases the amount of food available the number of low- income urban consumers will increase with mean scores of 3.59 and 3.11 respectively. The findings therefore stipulate that most of the residents in Lang'ata Sub County were somewhat interested with the

statement that number of consumers improves greater choice and sales by producers enhances the freshness of perishable food reaching urban consumers. These can make an important contribution to household food security, especially in times of crisis or food shortages.

The study sought to establish the level of agreement with the statements that relate to consumer demand for fresh produce in relation to urban agricultural projects. The results were, 18% of the respondents were neither interested nor disinterested with the statement that frequency of harvests increases the amount of food available; 31% of them were somewhat interested with the statement that sales by producers enhances the freshness of perishable food reaching urban consumers ; 26% were somewhat interested with the statement that number of consumers improves greater choice and better prices while 25% were neither interested nor disinterested with the statement that the number of low-income urban consumers will increase. All these led to the growth of urban agriculture.

The study found a strongly positive relationship between growth of urban agricultural projects and consumer demand for fresh produce having a correlation coefficient of 0.522. Consumer demand for fresh produce plays a major role in growth of urban agricultural projects in that for growth of urban agricultural projects to be effective, the consumer demand for fresh produce must increase.

5.2.2 Influence of space availability

From the findings, majority of the respondents were somewhat interested with the statements that there are adequate planters and pots for planting, there is adequate knowledge on hydroponics and most residents use green rooftops with mean scores of 4.59, 4.27 and 4.01 respectively. Majority of respondents were also neither interested nor disinterested with the statement Size of land available is large with a mean score of 3.09. The findings therefore insinuate that most residents in Lang'ata Sub County, Nairobi were somewhat interested that there are adequate planters and pots for planting, there is adequate knowledge on hydroponics and most residents use green rooftops.

The findings indicated that 4% of the respondents were neither interested nor disinterested with the statement that size of land available is large; 37% were somewhat interested with the statement that there is adequate knowledge on hydroponics; 49% of them were somewhat

interested with the statement that there are adequate planters and pots for planting while 10% were somewhat interested in the statement that most residents use green rooftops.

According to Dennery (1995), it appears that cultivation is acceptable but is not well viewed by local policy makers. The legal status of those who use open space plots but do not own them is even more ambiguous. It is expected that the frequency of evictions will increase as the legally recognized owner's start building housing in the area.

5.2.3 Influence of Non-governmental Organizations intervention

From the findings, majority of the respondents were somewhat interested with the statements that NGOs train communities' better skills and technology transfer and advocacy and assistance can easily overcome legal and regulatory obstacles with mean scores of 4.71 and 4.33 respectively. Furthermore, majority of the respondents were neither interested nor disinterested with the statements that NGOs always create awareness about urban agriculture and NGOs have to be involved in the planning process with mean scores of 3.10 and 3.05 respectively. The findings therefore show that most residents in Lang'ata Sub County were somewhat interested with the statements that NGOs train communities' better skills and technology transfer and advocacy and assistance can easily overcome legal and regulatory obstacles.

The study established that respondents started practicing urban agriculture due to the intervention of Non-Governmental Organizations. 15% were neither interested or disinterested with the statement that NGOs have to be involved in the planning process; 32% were somewhat interested in the statement that technology transfer and advocacy and assistance can easily overcome legal and regulatory obstacle; 18% were neither interested nor disinterested in the statement that NGOs always create awareness about urban agriculture while 35% of them were somewhat interested nor disinterested in the statement that NGOs train communities better skills.

The results show a positive relationship between growth of urban agricultural projects and Non-Governmental Organization intervention having a correlation coefficient of 0.311. It found that that there are adequate planters and pots for planting, there is adequate knowledge on hydroponics and most residents use green rooftops. Nairobi has a number of actors in the food and marketing chain. According to FAO (1996) they become involved in areas such as planning,

technology transfer, technical assistance and advocacy and assistance in overcoming legal and regulatory obstacles. NEFSALF bulletin (2014) reports that training initially included group dynamics, record keeping, gross margins, crop husbandry, livestock husbandry and on-site visits. Currently, training framework includes, farming practice; (Farming management and operations namely production, processing, distribution and consumption), farming resources; (farming spaces, farming capital and farming entrepreneurship), farming community; (farming households, groups, organizations, enterprises, platforms and networks) and trainee strategy development. The course content takes into consideration the agri-food components and relations with the social, built and natural environments.

