

**FACTORS INFLUENCING FOOD SECURITY OF FARMERS PRACTICING PERI-  
URBAN AGRICULTURE CROP PRODUCTION IN NAIVASHA MUNICIPALITY, KENYA**

**BY**

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## DECLARATION

This research project report is my original work and has not been presented for a ward of degree in any other university.

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

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## **DEDICATION**

I dedicate this research project report to my wife, Mrs. Ferister W. Githinji, and children, Abigail N. Kahiga and Stency N. Kahiga. Also, I wish to thank my dear parents Mr. and Mrs. Gerald Muteru who ensured that I attend nursery school to start my long academic journey when home comfort was of paramount importance to me at that time.

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## **ABBREVIATIONS AND ACRONYMS**

<b>FAO</b>	Food and Agriculture Organization
<b>FDI</b>	Foreign Direct Investment.
<b>GDP</b>	Gross Domestic Product.
<b>GoK</b>	Government of Kenya
<b>IIED</b>	International Institute for Environment and Development.
<b>ILO</b>	International Labour Organization.
<b>ICT</b>	Information and communication technology
<b>NGO</b>	Non Governmental Organization
<b>RUAF</b>	Resource Centres on Urban Agriculture and Food Security
<b>SHA</b>	Small Holder Association.
<b>UA</b>	Urban Agriculture.
<b>UN</b>	United Nations.
<b>UNFCC</b>	United Nations Framework Convention on Climate Change
<b>UPA</b>	Urban and peri-urban agriculture.
<b>U.S</b>	United States.

## ABSTRACT

Agriculture is the mainstay of the Kenya's economy and currently represents 24 per cent of GDP. There are more than 5 million smallholders engaged in different types of agriculture activities in the country. The compounded average growth rate of agriculture was 5.2 percent between 2001 and 2005 but the export growth was at 8 percent. However, formal employment grew by 1 percent. Agricultural sector is made up of four major sub-sectors namely, industrial crops, food crops, horticulture, livestock and fisheries. Development of these sectors is one of the government objectives as indicated in vision 2030. Despite the central role agriculture plays in the Kenya's economy the sector continues to face four major challenges associated with productivity, land use, marketing and value addition. The six flagship projects which will be implemented in the agricultural sector include enactment of the consolidated agricultural reform bill, fertilizer cost-reduction, disease free zones, land registry, land use master plan and ASAL development project. Urban and peri-urban agriculture is a strategy that can be adopted by low income households to meet their food and nutritional requirements. The purpose of the study was to assess the factors influencing peri-urban agriculture and food security of farmers in Naivasha municipality. The objectives of the study were: to determine how peri-urban agriculture production, how marketing, and organizational capacity affects food security among farmers in Naivasha municipality. The study used a descriptive survey design and was carried out in six wards of Naivasha municipality. The study used structured questionnaires in order to collect data from the farmers and a response rate of 76.5 percent was obtained. In order to ensure reliability of the questionnaires a pilot test was conducted before actual study was conducted and some adjustments were done on the original questionnaires before administering it to the farmers. Data collected was coded and analysis was done using statistical package for social sciences. Results are presented using tables, percentages, means and Anova Tables. Findings from the study reveal that 75% of the farmers had an average of 1.2 acres and 99% of them produced their crops on soil despite availability of modern technology advances while only 1 % were using soilless media mainly pumice, 95% of the farmers grew their crops in open fields and 85% never used any form of mechanization. Over 63% of the farmers depended on rainfall and this contributed to low productivity and high rate of crop failure affecting food security. The study found out that most of the crops grown yielded below optimum levels that can enable farmers realize profit and this could be attributed to the production factors analysed. The findings also indicate that majority of farmers did not have post secondary education, with only 4% with university education. The results also show 91% of the farmers had no management skills, 63% of the farmers did not keep any records, and 74% of the farmers were not visited by the agricultural extension service providers, there was only 2% support of NGOS in the agricultural sector, while only 3% of the farmers had access to internet hindering their access to current information on best practices that optimise productivity, management and marketing. Most of the farmers (83%) did not have any specific buyers for their crop produce and 71% did not have any storage facilities, while 91% were not doing any value addition to their crop produce. Over 85% were not involved in price setting for their crop produce, 36% of the respondents had a problem with food availability during some months of the year, and 62% had challenges with obtaining the variety of food they wanted, this is of great concern given that the population is growing at a high rate while resources are diminishing. The multiple regression carried out indicated that farmer's organisational capacity had the greatest effect on food security, followed by marketing and lastly production aspects. It's recommended that farmers should be encouraged to adopt modern methods of farming including use of covered greenhouses, irrigation systems and use of soilless media in order to improve yields and avoid crop losses. Further, there is need to improve on marketing of crop produce by opting for contracted farming where the farmers can negotiate the price of their produce based on cost of production. The Government and the NGOS should participate more in activities promoting peri-urban agriculture from the farm level to marketing and in Extension services which can enhance food security. The findings are important to all the stakeholders in the agriculture sector because they highlight the areas that need to be improved in order to ensure peri-urban agriculture plays a vital role in contributing towards food security.

# CHAPTER ONE

## INTRODUCTION

### 1.1 Background of the Study

The rapid urbanization progress is associated with land use changes resulting in challenges, for example food insecurity, poverty, hazards to public health, pollutions, urban waste as well as environmental degradation, for city sustainable development (Baumgartner and Belevi 200; Kutiwa et al. 2010). At the same time, agriculture has become more industrialized and relies on intensive cultivation, chemical fertilizers and pesticides, and the mechanization of cultivation and processing. The intensification in production triggered by profit maximization has affected the sustainable development of biodiversity in negative sense. Therefore, over the past decades, citizens, academicians and governments, are seeking coping strategies that can alleviate these problems and develop food sustainable cities.

Urban and peri-urban agriculture, which is a practice of cultivating, processing and distributing a diversity of food and non-food products integrated in the urban economy, social and ecological system by using resources from urban areas, and in turn supplying resources, products and services largely to the same or broader area (Mougeot ,2000). Consequently, urban and peri-urban agriculture with its multi-functionality is applied to achieve urban productivity and sustainability. The practice has spread quickly all over the world and according to the widely accepted estimate; about 200 million urban residents are involved in urban farming activities, providing food to approximately 800 million people. Concerns of urban agriculture and interest in studying what is urban and peri-urban agriculture, how it develops and how it contributes to sustainability have gained importance throughout different disciplines.

The terms “urban agriculture”, “peri-urban agriculture “and “urban and peri-urban agriculture” are often used synonymously in projects.

There is a considerable body of literature which put much attention on the growing of basic food production in urban and peri-urban areas in recent years and its positive role is highlighted. It shows that urban and peri-urban agriculture provides farmers with important food stuffs and employment opportunities that would otherwise not be available in the urban context (Kutiwa et al. 2010; Corrigan, 2011). However, its potential in terms of food utilization, dietary diversity and poverty alleviation

sometimes are overemphasized and as its share in income and overall agricultural production is often quite limited (Kutiwa et al. 2010).

In the context of China, UPA generally refers to the agricultural activities in the periphery of city; makes use of the resources in and around city, operated by the citizens and rural farmers, serve the city's social, economic, ecological and cultural needs by agricultural production. While, the main challenges urban and peri-urban agriculture faces in China is that sometimes even the authorities or the participants realizes the benefits, but they still hold the opinion that the development of agriculture in urban areas goes against the progress of modern city and government tries to maximize their short-term profits. Besides, the weakness in established land tenure system, well qualified participants, sufficient investment and communicated with markets etc., are all the constraints that influence the development of urban and peri-urban agriculture (Yu, 2010).

Sifuna (2011) states that Kenya's relatively high per capita income level hides the fact that 50 percent of the population is living in poverty. Raising farm incomes is described as the core of the anti-poverty effort as three quarters of the poor today are farmers. Estimates show that growth in the agricultural productivity of small farmers is, on average, at least twice as effective in benefiting the poorest half of a country's population as growth generated in non agricultural sectors. The recent famine and the failed rains in consecutive years have resulted in poor harvests and low farm incomes, resulting in the erosion of purchasing power of the farming community. This has negatively impacted their ability to participate in development initiatives in their areas.

## **1.2 Statement of the Problem**

Initiatives to develop market linkages for smallholder agricultural production may have been faced with a number of challenges. Smallholder farmers may be typically poor and practice low input agriculture, not by choice but due to poverty. This may have resulted to low productivity. Big buyers at times find it problematic to deal with this category of farmers due to inconsistency and unpredictability of supply. ( Shilpi and Umali Deininger ,2008)

In most parts of Africa, achieving adequate food supplies for the whole year is increasingly becoming a tremendous challenge. The problem of food insecurity is indiscriminate, affecting both rural and urban dwellers. Eldridge (2002:79) indicates that "even in 'normal' years, most smallholders do not harvest enough to last them 12 months, for several reasons, including; insufficient and/ or poorly distributed rainfall, poor soils, shortages of draught power, insufficient labor and, in some areas, a lack of money for fertilizer." The situation is worse among poor urban dwellers because of their low-income status.

The urban setup often leaves the informal settlement dweller (often without specialized skills) with no land for even small-scale food production.

Most of the farmers in Naivasha are still living below poverty level according to Naivasha District Development Plan( 2008-2012), Kenya vision 2030 June 2009. This is the reason why the researcher carried out the study to find out whether this is related to food security.

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

The purpose of this study was to examine the factors influencing food security of farmers practicing peri-urban agriculture in Naivasha Municipality.

### **1.4. Objectives of the Study**

This study was guided by the following objectives;

1. To investigate how peri - urban agriculture crop production influences food security of farmers in Naivasha Municipality.
2. To assess how organizational capacity of farmers influences their food security in Naivasha Municipality.
3. To evaluate how marketing of peri- urban agriculture crop influences food security of farmers in Naivasha Municipality.

### **1.5 Research Questions**

The study was guided by the following general questions;

1. How does peri-urban agriculture crop production influence food security of farmers in Naivasha Municipality?
2. How does organization capacity of farmers influence food security of farmers in Naivasha Municipality?
3. How does the marketing of agriculture crops influence food security of farmers in Naivasha Municipality?

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

The findings of the study are likely to bring into light the strengths and weaknesses of the existing activities in peri-urban agriculture practices which could help the county leaders to improve on the



same. This may help to develop the necessary food security measures that will ensure the urban farmers have sufficient food all year round. To the farmers it may send light to the areas they need to improve such as mechanization, storage and training to optimize on their outputs. For academicians and researchers, they would do an in-depth investigation on the degree to which the peri-urban agriculture would affect the residents' poverty rate in this area. Through studying the degree or the quantitative measurements of the impact, the study will enable them to carry out further studies as they progress in advancing their education levels.

### **1.7 Delimitation of the study**

To ensure representation among Naivasha Municipality residents, stratification of the target population was done by the County Assembly Wards in Naivasha Municipality using probability proportional to size. Naivasha is a representative of the Kenyan towns that are facing challenges of high rates of population growth due to rural urban migrations and pushing the available resources to the corner. The researcher also looked at the aspect of crop production and not all the peri-urban agricultural activities.

### **1.8 Limitation of the Study**

The study confined itself to the farmers in Naivasha peri – urban area. The researcher acknowledged that each peri-urban area has unique characteristics and that the generalisation of the findings certainly emerged as the major limiting factor to the study. Validity of the research instruments and random sample selection allowed for the generalisation but with caution. Responding to sensitive questions may also have received lower response rate but the researcher countered this shortcoming by assuring utmost confidentiality of the response.

### **1.9 Basic Assumptions of the Study**

The study assumed that peri-urban agricultural activities are on-going and that the respondents had a clear understanding about the variables influencing food security in Naivasha Municipality. The researcher assumed that the respondents were transparent and truthful in answering questions.

### **1.10 Definitions of significant terms used in the study**

**Break Even Yield** This is the crop yield that must be realized to pay all costs of production (both inputs and operational costs).