5.2.4 Influence of technology

From the findings, majority of the respondents were somewhat interested that technology can provide education and skills and better technologies tend to build urban agricultural society with mean scores of 4.11 and 4.09 respectively. Majority of the respondents also were neither interested nor disinterested with the statement that access to information is essential to those of a time-sensitive nature with a mean score of 3.59. However, some respondents were not at all interested with the statement that hydroponics is entirely used by participants with a mean score of 1.59. The findings therefore reveals that majority of residents living in Lang'ata Sub County were somewhat interested that technology can provide education and skills and better technologies tend to build urban agricultural society.

The findings of this study showed that technology is not so much used because of small scale urban agriculture but respondents practice urban agriculture because of the factors below; practice urban agriculture because better technology tend to build urban agriculture society; 32% of the respondents were somewhat interested in the statement that better technologies tend to build urban agricultural society; 35% were somewhat interested in the statement that technology can provide education and skills; 26% were neither interested nor disinterested in the statement that access to information is essential to those of time-sensitive nature while 7% were not at all interested with the statement that hydroponics is entirely used by participants

The results show that technology is strongly related to growth of urban agricultural projects with a correlation coefficient of 0.503. The findings agrees with FAO (1996) which explains that

Technology transfer could make available hardy and healthy seed varieties, assist in establishing cooperatives for acquiring inputs and marketing products and provide new systems such as biological wastewater treatment processes. The study found that NGOs train communities' better skills and technology transfer and advocacy and assistance can easily overcome legal and regulatory obstacles. It found that that technology can provide education and skills and better technologies tend to build urban agricultural societies. FAO provides information technology education and skills upgrading such as the position of management of advice and use of online distance education techniques. According to animal smart (2012), farmers use technology to make advances in producing more food for a growing world. Technology has enabled farmers make improvements in agriculture due to the use of motorized equipment, modified housing for animals and biotechnology.

5.3 Discussion of key findings

This section of the report discusses in detail the findings and compares them with literature reviewed in chapter two.

5.3.1 The influence of consumer demand for fresh produce on growth of agricultural projects

The study found out that respondents had different levels of interest in the following statements. Frequency of harvests increases the amount of food available, sales by producers enhances the freshness of perishable food reaching urban consumers, number of consumers improves greater choice and better prices and the number of low-income urban consumers will increase

The respondents attributed these factors to demand for fresh produce by the consumers. This is so because consumers are guided by desire for healthy living and nutrition. According to respondents, consumer demand for fresh produce is due to efficiency of production. Vegetable production has expanded in and around the city of Nairobi. Therefore consumers prefer fresh vegetable straight from the gardens compared to ones in supermarkets. Respondents also concluded that locally produced food requires less transportation and refrigeration, it can supply nearby markets with fresher and more nutritious products at competitive prices. The study also showed that vegetables have a short production cycle some are harvested within 60 days of planting so they are well suited for urban agriculture.

The study found a strongly positive relationship between growth of urban agricultural projects and consumer demand for fresh produce having a correlation coefficient of 0.522. Consumer demand for fresh produce plays a major role in growth of urban agricultural projects in that for growth of urban agricultural projects to be effective, the consumer demand for fresh produce must increase. According to Dennery (1995), it appears that cultivation is acceptable but is not well viewed by local policy makers. The legal status of those who use open space plots but do not own them is even more ambiguous. It is expected that the frequency of evictions will increase as the legally recognized owner's start building housing in the area.

5.3.2 The influence of space availability on growth of urban agricultural projects

The study found out that respondents had different level of interest in the following statement about urban agriculture. Size of land available is large, there is adequate knowledge on hydroponics, there are adequate planters and pots for planting and most residents use green rooftops. There are the factors that led to some respondents to practice urban agriculture in Lang'ata Sub County, Nairobi County.

Therefore, a higher proportion of respondents indicated that planters and pots have greater influence on growth of urban agricultural projects than any other way of planting crops. The respondents who chose other factors like hydroponics and green rooftops gave reasons that land may be unavailable due to its intensive use for buildings or maybe unsustainable for cultivation due to physical conditions including soil quality, soil contamination or lack of rain and sunlight.

The respondents who used planters and pots to practice urban agriculture said planters and pots contain uncontaminated soil and can be moved around to appropriate areas. They said that raised beds are permanent fixtures that separate the growth soil from contaminated soil by building up from the ground. Impermeable layers can also be placed as separation from contaminated soil. Grow bags and soil placed in slit bags, can be partially buried in the ground. The respondents who chose hydroponics said that growing plants without soil in a nutrient solution can be built on the ground, rooftops, balconies and other structures. They also said that hydroponics compared to on-ground gardens, can use fewer resources, increase yield per unit area and reduce water use,

The respondents who chose green rooftops said that modern green roofs, rooftops with vegetable growth can lengthen the lifespan and lower the life cycle costs of roofs and may also improve

sound isolation. The respondents said that cultivation is acceptable but is not well viewed by local policy makers. The legal status of those who use open space plots but do not own them is a challenge because one cannot own the plants completely. The producers who use land that do not belong to them expect that the frequency of evictions increase as the legally recognized owners start building housing in the area. According to the respondents, evictions usually take place without prior notice with the construction crew slashing down the crops and bringing in building materials from one day to the next. Producers in Hardy are aware of the fact that they can lose their crops and an integral part of their livelihood at any time. This is the main reason why the majority of producers' plant fast maturing crops and avoid planting trees and other perennials. Furthermore, insecurity of land tenure tends to limit producer incentive to protect soil from erosion.

The land users also state that there is also the social aspect to access to land. The usual method for securing access to land is via friends and relatives. If the potential producer knows of a friend or a relative who desires to cease cultivating, he or she will approach this person and offer a gift in order to secure the plot.

5.3.3 The influence of Non- governmental Organizations on growth of urban agricultural projects

With respect to the influence of Non-Governmental Organizations intervention on urban agricultural projects, the respondents indicated that NGOs have a great influence in the growth of urban agricultural projects. The findings showed different levels of interest in the following statements that NGOs have to be involved in the planning process, technology transfer and advocacy and assistance can easily overcome legal and regulatory obstacles, NGOs always create awareness about urban agriculture and NGOs train communities better skills led to growth of urban agricultural projects. Due to the cross cutting and multi-dimensional nature of urban agriculture, policy development and action planning on urban agriculture should involve various sectors, disciplines and NGOs like agriculture, health, waste management, community development, parks and nature management. NGOs have been involved in the planning process. According to FAO (1996), NGOs have become involved in areas such as planning, technology transfer, technical assistance and advocacy and assistance in overcoming legal and regulatory

obstacles. Many of these NGOs operate in slum areas and have urban farming as part of their livelihoods and poverty eradication components.

The respondents confirmed that the NGOs involved like Mazingira Institute offer urban farmers financial help like loans and reduced prices for training and seeds. This encouraged them to practice urban agriculture. The respondents confirmed that Mazingira Institute has an initiative known as Nairobi and Environs Food Security, Agriculture and Livestock (NEFSALF) which is a network consisting of farmers (individuals and groups) practicing urban agriculture and livestock keeping in the city of Nairobi and environs. This is an initiative to train the urban farming community after observing that there was a lack of knowledge and skill among urban farmers