**Impact** It is a measure of all negative and positive changes caused by the project whether planned or unplanned.

**Market linkages** It implies a physical connection between the producer and the ultimate consumer. Linkages also involve financial transactions, the selling and buying of goods and can

be broadly defined in four different ways: by the form of financial transactions or type of intermediaries who undertake the transactions; by the channels through which transactions occur and the type of facilities used for transactions; by how they are linked together by transport and communications networks; and by the spatial distribution of transactions - where they occur and whether this forms a pattern.

**Operational Costs** The costs of actions or services needed to produce the output commodity. Note that this does not include the costs of inputs. For example, in a farming business, such services paid for would include labour for land preparation, fertilizers, etc. While in a tailoring business, this would include labour for cutting fabric, sewing, lifting materials, etc.

**Peri-urban area** Refers to a transition or interaction zone, where urban and rural Activities are juxtaposed, and landscape features are subject to rapid modifications, induced by human activities.

**Product Development** It is a systematic, commercially oriented research to develop products and processes satisfying a known or suspected consumer need. There are four basic stages in every product development process. These are: product strategy development; product design and development; product commercialization; and, product launch and post-launch.

**Urban** This refers to location with a clustered population with at least 1000 people per square mile with a minimum area of twenty hectares

**Urban agriculture and peri-urban agriculture** It is a dynamic concept that comprises a variety of livelihood systems ranging from subsistence production and processing at the household and more commercialized agriculture.

**Value addition** Any activity performed by the business to capture more of the profit from the retail price that the end consumer will eventually pay for the product.

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

Chapter one is the introduction of the study; it gives the background of the study, statement of the problem, research objectives and the research questions that gives a guide to the study. The first chapter also contains the definition of significance terms in the study.

Chapter two of the study examines into details the existing body of knowledge to create a logical association between the identified variables and establish the probable gaps in knowledge. The chapter as well presents the theoretical background of the study. Lastly a conceptual framework has been illustrated diagrammatically to show the relationship between the independent variable and the dependent variables.

Chapter three demonstrate the research design, the method of data analysis that was adapted to analyse and interpret information collected from the respondents. The validity and reliability of the research instruments and the operationalisation of the identified variables has been discussed as well.

Chapter four of the study reveals the analysis of the data collected from the field. The analysed data has been presented in the tables that show the varying trends of the responses. Further the chapter made an interpretation of the findings in the write up prepared to explain the tables.

Chapter five is the final chapter for the study. It describes the summaries of findings and again this has been done in a tabular form with regard to the objectives of the study. Further the main findings have been discussed at length with linkages made with the past underlying theories. The chapter ends with conclusions of the study and suggests possible recommendation for the study problem.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

Urban and peri-urban agriculture (UPA) is a phenomenon as old as cities themselves and exists in various forms, from small plot in balcony or on rooftop, household backyard garden to extensive farm in city periphery, from household subsistence activities to large commercial enterprises. The differentials due to not only agricultural or geographic factors, but also the context it's rooted in varied by social economic and historical variations in the urban and peri-urban areas. This chapter draws an overall picture on how urban and peri-urban agriculture looks like and the connection between the sustainability, both positive and negative aspects will be mentioned by reviewing the relevant literatures.

#### **2.2 The concept of UPA**

UPA is observed in varying perspectives as well as defined in various ways respect to the way it makes effective use of available resources and opportunities, and also the purposes of researches conducted. Consequently, there is no a general organized notion prevailing in the literature applicable to all the countries worldwide due the specific context that urban and peri-urban agriculture emerged and developed. However, the most popular definition accepted by UNFCCC and IPCC and developed by Mougeot is that Urban agriculture is an industry located within (intra-urban) or on the fringe (peri-urban) of a town, a city or a metropolis, which grows and raises, processes and distributes a diversity of food and non-food products, (re-)using largely human and material resources, products and services found in and around that urban area, and in turn supplying human and material resources, products and services largely to that urban area.”(Mougeot, 2000).

This definition is not completely applied to the Kenyan or any other country urban agriculture although it contains some key components applied. The universal idea what constitutes the concept of urban and peri-urban agriculture, relates to the factors where (location and scale), which (activities and stages), who (stakeholder) and why (motivation). (Baumgartner and Belevi, 2001)

About the location and scale, the best-known international urban agriculture agencies RUAF indicates the location feature of UPA on its website as: inside the cities (intra-urban) or in the peri-urban areas, 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). The small-scale urban agriculture are prevailing phenomenon in most countries, both developed or developing, and play an important role in food supplying for household and ecological system conserving. But in Kenya, most of them are existed sporadically as a hobby or for greening purpose in central urban centers.

Bon et al. (2009) presented that the concept of urban agriculture involves two parts urban and rural at the same time, but the definition of what constitute is very important and vary from region to region. Thus, location is not just a geographic factor but a context that will link to UPA. When defining the location character of UPA for example in China, researchers combine the city planning with real situation and indicate UPA is located outside the urban centre but integrated in and have impacts in urban context(Yang ,2011).

When it comes to the activities and stages, Baumgartner and Belevi (2001) suggest that the following activities have to be included: acquisition and utilization of the necessary resources, inputs and services; production of goods; post-production, including processing, packaging, distribution, marketing, recycling and consumption. However, they defined a broader range for the UPA activities, while in most of literatures, the most common activity is production, and then the other activities which directly link to deal with their productions can be thought as UPA practices.

Who are participants or stakeholders? The emerging and developing of UPA is largely practitioner-led. Reviewing the processes, those involved are: the providers of resources, the providers of services; producers, the distributors, consumers, the promoters of activity and the administrators (Baumgartner and Belevi, 2000).These players, in turn, are in both formal and informal economy. Then the number of people engaged in urban and peri-urban agriculture is much higher than if only urban farmer are counted.

Obviously they are also not the traditional farmers. Different income level can take part in. And some studies indicate that in the household level, the main producer is women but some argue that the main producers are men and women who mainly focus on the market activities. Women, also are considered as the most active and predominantly participant in urban and peri-urban agriculture (Kutiwa et al. 2010)

Some researchers indicate that the urban farmers are not possible to be the migrants since it is difficult for them to get access to urban land water and other productive sources. However, with the expansion of urban areas, the initial rural area is becoming more urban and the scattered urban centers make some

cultivated land embedded in big urban agriculture concept. It creates more opportunities for migrants to obtain resources and practicing UPA.

In industrialized countries, on one hand, due to the continuous development of social-economic situation, the draw backs of highly urbanization are increasing significantly. People begin to realize the value of multi-functional agriculture. On the other hand, as income increases, people have more time and requirements for urban environment on leisure in terms of culture, education and entertainment. In this case, urban agriculture comes into being, which is considered as a necessary component of sustainable urban development, to improve living environment, benefit human beings and increase biodiversity. Nevertheless, it always acts as an informal tool for urban low-income groups to provide necessary food and enhance their livelihoods in developing countries.

In most developing countries, the driver factor that push urban household grow food in their backyard, for example, in most African cities, UPA as a strategy to cope with the food insecurity (Drakakis-Smith et al. 1995). Urban agriculture is providing not only food but also jobs, and this is the case in Nairobi, Kampala, Dakar, and other cities across sub-Saharan Africa. Or as a case so typical in Asian countries, the emerging of UPA mainly links to the increasing urban population (Nugent, 2000) and urbanization which result in population growth in cities while the hysteric job market creates unemployment and food insecurity. Urban household needs to seek other means to increase income and mitigate poverty, and thus revert to agriculture. Both of these explain the contexts in which urban agriculture emerges and develops. Increasing urban poverty and dependence on food banks led many community organizations in Canada and the United States to develop intensive UA projects aimed at increasing food security and creating jobs for low income households. In US, community support agriculture was prosperous in the urban periphery in order to provide safe food and contributed to community health as well as the local connection between people, economy and landscape (Schnell, 2007).

UPA is prone to Change concerning to forms or purposes, like allotment system, once the important form of UPA in Britain is the strategy to coping with the food insecurity. Even so, crisis occurred in industrial food production systems which always causes and suffers from a lack of resilience make them looking for the diversity of UPA (Gerrard, 2010).

## 2.3 Theories concerning UPA

They are various theories explaining how urbanization took place, a few have been cited below to give the researcher an overview of urbanization.

### 2.3.1 Von Thünen's model

The Von Thünen theory can be visually explained by Figure 1, the first circle is the centre of the city and there are four rings representing agricultural activities. The first ring is closest to the city, where dairy and other high value products and market garden occur herewith the highest transportation cost since they are more vulnerable and perishable. In the second ring, wood and fire will be produced for fuel and building materials. Wood is very heavy and therefore difficult and costly to transport. The third ring is field crops such as grain. Since grains is longer than other products and is much lighter than wood, then transport costs is considered to be lower, in the final ring where ranching is located surrounding the central city. Animals can be raised far from the city because they are self-transporting and thus have low transport costs. This model can be used to illustrate the impact of distance between agriculture production and agriculture products consumption on land use. The model relationship between urban and agriculture is of much concern to the theory of VonThünen

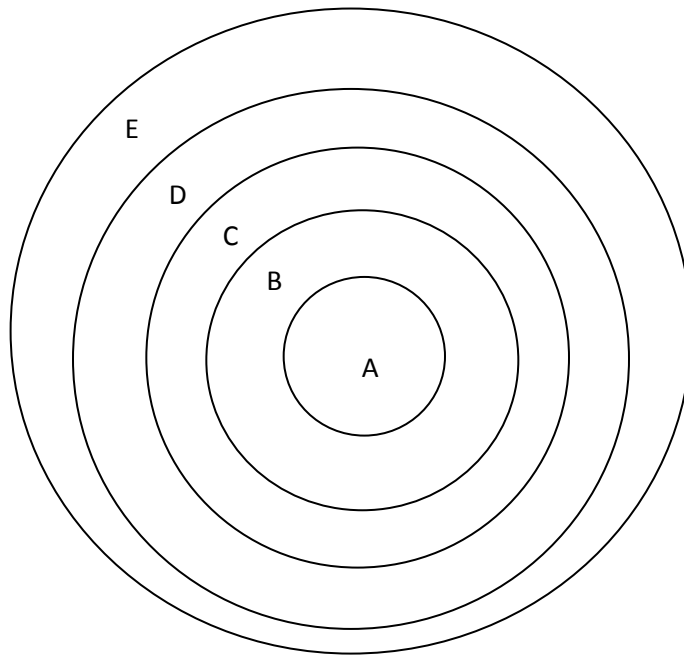


Figure 1. VonThünen Model (Source: Wikipedia accessed on 2<sup>nd</sup> February 2013)

Key: A represents the city centre

B represents the high value agriculture zone

C represents the woods production zone

D represents grains production zone

E represents ranching zone

### **2.3.2 Urban-Rural integration**

Ye (2009) presented urban rural income gap as the most dominated reason for the urban-rural integration. The integration of urban and rural areas is to eliminate the differences between these two areas especially the income gap and allocated urban and rural resources rationally. The role UPA plays in the process of integration is determined by its geographic characteristic. UPA is defined as the agriculture and related activities located at the urban and its periphery, and then there is a junction area which connects urban and rural. On one hand, UPA is a result of urban and rural integration. Urban area is continuously expanded and brings its advanced culture and mode of production to its surrounding, and then the area is more and more influenced by the urban areas. On the other hand, UPA is vital factor that can promote urban-rural integration. For, example, by reusing urban waste, provide fresh foodstuffs and better environment to urban dwellers, there are more communications between urban dwellers and rural farmers. UPA then promote the relation of urban and peri urban and rural area; to realize the free contribute to the integration of urban and rural.

### **2.3.3 Comparative advantage**

Then meaning of comparative advantage can be understood if goods can be produced in a relative low cost.

The application of comparative advantage theory in analyzing the emerging of UPA can generally get the following conclusions: First, the development of urban agriculture do not have the advantage in land resources and always compete with the urban development in land. Urban expansion has accelerated the reduction of arable land which makes arable land scarcer. Therefore, land-intensive products should thus not be a suggestive alternative. Secondly, compared to rural agriculture, urban agricultural develops with relatively high capital and technology advantages, which mean that there are better pre-conditions for capital-intensive and technology-intensive agricultural production, such as



high-tech agriculture and facility agriculture. Thirdly, consider the more densely populated cities and their surrounding, it provides a strong labor resource advantage for producing high value cash crops like vegetables, fruits, horticulture and animal feeding as well as agricultural products processing. Besides, it also provides a sufficient labor force to agriculture-related services, such as rural tourism, recreational agriculture and experience agriculture.