The study also found out that the respondent became interested in urban agriculture when a number of innovations were introduced to them. They confirmed the NEFSALF (2014) reports that training included group dynamics, record keeping, gross margins, crop husbandry, livestock husbandry and on-site visits. They also said that training framework includes farming practice, farming resources, farming community and trainee strategy development. The training course is supported by Rooftops Canada/Abri International with the assistance of Foreign Affairs, Trade and Development Canada (DFATD). The respondents said that the number of new markets of products made them practice urban agriculture. There was a confirmation of a number of new markets where producers can sell their produce online and supply to grocery stores and supermarkets around the city. This made the respondents confirm that they can sell their produce without wastage because of lack of market. Those who were engaged in horticulture could form a group dynamic in order to sell their flowers in a group. The results show a positive relationship between growth of urban agricultural projects and Non-Governmental Organization intervention having a correlation coefficient of 0.311. It found that that there are adequate planters and pots for planting, there is adequate knowledge on hydroponics and most residents use green rooftops. Nairobi has a number of actors in the food and marketing chain. According to FAO (1996) they become involved in areas such as planning, technology transfer, technical assistance and advocacy and assistance in overcoming legal and regulatory obstacles. NEFSALF bulletin (2014) reports that training initially included group dynamics, record keeping, gross margins, crop husbandry, livestock husbandry and on-site visits. Currently, training framework includes,

farming practice; (Farming management and operations namely production, processing, distribution and consumption), farming resources; (farming spaces, farming capital and farming entrepreneurship), farming community; (farming households, groups, organizations, enterprises, platforms and networks) and trainee strategy development. The course content takes into consideration the agri-food components and relations with the social, built and natural environments.

5.3.4 The influence of technology on growth of urban agricultural projects

The study indicated that respondents had different levels of interest in the following statements. Better technology tend to build urban agricultural society, technology can provide education and skills, access to information is essential to those of a time-sensitive nature and hydroponics is entirely used by participants. The study revealed technology is a very important factor in the growth of urban agricultural projects. The respondents argued that a number of information technology applications contributed to them practicing urban agriculture. Some of the respondents attributed urban agriculture to biotechnology. Others said seed technology encouraged them to practice urban agriculture. A small number of the respondents argued that Geographic Information System encouraged them to practice urban agriculture while some of the respondents attributed urban agriculture to waste management. Some said that hydroponics technology is growing in urban areas that do not have quality soil. The respondents said that the clay soil in their land made them sought other ways of growing crops and hydroponics was an option. The 1% of the respondents applied Geographic Information System (GIS) where the technology is used for examining land-use potential.

The results show that technology is strongly related to growth of urban agricultural projects with a correlation coefficient of 0.503. The findings agrees with FAO (1996) which explains that Technology transfer could make available hardy and healthy seed varieties, assist in establishing cooperatives for acquiring inputs and marketing products and provide new systems such as biological wastewater treatment processes. The study found that NGOs train communities' better skills and technology transfer and advocacy and assistance can easily overcome legal and regulatory obstacles. It found that that technology can provide education and skills and better technologies tend to build urban agricultural societies. FAO provides information technology education and skills upgrading such as the position of management of advice and use of online

distance education techniques. According to animal smart (2012), farmers use technology to make advances in producing more food for a growing world. Technology has enabled farmers make improvements in agriculture due to the use of motorized equipment, modified housing for animals and biotechnology.

5.4 Conclusions

On the basis of the study findings, the following conclusions were arrived at proposing the embracing of urban agricultural practices to enhance healthy living and nutrition.

The results show significant influence of consumer demand for fresh produce, space availability, Non-governmental Organizations intervention and technology on growth of urban agricultural projects.

The results show that consumer demand for fresh produce has a great influence on the growth of urban agriculture. This is due to the promotions and campaigns against unhealthy foods. These led to increase in demand for fresh produce hence increase in sales by producers, increase in frequency of harvests, increase in number of consumers and increase in frequency of demand. All these led to the growth of urban agricultural projects.

The findings also show that planters and pots space are favored as the most important of all the factors. Even though land is the traditional medium for agriculture since and just a few respondents have knowledge on using other ways to grow crops majority of the respondents still wish to access land for urban agriculture.

The research results also show that Non-governmental Organizations encouraged respondents to practice urban agriculture. According to the respondents, the NGOs offer training to the interested producers, they give them loans, supply them with seeds and fertilizers, train them on a number of innovations and help them with marketing of their products.

The findings also showed that technology is being embraced at a slow rate because urban agriculture is still practiced on a small scale in Lang'ata Sub County and majority of the respondents believe that if the County government reduced and loosened its restrictions on the practice of urban agriculture then technology will be used more often. Despite this, respondents still use a number of IT applications to monitor their farming activities and market products.

Very few use motorized equipment but on hire because motorized equipment are allowed on license. A small number of the respondents use biotechnology and said it is a technique that is still in the process of being embraced. Only 2 respondents admitted to use the GIS system because it is used to examine land-use potential on dairy farms only. Research findings also showed that majority of respondents practiced urban agriculture because of waste treatment. This is because the water is led back to the farms for irrigation so there was no wastage and water was always available because the people in the households always used water.

The study finally concluded that urban agriculture is growing in Langa'ata Sub County due to the residents' change of lifestyle by consuming fresh and healthy produce and this has motivated producers to practice urban agriculture.

5.5 Recommendations

This study makes the following recommendations.

1. The study recommends that city residents should embrace more of urban agriculture and learn about food crops that take short periods to mature so that there is food security and proper nutrition to the city residents as there is increase in consumer demand for fresh produce. This can also be a good business idea to producers who are interested in agribusiness hence more revenue to the government.
2. The study suggests that the government should support interested urban agriculture producers to learn other ways of growing crops apart from land. This could be done by training producers and giving them ideas on using space available for growing food crops.
3. The study also recommends that Non-Governmental Organizations should be more involved in the planning and management process so that more urban agriculture producers can access training and resources offered. This enables them to learn new methods of production that are effective in terms of limited resources.
4. The study also suggests that technology should be used more by the urban agricultural producers. This could help them learn new methods of growing food crops, learn about fast growing food crops, learn about biotechnology and seed technology which leads to

efficiency in production. Technology could also help producers to market their products and do online sales which increase the number of consumers.

5.6 Suggestions for further studies

1. The study selected only the producers of urban Agriculture in Lang'ata Sub County. It is recommended that this topic can be investigated from the consumers' perspective where clients constitute the sample population.
2. This report recommends that further research should be done on the safest ways to practice urban agriculture that could be accepted by the County government, the residents and neighbors of the producers of urban agriculture.

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APPENDICES

APPENDIX I: LETTER OF TRANSMITTAL

Stephanie Echakara

P.O Box 24814-00502

Nairobi,

7th October 2015.

Dear respondent,

RE: COLLECTION OF SURVEY DATA

I am a postgraduate student at the University of Nairobi, school of continuing and distance Education. In order to fulfill the degree requirements, I am undertaking a research project on factors influencing the growth of Urban Agricultural projects: The case of Lang'ata Sub County, Nairobi County. You have been selected to form part of this study. This is kindly to request you to assist me collect the data by filling out the accompanying questionnaire.

The information you provide will be used for academic work only. My supervisor and I assure you that the information you give will be treated with strict confidentiality. At no one time will you appear in my report. A copy of the final paper will be availed to you upon request.

Your cooperation will be highly appreciated and thank you in advance.

Yours faithfully,

Stephanie Echakara

MA (PPM) student

University of Nairobi

APPENDIX II: QUESTIONNAIRE FOR RESEARCH RESPONDENTS

The information provided here will only be used for academic purposes and will be treated with maximum confidentiality. Do not write your name or give any other form of identification on the questionnaire.

Part A: General and Demographic Information

Please tick the appropriate answer in the box where applicable.

1. What is your gender? Male () Female ()
2. Select the dwelling type that most closely describes your residence:
 - a. Single family house ()
 - b. Row/town housing ()
 - c. Apartment housing ()
 - d. Other (Please specify) ()
3. What is your marital status? Married () Single ()
4. What is your age bracket?
 - a. 19 and below ()
 - b. 20-29 ()
 - c. 30-39 ()
 - d. 40-49 ()
 - e. 50 and above ()
5. What is your highest level of Education attained?
 - a. None ()
 - b. Primary ()
 - c. Secondary ()
 - d. Tertiary ()
 - e. University ()
6. Do you practice Urban Agriculture?

As an employee () or as the owner of the project ()
7. How long have you practiced Urban Agriculture?