## **2.4 The benefits of UPA**

Urban and peri-urban agriculture (UPA) has always not just provided food productions but multifunctional, it plays others roles in the economy, society and ecology which help to mitigate some of the key challenges in our modern society, global warming, rapid population growth, international and domestic food insecurity plus urban waste.

### **2.4.1 Food Security**

Food security has been recognized as a major purpose of practicing UPA. Initiative UPA contribute to urban food self-sufficiency and nutrition by helping to provide all citizens with increased access to nutritious foods and reduce their food expenses which results in food security.

Kutiwa et al. (2010) indicate that urban agriculture is one way to escape the food insecurity and poverty cycle in a cash intensive environment and develop a conceptual model to address three components of food security. Households involved in urban agriculture can produce their own food and get immediately the fresh product for consumption. The money saved from the supplement of food make household get access to dietary diversity. The food utilization refers to the nutritional security in terms of food quality. Additional, the major products in urban and periphery is fresh and perishable products such as vegetables, fruits, eggs and milk, which is a complement of rural agriculture but not competing with it (Mougeot, 2001).

In many Asian countries, they have a long history of practicing urban and peri-urban agriculture with a great diversity of products to overcome the conflicts between big populations and limit arable land. As an example, many cities in China are able to be self-reliant in non-grain foods. Singapore is 25% self-reliant in vegetables and 100% in meat. In late 1980s of Cuba, the collapse of socialist bloc which had accounted for 85% of Cuba's trade in economic slump made Cuba agriculture face challenges to provide food but to the locally-available resources. But potential food safety risks may be higher for UPA production than those in rural areas because urban environment are more polluted.

One of the most urgent and challenging issues facing the African continent is achieving food security for its people. The first formal definition of food security was provided by the United Nations (UN) World Food Summit in 1974. The Summit concluded that food security is the “availability at all times of adequate world food supplies of basic foodstuffs to sustain a steady expansion of food consumption and to offset fluctuations in production and prices” (UN Report of the World Food Conference, 1974). A more recent definition by the World Food Summit held in Rome in 1996 states that “ Food security exists when all people at all times have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life”.

It is important to note that the problem of food insecurity among poor urban households in most developing countries has its origin partly in the migration of people from rural to urban settlements in search of what they perceive to be better jobs and a good life. For instance, Ellis and Freeman suggest that migration is one of the strategies used by the rural poor to improve their livelihoods (Ellis and Freeman, 2005).

## **2.5 How peri-urban agricultural activities affects poverty reduction through food security**

The role of peri-urban agriculture on poverty cannot be down looked, the following section review how food security results in poverty reduction

### **2.5.1 How market linkages of agricultural produce affect food security**

Market linkages are meant to facilitate the flow of produce between the different levels of the marketing system. The input to the process is the agricultural production (the supply) and the output is the consumption of that produce by consumers (the demand). The study focuses on the performance of the marketing system as such but assumes that if the system can be made more efficient it will be more competitive, will facilitate economic growth and will maximize benefits to farmers. Thus, the marketing process needs to be undertaken as efficiently as possible, at the lowest cost and with the minimum of losses occurring at each stage (Kibuikah, 2010).

#### **2.5.1.1 Marketing costs and margins**

According to (Nyamwasa, 2007), costs are the key to competitiveness. Marketing costs are the total costs for bringing produce from the farm to the ultimate consumer. Margins are the costs that are added by transporters and traders to cover their expenses and to provide a profit for their services. They are added to the basic farm gate price of a product. An analysis of marketing channels can be used to examine what margins are incurred at different stages in the process and whether they are reasonable.

As will be apparent later in this chapter, marketing costs and margins are also fundamental influences on the spatial distribution of the production areas and are heavily influenced by the cost of transport. In summary, the costs that make-up the marketing margins are as follows: the costs of sorting, washing, grading and packing the produce; transport costs: public transport, farmer's transport or truck hire, or use of trader's vehicles; and trader's overheads and profit. Structural adjustment programmes have had an impact on low-income groups and the dismantling of marketing boards has increased reliance on local markets.

Access to these markets is often hampered by lack of investment in transport infrastructure and storage facilities. Marketing facilities and other post-harvest infrastructure are usually limited in expanding urban areas. Urbanization is largely unplanned and local authorities generally do not have clear policies on developing facilities to meet their future needs as Kerubo (2009) points out.

### **2.5.1.2 Market infrastructure**

According to Reardon et al, (2003), efficient marketing infrastructure such as wholesale, retail and assembly markets and storage facilities are essential for cost-effective marketing, to minimize post-harvest losses and to reduce health risks. Markets play an important role in rural development, income generation, food security, developing rural-market linkages and gender issues.

Planners need to be aware of how to design markets that meet a community's social and economic needs and how to choose a suitable site for a new market. In many cases sites are chosen that are inappropriate and result in under-use or even no use of the infrastructure constructed. It is also not sufficient just to build a market: attention needs to be paid to how that market will be managed, operated and maintained. In most cases, where market improvements were only aimed at infrastructure upgrading and did not guarantee maintenance and management, most failed within a few years.

Nekoye, (2010) suggests that rural assembly markets are located in production areas and primarily serve as places where farmers can meet with traders to sell their products. These may be occasional (perhaps weekly) markets, such as haat bazaars in India and Nepal, or permanent. Terminal wholesale markets are located in major metropolitan areas, where produce is finally channelled to consumers through trade between wholesalers and retailers, caterers, etc. The characteristics of wholesale markets have changed considerably as retailing changes in response to urban growth, the increasing role of supermarkets and increased consumer spending capacity. These changes require responses in the way in which traditional wholesale markets are organized and managed. Retail marketing systems in

western countries have broadly evolved from traditional street markets through to the modern hypermarket or out-of-town shopping centre. In developing countries, there remains considerable scope to improve agricultural marketing by constructing new retail markets, despite the growth of supermarkets, although municipalities often view markets as sources of revenue rather than infrastructure requiring development. Effective regulation of markets is essential. Inside the market, both hygiene rules and revenue collection activities have to be enforced. Of equal importance, however, is the maintenance of order outside the market. Licensed traders in a market will not be willing to cooperate in raising standards if they face competition from unlicensed operators outside who do not pay any of the costs involved in providing a proper service.

### **2.5.2 How production of agricultural crops affect the poverty reduction through food security**

The goal of approaching farming as a business is to increase the incomes of the rural poor, or to put more money in the farmers' pockets and into the rural economy. This will enable them to improve their standards of living in terms of housing, food security and basic household needs, while contributing to the larger goal of making the transition from subsistence to a cash economy, or the creation of wealth. Agriculture in the Ugandan context is the only logical engine for rural economic growth. It generates income, provides productive employment, and enhances food security. To improve the livelihoods of rural people, there is a need to view agriculture as a business. Farm business emphasizes a shift from farming for subsistence to farming for profit. Farmers must learn to critically examine the costs related to production, and marketing, and the benefits that accrue through improved efficiencies from making informed management decisions. Before any venture is undertaken, the farmer must set a viable business goal. Business planning through self-assessment and examining the operating environment is essential in understanding both the risks and benefits of the business. In this manual, comparisons of farming and tailoring are used to demonstrate that the framework necessary for any business analysis is similar (Zinunula, 2009-2010).

There should be a guide that is designed to arm extension workers with skills that will assist them in fully understanding the commercial potentials of small-farm agricultural production. Sifuna (2011) points out that the potential for profits increase as the complexity of the management increases. By use of a progressive methodology, the well structured manual may be in a position to help assess capacity, identify shortcomings and propose strategies affecting the household's business success. The extension workers and farmers may be guided through the following steps: Understanding business terms and concepts as they relate to farming and tailoring. Comparisons of the costs and benefits of differing approaches to farming and business management. The value of saving compared to credit costs as an

input. Investigating various value-adding strategies. Risk management strategies. Reviewing market access and market alternatives.

Understanding the potential benefits of collective actions through associations with other farmers. Understanding simple and informative farm records. Understanding farm accounts for good decision making and business performance monitoring. Developing indicators to measure progress of the farm as an enterprise.

The food industry is one in which there are a large number of new products offered to retailers each year and inclusion of a new product almost always leads to discontinuation of another product. However, only a very small proportion of new products were radical changes, the majority were incremental changes. Even then, of the order of 75% of new products were considered to be failures. It was noted that in comparison to other industries (e.g. electronics, bio-technology) there is a very low level of Research and Development undertaken. Product and Process Development (commonly referred to as Product Development) is systematic, commercially oriented research to develop products and processes satisfying a known or suspected consumer need. Product development is a method of industrial research in its own right. It is a combination and application of natural sciences with the social sciences, of food science and processing with marketing and consumer science, into one type of integrated research whose aim is the development of new products. The most widely referenced normative product development models are those of Cooper and Kleinschmidt (1986).

They defined the innovation spectrum as “new to the world”, “product improvements” and “cost reductions”. They then defined three broad levels of innovations: incremental, major and radical. Product platforms were then used to group similar products. Changes to products made within a platform are “derivative” changes. It is also possible through radical changes to form new platforms of products. Crucial to the discussion of product development is to recognize that “innovation” is contextual. The consumers’ perception of product newness depends on the location of the consumer and the types of food products currently or recently on the market. For example, Asian food products were new products in Western supermarkets in the early 1990’s, but they were well-established and traditional products in Asia. The distributors’ views on product newness will depend on the product range of the producers that they interact with and their knowledge of local and other markets. Similarly, food producers will perceive the newness of a product in the context of their product range.

The fact that a food product is not ‘new to the world’, does not diminish its potential importance to a consumer, distributor or producer. Using the example of Asian food products referred to above. The development processes used, the investments required, the challenge of introducing the Asian food

products to a Western market, and the potential financial impact were no less important just because Asian foods had previously existed in Asia. A particular consumer, distributor, or producer will approach new products differently depending on whether they are either completely new to both the market and the producer (never-seen-before-products), or already exist in either the market or the producer (copying of or change from known products).

### **2.5.3 How organizational capacity of farmers affect food security**

According to England (2000) the first step with all linkage development is to identify the type of linkage required and the level of external support that may be necessary. It is important to balance the level of support offered with the amount of assistance really required. Linkages can be jeopardized both by too little and too much support. Simple steps by farmers to improve linkages with traders by bulking up produce may require no more than someone to make the initial suggestion and act as the honest broker. An extension worker may be able to carry out this role. At a slightly more complex level, linkages with an urban retailer, restaurant or processor may be something that a local NGO or a farmer association could develop. More sophisticated linkages may require support from several agencies and many activities do involve a multiplicity of facilitators.

The donor or donors provide technical inputs; several NGOs may work with farmers in different areas; another agency may do market studies and/or work with processors; a microfinance institution may be involved, and government agencies will almost certainly play a role. In some projects up to twelve partners have taken part. While agency specialization can provide significant advantages there are risks if the success of a venture depends on the continued involvement of all parties and one or two decide to withdraw prematurely. Having multiple partners also increases the potential for conflicts and may lead to a lack of focus (Nyamwasa, 2007).

From the farmers' perspective, the lack of or inadequate access to production or postharvest technology; the lack of or limited access to market information and intelligence on prices and alternative buyers and farmers' own limited negotiating or bargaining skills can be considered as constraints to initiating linkages. In planning linkages, business models need to be kept as simple as possible and worst-case scenarios also need to be reviewed from the outset. If, for example, produce is sold on consignment there is the possibility that farmers will not cover their costs, with the likelihood that the linkage will break down unless farmers fully understand the circumstances. Rejection of produce on quality grounds is a common cause of friction in contractual arrangements (Mutua, 2008).