- a. 1-3 years ()
 - b. 4-6 years ()
 - c. 7-9 years ()
 - d. 10-12 years ()
 - e. 13 and above ()
8. You decided to practice Urban Agriculture because?
- a. Most of my friends were practicing ()
 - b. My family and relatives were already practicing ()
 - c. It was an idea given to me and had to use it ()
 - d. Most of my neighbours or business associates practice it ()
9. Please indicate your monthly income bracket from Urban Agriculture
- a. 19 000 and below ()
 - b. 20 000 -49 000 ()
 - c. 50 000-79 000 ()
 - d. 80 000-109 000 ()
 - e. 110 000 and above ()

Personal interest in Gardening

These questions relate to your relationship to gardening and food production within Lang’ata Sub County. Please select all that apply.

1. Please indicate what gardening activities you currently engage in:
 - a. General landscaping or home yard care ()
 - b. Home/personal gardening ()
 - c. Balcony gardening or planters ()
 - d. Community gardening or yard shares ()
 - e. Commercial gardening ()
 - f. None of the above ()
2. On a scale from 1 to 5, how would you describe your interest in gardening?

Not at all interested	Not very interested	Neither interested or disinterested	Somewhat interested	Very interested
1	2	3	4	5

Part B: General information on community gardens and urban Agriculture

Community gardens

While there is no definition for community gardens in Nairobi County, community gardens are generally understood to refer to a piece of land used either collectively or individually which can be used to grow food for personal use.

3. What is your relationship with community gardens?

- a) I am currently a member ()
- b) I would like to be a member or I am on a wait list to be a member ()
- c) Have been a member previously but am currently not a member ()
- d) I have no interest in community gardens ()
- e) I am unfamiliar with community gardens ()

4. Please rate where you feel community gardens for personal use would be appropriate?

	Inappropriate	Somewhat inappropriate	No opinion	Somewhat appropriate	appropriate
Agricultural areas					
Residential areas					
Commercial areas					
School sites					
Public parks					
Utility					

corridors					
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Urban Agriculture

While urban agriculture is not defined within Nairobi County, the term is understood to mean the growing of food within the urban environment for commercial and personal purposes.

5. Where would you think urban Agriculture for commercial purposes would be appropriate? (select all that apply)

	Inappropriate	Somewhat inappropriate	No opinion	Somewhat appropriate	appropriate
Agricultural areas					
Residential areas					
Commercial areas					
School sites					
Public parks					
Utility corridors					

6. Please select the statement that most closely resembles your opinion:

- a) Land being used for urban agriculture should be specifically zoned for agricultural use
- b) Urban agriculture should be allowed on any vacant lots, regardless of their zoning
- c) Urban agriculture should be allowed on some vacant lots

7. Please select the statement that most closely resembles your opinion

- a) Gardens being used for urban agriculture should be allowed to sell produce on site with no restrictions

- b) Gardens being used for urban agriculture should only be allowed to sell produce offsite at farmers’ markets or grocery stores.
- c) Gardens being used for urban agriculture should be allowed limited onsite sales, restricted to within the neighborhood and only at certain times.

Operation of urban and community gardens

The following questions relate to both questions relate to both community gardens and urban agriculture.

8. Please indicate what types of garden structures/ activities you feel are appropriate for use within your neighborhood

	Inappropriate	Somewhat inappropriate	No opinion	Somewhat appropriate	appropriate
Greenhouses					
Tool sheds					
Farm stands- limited sales on site					
Market gardens- continual sales on site					
Production facilities					
Compost- Bins or storage					
Motorized gardening equipment					
Fertilizer use					

Pesticide use					
Herbicide use					

9. When making decisions regarding gardening within your neighbourhood, what do you feel should be the top priorities to consider?

	Not a priority	Low priority	Medium priority	High priority
Establish a local food supply				
Support the local economy				
Protect local food security				
Utilize vacant lots				
Limit noise				
Limit odour				
Limit operating hours				

Part C: Determinants of growth of Urban Agricultural projects

1. Influence of consumer demand for fresh produce

10. What is your level of agreement with the following statements that relate to consumer demand for fresh produce in relation to urban agriculture projects? Use a scale of where 1= Not at all interested, 2= Not very interested, 3= Neither interested or disinterested, 4= Somewhat interested and 5 = Very interested.

	1	2	3	4	5
Frequency of harvests increases the amount of food available					

Sales by producers enhances the freshness of perishable food reaching urban consumers					
Number of consumers improves greater choice and better prices					
The number of low- income urban consumers will increase					

2. Influence of space availability

11. Please indicate the extent to which you favored these statements most when choosing to practice urban agriculture. Use a scale of where 1= Not at all interested, 2= Not very interested, 3= neither interested nor disinterested, 4= somewhat interested and 5 = Very interested.

	1	2	3	4	5
Size of land available is less due to its intensive use for buildings					
There is adequate knowledge on hydroponics					
There are adequate planters and pots					
Most residents use green rooftops					

3. Influence of Non-Governmental Organization intervention

12. Please indicate what statements you considered most when choosing to practice urban agriculture. Use the key below for your guidance where 1= Not at all interested, 2= Not very interested, 3= neither interested nor disinterested, 4= somewhat interested and 5 = Very interested.

	1	2	3	4	5
NGOs have to be involved in the planning process.					
Technology transfer and advocacy and assistance can easily overcome legal and regulatory obstacles					
NGOs always create awareness about urban agriculture					
NGOs train communities better skills					

4. Influence of technology

13. Please indicate the extent to which you considered the following statements when choosing to practice urban agriculture. Use the key below for your guidance where 1= Not at all interested, 2= Not very interested, 3= neither interested nor disinterested, 4= Somewhat interested and 5 = Very interested.

	1	2	3	4	5
Better technologies tend to build urban agricultural societies					
Technology can provide education and skills					
Access to information is essential to those of a time-sensitive nature					
Hydroponics is entirely used by participants					

APPENDIX III.KREJCIE AND MORGAN SAMPLE DISTRIBUTION TABLE

Sample Size (S) Required for the Given Population (N)

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	346
25	24	130	97	320	175	950	274	4000	351
30	28	140	103	340	181	1000	278	4500	354
35	32	150	108	360	186	1100	285	5000	357
40	36	160	113	380	191	1200	291	6000	361
45	40	170	118	400	196	1300	297	7000	364
50	44	180	123	420	201	1400	302	8000	367
55	48	190	127	440	205	1500	306	9000	368
60	52	200	132	460	210	1600	310	10000	370
65	56	210	136	480	214	1700	313	15000	375
70	59	220	140	500	217	1800	317	20000	377
75	63	230	144	550	226	1900	320	30000	379
80	66	240	148	600	234	2000	322	40000	380
85	70	250	152	650	242	2200	327	50000	381
90	73	260	155	700	248	2400	331	75000	382
95	76	270	159	750	254	2600	335	100000	384

Source: Krejcie and D.W Morgan (1970)

APPENDIX IV. RESEARCH PERMIT

CONDITIONS

- 1. You must report to the County Commissioner and the County Education Officer of the area before embarking on your research. Failure to do that may lead to the cancellation of your permit**
- 2. Government Officers will not be interviewed without prior appointment.**
- 3. No questionnaire will be used unless it has been approved.**
- 4. Excavation, filming and collection of biological specimens are subject to further permission from the relevant Government Ministries.**
- 5. You are required to submit at least two(2) hard copies and one(1) soft copy of your final report.**
- 6. The Government of Kenya reserves the right to modify the conditions of this permit including its cancellation without notice.**

RESEARCH CLEARANCE PERMIT

Serial No: A 7028

CONDITIONS: see back page

THIS IS TO CERTIFY THAT:

MISS. STEPHANIE J ECHAKARA

of UNIVERSITY OF NAIROBI, 0-100

NAIROBI, has been permitted to conduct

research in Nairobi County

on the topic: DETERMINANTS OF

GROWTH OF URBAN AGRICULTURAL

PROJECTS: CASE OF LANG'ATA

SUBCOUNTY, NAIROBI COUNTY, KENYA

for the period ending:

30th October, 2016

Steph

Applicant's Signature

[Signature]

Director General

National Commission for Science, Technology & Innovation