## **2.5.4 How coordination of farmers affect food security**

According to Kerubo (2009), supply chains are changing rapidly, with transactions increasingly based on chains that involve coordinated links between farmers, traders, processors and retailers. It is against this background that organizations working with farmers, such as donors, NGOs and government extension services (“linking organizations”), are seeking to promote farmer welfare by using the “linking farmers to markets” approach, which usually involves organizing farmers into groups to supply identified markets. Marketing systems are undergoing rapid transformation. Traditional marketing channels with ad hoc sales are being replaced by coordinated links between farmers, processors, retailers and others. As incomes increase, food consumption patterns are changing, with a greater emphasis on meat, dairy products and fruits and vegetables. Consumers are becoming more demanding in terms of quality and safety and demographic and income trends are leading to increased demand for convenience foods, together with assurances of product safety. Agri-food systems are undergoing rapid transformation. Increasing concentration in processing, trading, marketing and retailing is being observed in all regions of the world and in all segments of production-distribution chains.

The traditional way in which food is produced, without farmers having a clear idea in advance of when, to whom and at what price they are going to sell their crops, is being replaced by practices more akin to manufacturing processes, with far greater coordination between farmers, processors, retailers and others in the supply chain.

Farmers increasingly produce to meet the requirements of buyers rather than relying on markets to absorb what they produce. As incomes increase, food consumption is changing (Tracey-white, (2003) and Odhiambo, (2011).

### **2.5.4.1 Group formation, structure and legislation**

Notwithstanding the fact that farmer group formation has had a mixed success to date, with the resources required to achieve success reducing prospects for replication, it is generally felt by linking organizations that development of groups is necessary to enable farmers to make the transition from a production to a market orientation (Cadilhon, (2006). Farmers can access extension and inputs more easily, improve product quality, increase quantity and achieve economies of scale, and increase bargaining power with buyers. From the point of view of a company, provision of credit and inputs through groups can reinforce peer pressure and can discourage non-compliance with contractual obligations. Working through groups can also reduce the costs associated with supplying inputs,

collecting outputs, providing extension advice and negotiating contracts. Nevertheless, it should be noted that several of the successful direct linkages between the private sector and farmers have been initiated by the private sector without group formation.

In Tanzania, for example, a study found that strong leaders able to carry out contract farming negotiations were more critical to success than group cohesiveness. In Mali, producer organizations were established in conjunction with rice irrigation schemes. One estimate suggested that by 2005 only two percent of the organizations were working correctly. This was attributed to serious governance and management problems. However, it is not clear how NGOs and others promoting collective action would be able to assess in advance the availability of leadership and other skills among farmers. One approach may be to develop a short-term crop to demonstrate immediate economic benefits at the same time as developing crops with a longer gestation period.

In Ken the producer marketing groups are required to register as self-help groups and therefore lack legal status as business enterprises. In Colombia, groups have tended to register as non-profit businesses in order to take advantage of low registration fees and tax incentives but such an organizational structure may become an obstacle to long-term development. In some other countries there have been moves to force farmer groups or associations to be registered as cooperatives, despite the fact that there appears to be a preference among groups to have the status of limited liability companies. There is often confusion about the exact legal status of cooperatives and how best groups can register as such. In general, hierarchical cooperative structures would appear to represent an unnecessary distraction for farmer groups (González et al., 2006).

## **2.5.5 How government policies can be used to enhance food security**

The following are policies that have a big role to play in enhancing peri-urban agriculture

### **2.5.5.1 Regional and rural development policies**

According to Nekoye, (2010), although the ideas on location and central places are “theories” they have had a significant impact on the development of planning policies and practice. These are normally expressed as “growth centre” and “growth pole” policies, sometimes related to transport corridors. The assumption behind adopting these principles has usually been that the most effective and least costly way of distributing services to serve rural populations is obtained by promoting a “balanced” growth of a hierarchy of settlements. The basic premise of these policies is that the higher level centres serve the lower-order centres, who provide services and goods to the rural region.



Recently, the Government of Kenya adopted the ‘Sessional Paper No. 3 of 2009 on National Land Policy’ and made public the draft National Urban and Peri-Urban Agriculture and Livestock Policy (UPAL) document. The two policy initiatives are aimed at regulating and supporting urban farming.

The Sessional Paper provides the most progressive and coherent national policy statement yet on urban agriculture. It is intended to “form the basis for, and the overall guide to all other land-related policies” (Section 270) and a reference point for the review and harmonization of “land use planning functions of 212(all) local authorities” (Section 255), including existing legislative frameworks for urban agriculture (Sections 254, 255, 270). Besides addressing a wide range of issues related to land that have a bearing on urban agriculture – e.g. land governance, management, utilization, access, equity, social justice, and tenure rights for various groups, including women, etc. The Sessional Paper goes a step further. Not only does it recognize that “[U]rban agriculture has not been properly regulated and facilitated”, it lays down principles upon which it shall be carried out: (a) “promotion of multi-functional urban land use, and (b) putting in place an appropriate legal framework to facilitate and regulate urban agriculture and forestry” (Section 12).

As a planning concept, urban multifunctional land use (MLU) promotes intensification in the use of urban space by emphasizing the combination of diverse but synergetic and inter-dependent land uses in one area (Vreeker *et al.* 2004). In the context of urban agriculture, this principle disabuses the notion that the activity does not belong in the city and that it is incompatible with other urban land uses. It also departs from the oft-preferred ‘zoning’ model ( Owusu 2007; Mireri *et al.* 2007) that proposes the designation of particular areas as farming zones while excluding agricultural activities from other areas designated for other land uses such as residential, industrial, recreational, etc. Based on the MLU model, a case could be argued, for example, in favour of promoting urban agriculture within (or in close proximity of) residential areas because of its predominantly subsistence nature, but also because of the existence of a ready market (for home consumption) for any surplus agricultural produce. Allowing urban agriculture within close proximity of their residences rather than zoning far away areas for farming would also tap into women’s labour and en-hance their participation in the activity. This is because of women’s supposed ability to juggle between the various domestic chores and farming tasks (Mougeot, 2000), especially where agricultural activities and products can be integrated into their other income-generating activities. Given their domestic-based reproductive responsibilities, women are usually ex-cluded from off-plot farming activities due to distance and time-related con-straints.

The MLU principle’s focus on maximization of urban space finds resonance in Section 109 (c) of the Sessional Paper which spells out that “the government shall encourage development of underutilized

land within urban areas”. To appreciate the importance of this provision one has to consider that many urban farmers in Kenya cultivate plots in open, undeveloped public and private spaces but under circumstances of great anxiety and uncertainty over precarious tenure rights and harassment by local authorities as well as landlords and their agents (Foeken 2006; Dennery 1996; Freeman 1991).

Some of the (undeveloped) public spaces, the government can actualize the provision by allocating such land for purposes of urban farming. It is particularly instructive that unlike in the past when bureaucracy, corruption and nepotism excluded the poor from benefitting from allocation of public land in Kenya’s urban centers ( GoK, 2009), the Sessional Paper contains provisions that cushion poor urban dwellers, including women, against exclusion in the land allocation process. For instance, it spells out that public land shall be allocated “through public auctions except for land earmarked for the support of livelihoods in urban and rural areas” (Section 84, c). This means that the government can deliberately allocate land to the poor rather than open it up for competition through the public auction process that would in all likelihood favour those with ample financial resources. The position of the poor urban residents – and especially women – in respect of access to public land for urban farming is further augmented by the emphasis the Sessional Paper places on “equitable access to land in the interests of social justice” (Section 39, e).

As regards the second principle, namely “putting in place a legal framework to facilitate and regulate urban agriculture”, it is expected that the legalization of urban agriculture will go a long way in removing anxiety among farmers about the official status and future of urban agriculture in general, and about possibilities of having their crops destroyed. It is expected that a supportive and facilitative legal and policy environment would constitute an important incentive for urban farmers to invest in urban agriculture, but also attract outside resources, innovations and technologies necessary for improving productivity, profitability and environmental sustainability (Bryld 2003; van Beek and Rutt 2007).

The Sessional Paper also makes clear the need to balance between the benefits of urban agriculture with ecological and public health concerns. It highlights the need for land use plans that promote “orderly management of human activities to ensure that such activities are carried out taking into account considerations such as the economy, safety, aesthetics, harmony in land use and environmental sustainability” (Section 104, c). Ironically, it is such framing of the essence of spatial planning that has defined the restrictive policy and legal frameworks for urban agriculture in many African cities. As was observed in Chapter 2, anti-urban agriculture policies and official attitudes were invariably predicated on the activity’s perceived marginality to the urban economy, public health and security risks as well as its supposed incompatibility with other more formal urban land uses.

It should also be noted, as evidence from elsewhere on the continent suggests ( Mkwambisi *et al.* 2010; Mlozi 2003), that favorable national policy frame-works for urban agriculture will amount to nothing if concrete steps are not taken to translate them at the local level. In light of the prevailing negative official attitudes within the Municipal councils, educational and advocacy programmes targeted at municipal officials should thus form an integral part of the implementation process. The purpose of such programmes should be to raise awareness among officials of the importance of urban farming for urban households, and of ways in which the practice could be integrated into urban planning in a manner that enhances the urban environment. The involvement of civil-society organizations and research institutions will be critical in this process. Such programmes have yielded positive results in Kenya's Nakuru town (Foeken 2008), and in other urban centres in Sub-Saharan Africa (van Beek & Rutt 2007). Effective implementation of the national policies at municipal level will also require improved coordination among various stakeholders in urban agriculture, including the Municipal council of Naivasha, relevant government departments, research institutions and civil-society organizations (including farmers' organizations) operating in the municipality. And finally, greater participation by the farming community in the design and implementation of urban agriculture support and regulatory frame-work is imperative. The (aspiring) urban and peri-urban farmers must find a way of engaging and negotiating with urban authorities (and other stakeholders in urban land use planning) and articulating their interests in an organized and structured manner. This is best realized by farmers' organizations, which are currently rare in urban centres in Kenya. Non-governmental and civil-society organizations can play an important role in raising awareness among farmers and organizing them and/or strengthening the capacity of farmers' organizations as vehicles through which farmers can participate in the policy implementation process. As has been demonstrated elsewhere ( Brock & Foeken 2006), organized farmers' groups could also play a critical role in enabling their members to access – through collective bargaining – farm inputs at affordable rates, extension services and new farming techniques and technologies, as well as markets and good prices for their produce. As shall be discussed below, participation of women in farmers' groups also offers them opportunities to network and build solidarity necessary for psychological support and collective action.

#### **2.5.5.2 Development of intermediate market towns**

Main factors influencing intermediate market towns: Argenti, (2000) points out that farming systems and access to natural resources and labour, large-scale commercial cash crop and/or export oriented agriculture tends to bypass local centres.

Small-scale horticultural production tends to rely more on the presence of local services; accessibility and affordability of transport and road infrastructure, the existence of inexpensive local bus services, for example, will have a positive influence, although this can also have a negative influence by allowing local centres to be bypassed; access to storage and processing facilities and slaughterhouses; to reduce losses; presence of local urban demand for fresh food, although this will be limited by local income levels; Links with wider trade network of middlemen, collection centres and assembly/wholesale markets, that gives access to non-local markets. However, this could remain limited to very low-level transactions unless farmers are able to respond to demand from urban-based consumers (and traders); and relations between producers and traders, the negative side of which might be the use of monopolistic practices and the positive side the provision of transport, extension advice and informal credit, which would not otherwise be available to small farmers. (Satterthwaite and Tacoli (2003).

According to Kerubo (2009), Government policies are increasingly recognizing the importance of marketing to the commercialization of agriculture and the expansion of agriculture productivity. Linking of producers to consumers is usually addressed in two ways: through improved marketing extension and by improving physical infrastructure. The author's study focused primarily on physical infrastructure, including rural and urban markets, and rural access roads. The starting point of such a study is the supply side or the producers. It involves identifying main production areas for key crops and their handling characteristics, transport modes, looking at past growth and the potential for increased production. Next, the physical facilities that support this network of linkages are reviewed, including communications, as well as the intermediate markets and other infrastructure that facilitates linkages. Produce flows to local, regional and city markets are assessed and an evaluation undertaken of infrastructure improvements needed to meet future demand coming from the urban areas. Finally, the implications of transport improvements on market linkages are reviewed.

## **2.6 Empirical Review**

The origin of the people involved in urban agriculture varies widely as does the contribution of agriculture to urban livelihoods. Urban farmers can be: Farming families that have gradually become absorbed by the expanding city and often adapt their farming systems to new urban opportunities, like closeness to markets with better opportunities to collect market information and to sell directly to urban consumers or shopkeepers (either in fresh or in processed form including vending street foods). Despite these opportunities, some peri-urban and urban producers continue to have a 'rural outlook' and need support to utilize new markets and market channels (Arce et al., 2007). They can also be constrained by

other, negative changes, especially loss of customary land rights, increased competition for land from speculators and industry, quarrying activities (for example, construction sand and stones), and more regulation, control and political pressure. Recent migrants who engage in agriculture as a (temporary) survival strategy. They often rely on relatives and people with common origins to get access to land, or else make use of vacant public land. They often bring farming knowledge and skills from their place of origin, part of which does not apply under the urban conditions and will need adaptation. Very poor and food-insecure urban households (including female-headed households with children, HIV/Aids-affected households, young unemployed people, elderly people without a pension, etc.). These socially excluded people may engage in food production out of necessity on very small plots on often marginal, vacant open private or public land and around their homes. Low and middle class urban households that seek to complement their incomes by engaging in agricultural activities, often on their homesteads, for example, zero grazing dairy units, small poultry units, tree nurseries, ornamental plants, mushrooms, etc.

The fact that agricultural production in urban areas is often combined with part- or full-time activities in other urban sectors means that urban household decision-making processes and strategies regarding deployment of household resources are more complicated than those for rural households.

### **2.6.1 Farming types and agricultural innovation**

The above factors have a strong impact on the types and styles of farming that one encounters in rural and urban settings. Rural areas are dominated by rain-fed farms that produce cereals, coarse grains or root crops or extensively raise livestock (cattle, sheep). Urban and peri-urban “farms” tend to become specialized micro-units of intensive livestock raising and horticultural production, sometimes without the need of cultivated land (as in rooftop, hydroponic and container production). Perishable and “special niche” products dominate, especially green vegetables, dairy products, poultry, pigs, mushrooms, ornamental plants, herbs and fish. Year-round production is common through multiple crop cycles, irrigation and use of cover. Innovation takes place continuously in rural farming systems, and in some areas it is even intensifying under the influence of increasing market penetration and stronger rural-urban linkages, both driven by globalization processes. But in the urban context the need as well as the opportunities for innovation appear to be higher, due to the factors mentioned above, leading to a higher intensity of technical innovation, more diversity in farming types as well as new forms of organization and cooperation .

### **2.6.2 Putting agriculture into the plan in Kenyan Towns**

Since independence, city planning in Kenya has not been carried out effectively. In the absence of a clear land use policy, urban agriculture is currently thriving in Kenya. But, according to the same author, the confused policy situation and lack of overall coordination leads to conflicting implementation of different land use activities. Little consideration has been given to the areas allocated to agriculture, and the outcome has been to put people's health at risk. If people properly regulate urban agriculture, then, it can be practiced well. But the way it is conducted today leads to environmental and health hazards, like creating breeding grounds for mosquitoes and contaminating waterways with agrochemical inputs. Good town planning, suggests that it is a major factor in ensuring the health of residents.

But in Kenyan towns, especially in low-income, heavily populated areas, water supplies, sanitation and waste disposal systems are inadequate, impacting heavily on people's health and the urban environment.

### **2.6.3 Urban Land Characteristics**

One of the most significant dynamics impacting on Kenyan society is rapid urbanization, mainly due to rural-urban migration and high urban growth rate. Kenya's population shows remarkable trends in levels of urbanization having increased from 8% at independence to 19% in 1989, 19.4% in 1999 (Population and Housing Census-CBS 1999) and is projected to account for over 50% of the total population by the year 2015. Some of these urban centres, Nairobi in particular, have doubled in population over the past decade. However, urbanization on its own is neither good nor bad because it is often a response to economic growth. There is a clear relationship between a country's level of development and the proportion of the national population that is urbanized (Republic of Kenya, 2008).

### **2.6.4 Micro-Gardens in Dakar, Senegal**

The city plays a prominent role in technological development "For a very long time, the Earth has been the great laboratory; it was just recently that this role was taken over by the city". Specific circumstances in Dakar have stimulated the development of micro-gardening, such as the annual arrival of many new inhabitants (about 100,000 according to IUCN, 2002), the subsequent search for new livelihood opportunities, the problematic access to farming land (Fall and Fall, 2001), and several efforts of NGOs and researchers promoting urban agriculture. A micro-garden is a soil-less farming

system, which involves the cultivation of plants on either solid substrate or in water (hydroponic). This technology has been tested by FAO in Latin America and the Caribbean.

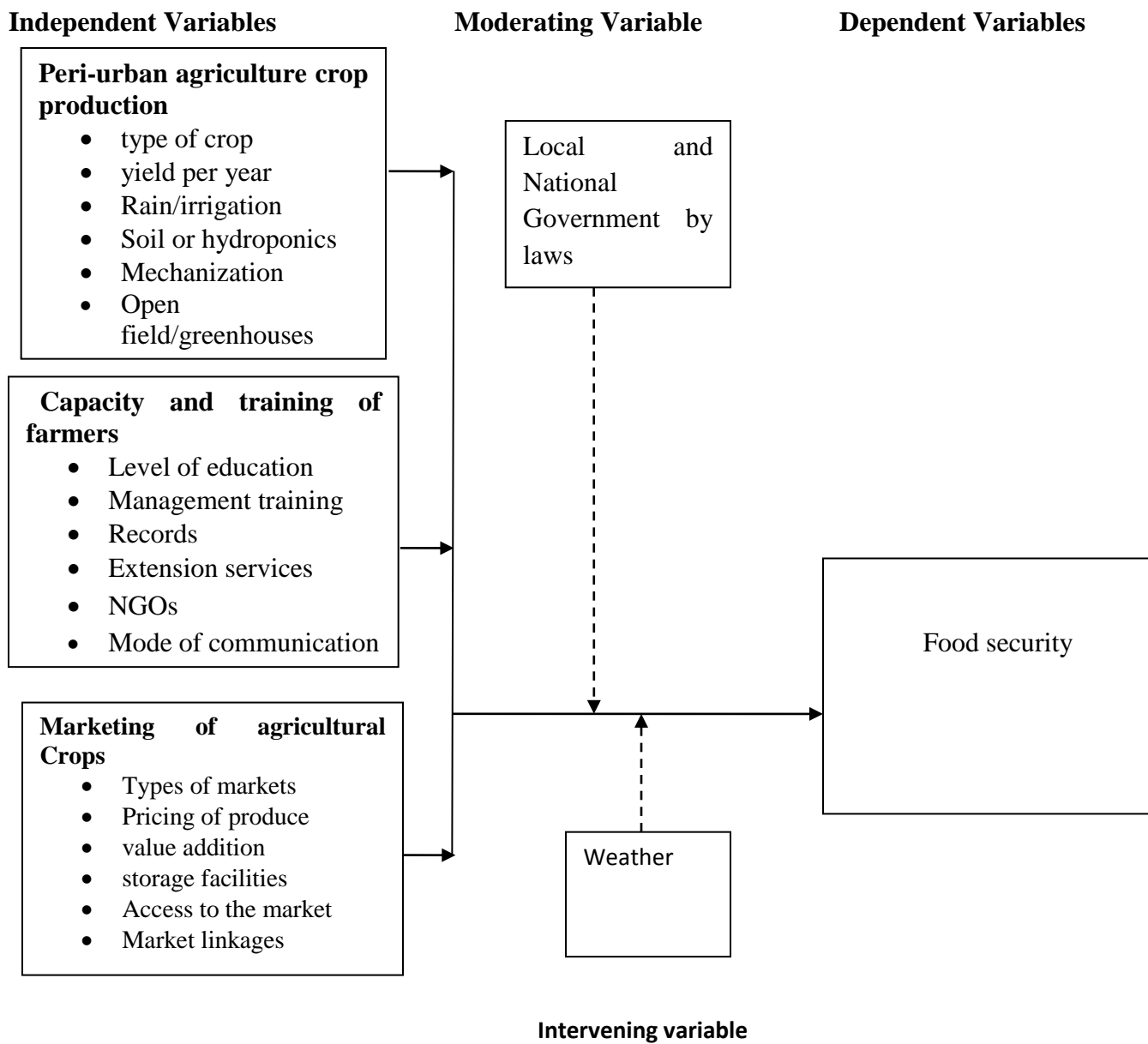
Since Micro-gardens in Dakar T 1999, the Department of Horticulture in Senegal has been coordinating a project called the Micro-gardens' Programme. This department has played a crucial role in innovation, firstly by taking the decision to entrust researchers with the project, which was to be developed together with the farmers.

## **2.7 Conceptual Framework**

In this conceptual frame work given in Figure 2 there are three independent variables selected for this study namely; production of agriculture crops, farmer's organizational capacity and marketing of peri-urban crops produce In Naivasha Municipality. These variables were selected to check their influence on peri-urban agriculture and food security of farmers in Naivasha Municipality.

In the conceptual framework we also have one modulating variable which also behaves like the independent variable in that it has a significant contributory or contingent effect on the relationship between dependent and independent variable. The researcher being aware of the influence the Government policies have on peri-urban agriculture and food security took into account their effects by asking farmers in the questionnaires to list the challenges they face in order of priority. This was done given that the policies take long to be revised and therefore the effect may be constant as long as no reviews are done.

The study also incorporated one intervening variable which affects the relationship of the dependent and independent variables but it is difficult to measure. The weather factor influences peri-urban agriculture but it was not easily measurable and therefore only factors influencing crop production related to weather such as irrigation and use of green-houses were considered during the study. These were considered as indicators of how controlled weather conditions affect peri-urban agriculture and food security of farmers in Naivasha Municipality.



**Figure 2. Factors Influencing food security of farmers practicing peri-urban agriculture crop production**

## 2.8 Knowledge gaps

This list of challenges facing Kenyan agriculture and farmers is not exhaustive. There are some major challenges which can be solved if effective extension and advisory services are accorded to farmers especially small scale farmers. The government also has a big role to play in solving some of these challenges like the poor infrastructure, strengthening research, extension and training and enhancing farmer access to affordable inputs and credit. Most of the challenges are caused by lack of information and knowledge on how to avoid them or how to solve or circumvent those that cannot be avoided. There are some assumptions that extension and advisory services have a big role to play in alleviation



of most of these challenges as highlighted in this chapter. According to (Nyamwasa, 2007), costs are the key to competitiveness. Marketing costs are the total costs for bringing produce from the farm to the ultimate consumer. Margins are the costs that are added by transporters and traders to cover their expenses and to provide a profit for their services. They are added to the basic farm gate prices of products. An analysis of marketing channels can be used to examine what margins are incurred at different stages in the process and whether they are reasonable.

An efficient and functioning marketing system is a precondition for agricultural diversification and improved nutrition. This enables better prices to be obtained by producers (leading to higher incomes) and improves the availability of competitively priced produce to consumers. “Linking farmers to markets” can embrace a whole range of activities, from the very small and localized to the very large. The concept does, however, assume the development of long-term business relationships rather than support for ad hoc sales. This mirrors trends in developed country markets, where there has been a rapid shift from sales through open markets to direct sales that involve linkages and alliances from production to consumption as Kibuikah (2010) points out.

There should be a guide that is designed to arm extension workers with skills which will assist them in fully understanding the commercial potentials of small-farm agricultural production. Sifuna (2011) points out that the potential for profits increase as the complexity of the management increases. By use of a progressive methodology, the well structured manual may be in a position to help to assess capacity, identify shortcomings and propose strategies affecting the household’s business success.

The extension workers and farmers may be guided through the following steps: Understanding business terms and concepts as they relate to farming and tailoring.

Comparisons of the costs and benefits of differing approaches to farming and business management. The value of saving compared to credit costs as an input. Investigating various value-adding strategies. Risk management strategies. Reviewing market access and market alternatives. Understanding the potential benefits of collective actions through associations with other farmers. Understanding simple and informative farm records. Understanding farm accounts for good decision making and business performance monitoring. Developing indicators to measure progress of the farm as an enterprise. There are essentially four basic stages in these models for every product development process. These are: product strategy development; product design and development; product commercialization; and product launch and post-launch. Each stage has activities which produce outcomes (information) upon which management decisions are made.

Existing technologies can be used in processing, reinforcing the importance of the concept for the new product. Processing waste can be a valuable source of raw material for new products. Ingredients for food products also form an area of business that can benefit from innovations.

Studies of farmer-to-market linkages often talk of the need to promote entrepreneurial capabilities of farmers. This does raise the question of whether someone can be taught to be an entrepreneur or whether such capacity building can only assist those who already have an entrepreneurial instinct to become better managers. It may be unrealistic to expect people living in rural areas to suddenly become entrepreneurs. However, some linkage projects, particularly those with a “pro-poor” orientation, try to go beyond the immediate goal of improving rural incomes to that of enabling rural producers to become “chain owners”. Supply chains are changing rapidly, with transactions increasingly based on chains that involve coordinated links between farmers, traders, processors and retailers.

It is against this background that organizations working with farmers, such as donors, NGOs and government extension services (“linking organizations”), are seeking to promote farmer welfare by using the “linking farmers to markets” approach, which usually involves organizing farmers into groups to supply identified markets. Marketing systems are undergoing rapid transformation.

The stakeholders need to provide a simple planning methodology and framework that focuses on the issue of linking farmers to market outlets for their produce particularly identifying their marketing infrastructure needs.

The users of the guide are likely to be at national, provincial or district levels and could include: Planning and marketing officers in ministries and departments of Agriculture, concerned with promoting activities in production areas and developing appropriate production, post-harvest and marketing extension packages. Planners and engineers in ministries and departments of Public works and Transport, concerned with making decisions on improving rural roads and other transport systems. Local authority officers in planning, commerce and marketing departments in urban areas, concerned with the supply of wholesome and reasonably priced food to urban consumers and with identifying new wholesale and retail market facilities within the cities to serve this need.

## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

#### **3.1 Introduction**

This chapter gives the description of the procedures which were used to carry out the study. The chapter covers the research design, target population, sampling procedures and sample size, data collection instruments and procedures, data analysis techniques, ethical considerations and operational definition of variables.

#### **3.2 Research Design**

The study employed a descriptive survey design. A descriptive research is used to obtain information concerning the current status of the phenomena to describe “what exists” with respect to variables or conditions in a situation (Chandran, 2004). Kothari (2004) also defines a descriptive research study as one that is “concerned with describing the characteristics of a particular individual or of a group”. In a descriptive survey research objectives are predetermined in which case it allows data collection to be relevant and sufficient to the study problem. By combining both the quantitative and qualitative data collection procedures, a descriptive research design allows the researcher to gather information in a manner that reduces the cost of data collection.

This research design therefore enabled the researcher to draw inferences about the factors influencing peri-urban agriculture and food security of Farmers in Naivasha through studying a representative sample of the population.

#### **3.3 Target Population**

The residents who are practicing peri-urban agriculture within Naivasha constituted the target population. According to Kiangazi foundation, Naivasha Municipality has a population of 224,414 residents, who live in this peri-urban area and this population was used in the study.

#### **3.4 Sample Size and Sampling Techniques**

A sample is a finite part representative of the target population whose properties are used in studies to gain information about the whole population. The selection of a representative sample requires a suitable sampling technique.

### 3.4.1 Sample Size

The population of Naivasha municipality in terms of residents is considered finite and thus the following suitable formula was used (Cochran, 1963 and Glen, 1992).

$$n = \frac{N}{1 + N(p)^2}$$

$$= \frac{224,141}{1 + 224,141(0.07)^2} = 204$$

Where n is the sample size

N is the population size

P is the level of precision

A sample size of 204 was used in the study

### 3.4.2 Sampling Technique

To ensure representation among Naivasha Municipality residents, stratification of the target population was done by the County Assembly Wards in Naivasha Municipality using probability proportional to size. Target sample was 204 respondents.

**Table 3. 1. Sample size**

<b>Strata</b>	<b>Total Residents</b>	<b>Sample Size</b>
Biashara County Assembly Ward	15,692	14
Hellsgate County Assembly Ward	39,209	36
Lakeview County Assembly Ward	29,796	27
Maeilla County Assembly Ward	27,528	25
Naivasha East County Assembly Ward	20, 884	19
Viwanda County Assembly Ward	45,543	42
Naivasha Town County Assembly Ward	45,489	41
<b>Total</b>	<b>224,141</b>	<b>204</b>

**Source: Statistics Office Naivasha District 1999 census data**

Representative sample was selected according to the seven county assembly wards in Naivasha Municipality as shown in Table 3.1. Depending on the population in each ward, Viwanda ward got the highest sample of 42 farmers while Biashara ward got the least sample of 14. In each stratum listing of farmers was made and samples selected at random.

### **3.5 Data Collection Instruments**

The study employed questionnaires to collect data. Kothari (2004) observes that the questionnaire method has been extensively used in a range of business and economic surveys due to its unbiased nature and ability to capture larger samples. Questionnaire use also provides greater anonymity through questionnaire coding and discrete analysis of the respondent personal details.

The first section of the questionnaire contained background and demographic information about respondents while the other sections address issues relating to the impact of peri-urban agricultural towards food security. Quantitative techniques were used to collect data from the target respondents.

The questionnaires design entailed both open and close ended questions. The existence of closed ended question or structured was deliberate to ensure the researcher is able to capture particular variables of the study problem. On the other hand open ended or unstructured questions allowed the researcher to provide a more complete picture of the respondent's feelings and attitude. The questionnaire was constructed in a manner to ensure that the three identified variables relevant to the study are captured. To comprehensively administer the questionnaire within the time constraint, the researcher engaged several trained research assistants to facilitate timely feedback from the respondents.

#### **3.5.1 Pilot Testing of the instrument process**

The research instrument was administered to 100 residents of Gilgil Town, who were selected randomly, at least a week before the main study was done. This allowed for a fine – tuning of the research instruments before the actual study. The respondents from the pilot survey were however not utilised in the data analysis stage.

### **3.6 Data Collection Procedure**

The researcher sort approval for this study through the University of Nairobi from the National Council for Science and Technology. An introduction letter was then forwarded to the assistant County Commissioner and the county ward chiefs. As soon as permission was granted, the study proceeded in the following chronology: Recruitment of six research assistants; Conducting training and briefing for

the assistants on the study objectives, data collection process and study instrument administration; Pilot testing; Revision of the data collection instruments after the pilot study; Reproduction of required copies for data collection upon approval by supervisors; Administration of data collection instruments to Naivasha Municipality residents in the respective County Assembly Wards; Collection of duly completed research instruments, assessment of filled in questionnaires through serialization and coding for analysis; Data analysis and discussion; preparation of conclusion and recommendations.

### **3.7 Validity and Reliability of research instruments**

This subsection describes how the research study met the threshold of a quality study by observing validity and reliability as is the norm in any sound research.

#### **3.7.1 Validity**

Validity is the extent to which research outcomes actually correspond to the phenomena under study (Mugenda and Mugenda 1999). Valid results allow the researchers to make more generalization with ease. Validity has to be assured both internally and externally. Internal and external validity relates to the overall organization of the research design. External validity relates to the freedom of generalization provided for in the study. Internal validity on the other hand explains the degree to which the design of the study actually lend itself sufficient in answering the research questions or accepting/nullifying the stated hypothesis. To enhance external validity therefore, the researcher endeavoured to draw a representative sample that was randomly selected from the stratified target population of farmers within Naivasha town.

There are three major ways of testing questionnaire validity. These include construct validity, content validity and criterion validity. Construct validity test the degree to which between data obtained from the field actually conform to the underlying theory (Mugenda and Mugenda 1999). In this respect the researcher used construct validity by discussing their content with other colleagues and consultation with the supervisor. The questionnaire was subjected to a pilot test and then subjected to an expertise opinion on their validity.

#### **3.7.2 Reliability of research instruments**

Reliability refers to the consistency of the measured results over repeated attempts. A measure that does not contain random errors is considered to be perfectly reliable. Charles ( 1995) adheres to the notion that the consistency with which questionnaires items are answered remain relatively the same can be determined through the test-re-test method of two different times. The researcher purposively carried

out a pre-test exercise on the questionnaire through a pilot survey on a selected group of 100 farmers in Gilgil. Reliability of instruments was tested using the split half method. Test scores were divided into two parts comprising even and odd numbers and correlated using the Spearman's Brown prophecy formula. A reliability coefficient of 0.75 was obtained and thus the research questionnaire was found to be reliable.

### **3.8 Data Analysis Technique**

Raw data collected from the field is usually unorganised, and requires to be cleaned for potential errors. The questionnaire should be coded before entering data into the computer. Descriptive statistical analysis of quantitative data was made possible by use of computer soft ware known as statistical package for social sciences, where means used to express average of responses. In addition measure of dispersion enabled the researcher to make conclusions on data variability using sample standard deviation. Further the researcher made use of percentages to report on proportions as well as correlations to determine the degree of association between variables under study.

### **3.9 Ethical Considerations**

As an initial step to research effort the researcher obtained a transmittal letter from the University. In addition the researcher assured anonymity and confidentiality of responses to protect the credibility of the respondent. This was made possible through questionnaire coding.

### **3.10 Operational definition of variables**

Operational definition of variables is given in Table 3.2

**Table 3.2 Operational definition of Variables**

Objectives	Variables	Indicators	Measurement scale	Tools of analysis
To evaluate how peri-urban agriculture production affect food security of farmers in Naivasha municipality	<b>Independent</b>  Agricultural crop production	<ul style="list-style-type: none"> <li>• Level of mechanization</li> <li>• Rain/Irrigation</li> <li>• Open field /Greenhouses</li> <li>• Yield per area per year</li> <li>• Area under production</li> <li>• Soil or hydroponics</li> </ul>	Ordinal,  Ratio	Means,  percentages
To assess how capacity and training of farmers affect food security in Naivasha municipality	Organizational capacity of farmers	<ul style="list-style-type: none"> <li>• Level of education</li> <li>• Management skills</li> <li>• Use of records</li> <li>• Extension services</li> <li>• NGOs</li> <li>• Mode of communication</li> </ul>	Ordinal  Ratio	Means  Percentages
To evaluate how marketing of peri-urban agriculture crop, influences food security of farmers in Naivasha municipality	Marketing of agricultural products	<ul style="list-style-type: none"> <li>• Type of market</li> <li>• Prices</li> <li>• Value addition</li> <li>• Post harvest facilities</li> <li>• stakeholders</li> </ul>	Ordinal  Ratio	Means  Percentages
		<ul style="list-style-type: none"> <li>• Availability of food</li> <li>• Food quality</li> </ul>	Ratio	Means  Percentages



## CHAPTER FOUR

### DATA ANALYSIS, PRESENTATION AND INTERPRETATION

#### 4.1 Introduction

This chapter contains findings from the descriptive analysis of data collected from the respondents, interpretation and presentation of the findings. The study sought to establish factors that influence food security of farmers in Naivasha municipality, Kenya. The chapter is subdivided into the following sub-sections: questionnaires return rate; background information regarding respondents; agricultural productivity; organizational capacity of farmers, marketing and food security.

#### 4.2 Questionnaire return rate

From a total of 204 questionnaires which were administered, 156 questionnaires were returned representing a response rate of 76.5%. The questionnaires were administered, then the respondents were allowed time to complete them and thereafter they were collected. Nevertheless, not all respondents managed to fill the questionnaires on time. The sample size was a representative of the initial sample to a high degree ensuring validity of the findings. The results of the findings are shown on Table 4.1.

Table 4.1 Response Rate

<b>Response</b>	<b>Number of respondents</b>	<b>Percentage</b>
Expected responses	204	100
Received responses	156	76
<b>Un-received</b>	48	14

#### 4.3 Background of the respondents

In this section, the respondents' gender, location of residence and the nature of peri-urban agriculture they practiced in terms of either full or part time basis are discussed.

##### 4.3.1 Distribution of respondents by gender

In order to determine the gender of farmers engaged in peri-urban farming, the respondents were asked to indicate their gender and the responses captured are shown in Table 4.2.

Table 4.2 Distribution of respondents by gender

<b>Gender</b>	<b>Frequency</b>	<b>Percentage</b>
Male	83	53.2
Female	73	46.8
<b>Total</b>	<b>156</b>	<b>100.0</b>

The findings reveal that majority of respondents practicing peri-urban farming were males as shown by the 53% response rate compared to 47% of the females. However, the margin between the two categories is not that large, and this shows that both genders are actively involved in peri-urban farming.

#### **4.3.2 Distribution of respondents by location**

The researcher sought to establish the place of residence of the respective respondents. The findings are shown in Table 4.3.

Table 4.3 Distribution of respondents by location

<b>Respondents' residence</b>	<b>Frequency</b>	<b>Percentage</b>
Biashara	17	10.9
Hell's Gate	27	17.3
Lakeview	23	14.7
Maiela	18	11.5
Naivasha East	18	11.5
Naivasha Town	35	22.4
Viwanda	18	11.5
<b>Total</b>	<b>156</b>	<b>100.0</b>

The findings reveal that Naivasha town had the highest number of individuals who engaged in peri-urban farming given the 22% response rate. This was followed by Hell's Gate (17%); Lakeview (14%); Maiela, Naivasha East and Viwanda (each with a response rate of 12%) and lastly, Biashara area with a response rate of 11%. This shows that most activities relating to peri-urban agriculture were concentrated on Naivasha town while they were least represented in Biashara area.

### 4.3.3 Distribution of respondent's by mode of the farming

The study sought to establish the nature of peri-urban farming practiced by farmers in Naivasha municipality i.e. in terms of whether it was a full time or part-time venture. The findings are captured in Table 4.4.

Table 4.4 Distribution of respondents by mode of the farming

<b>Nature of farming</b>	<b>Frequency</b>	<b>Percentage</b>
Full time	51	32.7
Part-time	105	67.3
<b>Total</b>	<b>156</b>	<b>100.0</b>

The results reveal that 67.3% of the respondents were undertaking peri-urban farming as a part-time venture while the remaining 32.7% took it as a full-time venture. This means that majority of farmers in Naivasha who practice peri-urban farming, do so as a part-time activity.

## 4.4 Agricultural Productivity

The researcher sought to assess how agriculture crop production affects production which may result to food insecurity as a result of low production. The factors considered are explained below;

### 4.4.1 Number of crops cultivated by farmers

The study sought to establish the number of crops grown by each peri-urban farmer in the municipality. The findings are shown in Table 4.5.

Table 4.5 Number of crops cultivated by farmers

<b>Number of crops cultivated</b>	<b>Frequency</b>	<b>Percentage</b>
1	55	35.3
2	62	39.7
3	31	19.9
4	8	5.1
<b>Total</b>	<b>156</b>	<b>100.0</b>

The findings reveal that 62% of respondents cultivated a maximum of two types of crops, 55% cultivated only one type of crop, 31% cultivated three types of crops, while the remaining 8%

cultivated a maximum of four types of crops. These findings suggest that majority of farmers' cultivated only two types of crops, while a few of them cultivated four types of crops.

#### **4.4.2 Acreage of crops cultivated by each farmer**

The study sought to find out the total acreage of crops cultivated by each farmer in the municipality.

The results are shown in Table 4.6.

Table 4.6 Acreage of crops cultivated by each farmer

<b>Measure</b>	<b>Acreage</b>
Mean	1.18
Mode	1.00
Minimum	0.02
Maximum	15.5

The findings reveal that the average number of acres cultivated by farmers was 1.186 acres. The results also indicate that most farmers practiced peri-urban farming on a one acre piece of land, given that the mode was found to be one. The minimum size of land on which peri-urban farming was practiced was found to be 0.02 acres while the maximum piece of land utilized for the same purpose was 15.5 acres.

#### **4.4.3 Annual yields per acre**

The study also sought to compare the realized yields by farmers with the expected optimum yields as per the latest update by horticultural crop development authority and ministry of agriculture. The findings are shown in Table 4.7

Table 4.7 Annual yields per crop

Crop	Mean yield /acre ( tonnes)	Optimum yield /acre ( tonnes)
Cabbage	28	45
Kales	17	30
Maize	1.3	1.8
Beans	0.65	0.9
Potatoes	1.1	1.35
Average	9.61	15.8

The findings reveal that the yield per acre for all the crops fell below the optimum expectations. These findings imply that agricultural productivity of most farmers was below levels where they could make profits, a factor that may lead to continuous shortage of food if proper measures are not put in place to arrest the situation

#### 4.4.4 Average income from farm produce

The researcher also sought to determine the income which farmers managed to realize from selling their farm produce. The results are shown in Table 4.8.

Table 4.8 Average income from farm produce

Measure	Value (KSh.)
Mean	79459.7
Mode	6000.0
Minimum	0
Maximum	1000000

The findings reveal that the average income that a farmer earned from selling the farm produce was KShs70459.74. In addition, the results revealed that most farmers earned an income of KSh. 6000. Lastly, the minimum earnings that a farmer ever realized was KSh. 0 while the maximum income was KShs 1 million.

#### 4.4.5 Growing media

The study also sought to determine the growing medium utilized by farmers in crop production. The results are shown in Table 4.9.

Table 4.9 Growing media

Growing medium	Frequency	Percentage
Soil	155	99.4
Soil-less	1	0.6
<b>Total</b>	<b>156</b>	<b>100.0</b>

The findings reveal that 99% of the respondents cultivated their crops on the soil medium, while only 1% cultivated their crops on a soil-less medium. This implies that most farmers cultivated their crops on the soil medium.

#### 4.4.6 Method used to water crops

The researcher also sought to establish the methods that farmers were using to water their crops. The results are shown in Table 4.10.

Table 4.10 Method used to water crops

Watering method	Frequency	Percentage
Irrigation	32	20.5
Rainfall	98	62.8
Irrigation and rainfall	26	16.7
<b>Total</b>	<b>156</b>	<b>100.0</b>

The findings reveal that 62.8% of respondents relied on rainfall as means of watering their crops, 20.5% of them relied on irrigation, while the remaining 16.7% depended on both. Thus, it can be concluded that majority of farmers relied on rain-fed way of watering their crops.

#### 4.4.7 Type of field used for cultivation

The study as well sought to find out the type of field used by farmers for crop production. The results are shown in Table 4.11.

Table 4.11 Type of field used for cultivation

<b>Type of field used for production</b>	<b>Frequency</b>	<b>Percentage</b>
Open	149	95.5
Covered	4	2.6
Both	3	1.9
<b>Total</b>	<b>156</b>	<b>100.0</b>

The findings reveal that 95.5% of respondents cultivated their crops in an open field, 2.6% did it in a closed field, while the remaining 1.9% cultivated their crops on both types of fields. This means that majority of farmers cultivated their crops in an open field, while a few of them utilized both types of field.

#### **4.4.8 Application of machinery during cultivation**

The researcher also set out to establish whether farmers made use of machinery or not during cultivation of their crops. The findings are shown in Table 4.12.

Table 4.12 Application of machinery during cultivation

<b>Mechanization</b>	<b>Frequency</b>	<b>Percentage</b>
Applied	23	15
Not applied	133	85
<b>Total</b>	<b>156</b>	<b>100</b>

The findings indicate that 85% of respondents did not employ any machinery during cultivation while the remaining 15% did so. These results imply that few farmers employ machines during crop production.

#### **4.4.9 Rating of challenges facing farmers during the growing period**

The study also sought to determine the priority of challenges faced by farmers during the growing period. The results are captured in Table 4.13.

Table 4.13 Rating of challenges facing farmers during the growing period

<b>Nature of challenge</b>	<b>Frequency</b>	<b>Percentage</b>
Selection of the type of crop to grow	4	2.5
Availability of water	29	18.6
Reliability of rainfall	77	49.4
Soil or media management	9	5.8
Availability of fertilizers	31	19.9
Availability of machinery	6	3.8
<b>Total</b>	<b>156</b>	<b>100.0</b>

The findings from the respondents shows that 49.4% of the respondents believed that the biggest challenge they faced during the growing period was reliability of rainfall, 19.9% said it was availability of fertilizers, 18.6% stated that it was availability of water, 5.8% indicated that it was soil/media management, 3.8% indicated that it was availability of machinery while the remaining 2.5% indicated that the most influential variable was selection of the type of crop to grow. These results imply that farmers have to devise new ways of watering crops in order to enhance productivity thereby boosting their food security.

#### **4.5 Capacity and training of farmers**

The researcher sought to determine how organization capacity and training of farmers affect food security, in regard to the following factors were considered;

##### **4.5.1 Farmer education level**

The study also set out to determine the education level of farmers. The findings are shown in Table 4.14

Table 4.14 Farmer education level

<b>Educational level</b>	<b>Frequency</b>	<b>Percentage</b>
Primary	26	16.7
Secondary	85	54.5
College/vocational	40	25.6
University	3	1.9
Post-graduate	2	1.3
<b>Total</b>	<b>156</b>	<b>100.0</b>



The findings reveal that 85% of respondents had attained secondary school educational, 40% had a college education, 26% of them had attained primary level education, and 3% had a university level qualification while the remaining 2% had achieved post-graduate level education. These findings show that most of the farmers engaged in peri-urban crop farming in Naivasha had post-primary school qualification although a very small number had a university and post-graduate education.

#### 4.5.2 Management training

The researcher also sought to establish whether respondents had received any management training or not. The findings are shown in Table 4.15.

Table 4.15 Management training

<b>Status of management training</b>	<b>Frequency</b>	<b>Percentage</b>
Trained in management area	14	9.0
Not trained in management area	142	91.0
<b>Total</b>	<b>156</b>	<b>100.0</b>

The results indicate that 91% of respondents had not been trained in the field of management while only 9% had received such training. This means that majority of farmers engaging in crop production in Naivasha town did not have the much needed management training required of anyone undertaking agri-business.

#### 4.5.3 Record keeping by farmers

The study also set to determine whether respondents kept records relating to their farming activities. The findings are shown in Table 4.16.

Table 4.16 Record keeping by farmers

<b>Record keeping status</b>	<b>Frequency</b>	<b>Percentage</b>
Records kept	57	37
Records not kept	99	63
<b>Total</b>	<b>156</b>	<b>100</b>

The outcome of the study shows that 63% of respondents did not keep records pertaining to their farming activities while 37% maintained such records. This means that most farmers do not maintain

records pertaining to their activities something that is mandatory if effectiveness and efficiency is to be achieved in crop production.

#### 4.5.3.1 Type of records kept by farmers

The study also sought to establish the type of records maintained by farmers. The findings are captured in Table 4.17.

Table 4.17 Type of records kept by farmers

<b>Type of record</b>	<b>Frequency</b>	<b>Percentage</b>
Production	46	75.4
Sales	7	11.5
Wage bill	2	3.3
Receipts	5	8.2
Farm equipment	1	1.6
<b>Total</b>	<b>61</b>	<b>100.0</b>

The findings reveal that 75.4% of respondents kept production records, 11.5% of them kept sales records, 8.2% maintained receipts, 3.3% kept wage bill records, while the remaining 1.6% maintained records pertaining to farm equipment. These results suggest that the type of record that was maintained by the majority of farmers were production records while records on farm equipment were the least maintained.

#### 4.5.4 Visit by extension officers

The researcher also sought to find out the number of times extension officers visited the farmers. The results are shown in Table 4.18.

Table 4.18 Visit by extension officers

<b>Nature of visits</b>	<b>Frequency</b>	<b>Percentage</b>
Monthly	1	0.6
Over one month	40	25.6
Never	115	73.7
<b>Total</b>	<b>156</b>	<b>100.0</b>

The findings reveal that 73.7% of respondents had never been visited by extension officers, 25.6% of them experienced such visits after a month has elapsed and finally, only 0.6% were being visited on a

monthly basis. These findings indicate that most farmers were not receiving the much needed guidance from extension officers that would boost productivity of their land. There is therefore the need for the government and other relevant stakeholders to fast-track the deployment of more agricultural extension officers to provide expertise advice regarding latest technologies in peri-urban crop-production. If this is done, food security will be easily realized by the farmers.

#### 4.5.6 NGO support

The study also set to determine whether farmers were receiving support of any kind from NGOs operating locally or internationally. The findings are shown in Table 4.19.

Table 4.19 NGO support

<b>NGO Support</b>	<b>Frequency</b>	<b>Percentage</b>
Supported	3	2
Not supported	153	98
<b>Total</b>	<b>156</b>	<b>100.0</b>

The findings show that 98% of respondents were receiving no support from either local or international NGOs operating in the area, while only 2% did receive such support. This finding suggests that most farmers were thus relying on their own knowledge, skills, or otherwise when it came to crop production. In order for maximum yield to be realized through the application of most recent and hence effective technologies, there is need for relevant NGOs to come on board and assist the farmers if food security is to be attained.

#### 4.5.7 Mode of disseminating agricultural information to farmers

The study as well sought to determine whether farmers were seeking or accessing information relating to crop production activities. The findings are shown in Table 4.20.

Table 4.20 Mode of disseminating agricultural information to farmers

<b>Communication</b>	<b>Frequency</b>	<b>Percentage</b>
Received information	151	96.8
Did not receive information	5	3.2
<b>Total</b>	<b>156</b>	<b>100.0</b>

The findings reveal that 96.8% of respondents were accessing relevant information relating to crop production while the remaining 3.2% did not seek after such information. This means that majority of

farmers were accessing and utilizing information relating to their farming activities. This essentially means that farmers utilize such information during production leading to enhanced yields and subsequently food security.

#### **4.5.7.1 Rating of the various modes of communication utilized by farmers**

The study also sought to establish the most frequently used medium for receiving information. The findings are shown on Table 4.21.

Table 4.21 Rating of the various modes of communication utilized by farmers

<b>Communication medium</b>	<b>Frequency</b>	<b>Percentage</b>
Radio	52	33.34
Television	47	30.20
Phone	51	33.21
Internet	6	3.25
<b>Total</b>	<b>156</b>	<b>100.0</b>

The findings reveal that 33.34% of respondents relied on radios to receive information about farming, 33.21% depended on phones, and 30.20% depended on television while the remaining 3.25% relied on the Internet. This means that farmers are in touch with the outside world regarding information on how they can improve productivity in their pieces of land. It is also worth noting that very few farmers make use of the internet as a source of information. Thus it will be prudent for them to do so in order to harness the Internet as a key source of very recent information regarding how they can boost productivity.

### **4.6 Marketing of farm-produce**

Marketing plays a key role in distribution and availability of food, thus the researcher sought to find out how marketing related attributes contributes to food security as explained below;

#### **4.6.1 Buyer specification**

The researcher also sought to determine whether farmers grew for any specific buyer. The findings are captured in Table 4.22.

Table 4.22 Buyer specification.

<b>Buyer</b>	<b>Frequency</b>	<b>Percentage</b>
Specified	27	17.3
Unspecified	129	82.7
<b>Total</b>	<b>156</b>	<b>100.0</b>

The findings indicate that 82.7% of respondents produced for unspecified buyers while the remaining 17.3% produced for specific buyers. This means that most farmers targeted no specific buyer. The advantage of this marketing approach is that it endows upon the farmer the liberty to sell their produce to whoever will offer the best prices in the prevailing market conditions but also makes them prone to exploitation especially during gluts.

#### **4.6.1.1 Destination of farm produce**

Furthermore, the study sought to establish whether farmers were producing for the local or international market. The findings are shown in Table 4.23.

Table 4.23 Destination of farm produce

<b>Destination of farm produce</b>	<b>Frequency</b>	<b>Percentage</b>
Local	111	71.2
International	45	28.8
<b>Total</b>	<b>156</b>	<b>100.0</b>

The results show that 71% of respondents produced for the local market while the remaining 29% targeted the international market. This implies that most farmers produced for local consumption while the rest were exporting their produce. Local consumption is significant as it helps alleviate food insecurity. On the other hand, export of produce ensures more income to the farmer given competitive prices offered at the international market. Furthermore, the country is able to earn a substantial foreign currency due to export business.

#### **4.6.2 Categories of local buyers**

The study also sought to establish the categories of local buyers of farm produce. The results were as shown on Table 4.24.

Table 4.24 Categories of local buyers

<b>Category of local buyers</b>	<b>Frequency</b>	<b>Percentage</b>
Direct consumer	109	69.9
Middle-men	47	30.1
Cooperative society	0	0.0
<b>Total</b>	<b>156</b>	<b>100.0</b>

The findings indicate that 69.9% of respondents sold their produce to direct consumers while 30.1% sold it to middlemen. None of the respondents sold their produce to cooperative societies. This means that most farmers preferred to sell their produce directly to the consumer. By so doing, farmers are able to earn maximum returns compared to selling their produce through middlemen who most of the time will be out to exploit unsuspecting farmers.

#### 4.6.2.1 Other kinds of buyers

The study also sought to determine other buyers of farm produce. The results are shown in Table 4.25.

Table 4.25: Other kinds of buyers

<b>Other types of buyers</b>	<b>Frequency</b>	<b>Percentage</b>
Market sellers	58	40.8
Grain-millers	56	39.4
Groceries	20	14.1
Hotel	7	4.9
Company	1	0.7
<b>Total</b>	<b>142</b>	<b>100.0</b>

The findings indicate that 40.8% of respondents sold their produce to market sellers, 39.4% sold it to grain-millers, 14.1% sold it to groceries, and 4.9% sold it to hotels, while the remaining 0.7% sold their produce to companies. This means that most farmers preferred to dispose their produce to market sellers while very few sell it companies. This could be because of ease of access of market sellers compared to the rest of the buyers.

### 4.6.3 Availability of storage facilities

The researcher also sought to establish whether farmers possess any type of storage facilities to keep their harvest before selling or even consumption. The findings of the study are shown in Table 4.26.

Table 4.26 Availability of storage facilities

Availability of storage facilities	Frequency	Percentage
Present	46	29
Absent	110	71
<b>Total</b>	<b>156</b>	<b>100.0</b>

The findings reveal that 71% of respondents did not have any storage facility whereas 29% had storage facilities where they stored their harvest. These results show that most farmers did not have storage facilities where they would keep their harvest before selling. The disadvantage of not having a specific place to store farm produce is that it becomes prone to theft, destruction, devaluation, etc. This aspect thus immensely contributes to food insecurity which ultimately undermines any efforts by the farmer to attain self-sufficiency. It is thus imperative that farmers lacking such a strategic facility move with speed to construct the same in order to realize effectiveness and efficiency.

#### 4.6.3.1 Type of storage facility

The study also sought to determine the various types of storage facilities that farmers had erected to store farm produce. The findings are captured in Table 4.27.

Table 4.27 Type of storage facility

Type of store	Frequency	Percentage
General store	11	23.9
Grain store	14	30.4
Home store	19	41.3
Harvest to market	2	4.3
<b>Total</b>	<b>46</b>	<b>100.0</b>

The findings indicated that 41.3% of respondents had home stores, 30.4% had grain stores, and 23.9% had general stores, while the remaining 4.3% had no stores but instead took their harvest directly to the market after harvest. This implies that the common type of store amongst farmers were the home stores and grain stores.

#### 4.6.4 Farm produce preservation

The study also set to determine whether farmers had any means of preserving their farm produce. The findings were as shown in Table 4.28.

Table 4.28 Preservation of farm produce

<b>Preservation of farm produce</b>	<b>Frequency</b>	<b>Percentage</b>
Preservation practiced	39	25
Preservation not practiced	117	75
<b>Total</b>	<b>156</b>	<b>100.0</b>

The findings indicate that 75% of respondents did not have a means of preserving their produce while only 25% had preservation means. These results imply that farmers without means of preserving their produce would have it quickly going bad. This would simply result a lot of wastage within a very short time an occurrence that negatively impact on the efforts toward attainment of food security. In addition, farmers who did not have any means of preserving their produce would most likely try to quickly sell it over in order to avoid loses. However, this is not the case since the prices such produce would fetch is likely to be very low given the glut of such produce in the market at a time such as that.

#### 4.6.5 Value addition practices employed by farmers

The study also set to establish whether farmers engage in any value addition practices before selling their produce. The findings are shown in Table 4.29.

Table 4.29 Value addition

<b>Nature of value addition</b>	<b>Frequency</b>	<b>Percentage</b>
Processing	0	0.0
Packaging	11	7.1
Branding	0	0.0
No value added	145	92.1
<b>Total</b>	<b>156</b>	<b>100.0</b>

The findings show that 92.1% of respondents did not add any value to their produce after harvest while only 17.1% did so. The type of value addition that was recorded as having been employed was packaging. This implies that very few farmers engaged in this important function of marketing. The implication of this observation is that the returns realized from selling farm produce would not be as high as it would have been if value addition had been undertaken. It is of paramount importance for



farmers to seek information from relevant sources regarding how they can undertake value addition with the aim of maximizing returns from selling their produce.

#### 4.6.6 Market access

The study also sought to establish whether farmers experienced difficulties in accessing the market for their produce. The findings are reflected in Table 4.30.

Table 4.30 Market access

<b>Market access difficulty</b>	<b>Frequency</b>	<b>Percentage</b>
Experienced	13	12
Not experienced	138	88
<b>Total</b>	<b>156</b>	<b>100.0</b>

The findings indicate that 88% of respondents experienced no difficulty in accessing the market while 12% did experience the difficulty. These results show that majority of farmers did not face a lot challenges while moving their produce from the farm to the market. However, the issue needs to be looked into for the sake of the 12% who were still experiencing problems, if food security is to be realized.

#### 4.6.6.1 Nature of difficulty experienced by farmers during marketing of farm-produce

In addition, the study sought to determine the type of difficulty that farmers experienced while marketing their products. The findings are shown in Table 4.31.

Table 4.31 Nature of marketing difficulty

<b>Nature of marketing difficulty</b>	<b>Frequency</b>	<b>Percentage</b>
Middlemen/brokers	1	5.3
Poor road-network	18	94.7
<b>Total</b>	<b>19</b>	<b>100.0</b>

The findings indicate that 94.5% of respondents who were experiencing marketing difficulty stated that poor road network was the major challenge they were experiencing. The remaining 5.3% stated that middlemen were the key challenge when it came to marketing their produce. These results show that poor road network was a significant challenge during marketing of their produce. It is important not to

wish away middlemen as another impediment farmers have to overcome in order to reap maximum profits from selling their produce.

#### 4.6.7 Pricing of farm produce

The study also sought to establish whether or not farmers were the ones setting the price at which they sell their produce. The results are captured in Table 4.32.

Table 4.32 Pricing of farm produce

<b>Pricing of farm produce</b>	<b>Frequency</b>	<b>Percentage</b>
Farmer involved in setting price	31	20
Farmer not involved in setting price	125	80
<b>Total</b>	<b>156</b>	<b>100</b>

The findings reveal that 80% of respondents did not play any role in setting the price at which their produce would be sold while the remaining 20% were involved. These findings mean that farmers play no major role in setting the prices at which their produce would be sold. In essence, this leaves them at the mercies of external determinants which may come up with prices that are less likely to favour the farmer.

#### 4.7 Price determinants

The researcher also sought to establish the key determinants of price as far as farm produce was concerned. The findings are shown in Table 4.33.

Table 4.33 Price determinants

<b>Price determinants</b>	<b>Frequency</b>	<b>Percentage</b>
Season	79	50.6
Middlemen/brokers	31	19.9
Market rates	30	19.2
Buyer purchasing power	15	9.6
Company rates	1	0.6
<b>Total</b>	<b>156</b>	<b>100</b>

The findings show that 50.6% of the respondents stated that seasonality affected the price at which the produce would be sold, 19.9% of them stated that brokers are the ones who set prices for their produce, 19.2% stated that it was market rates that determined the price, while the remaining 9.6% noted that the

company buying their produce would set the price. These findings imply that the key determinants of price were availability of the product, middlemen and market rates.

## 4.8 Food Security

The study also sought to establish the level of food security of the peri-urban farmers who were targeted in the study. In this regard, three key dimension of food security were considered i.e. food availability, food sufficiency and food variety. The three are considered in the following sub-section.

### 4.8.1 Food availability

The researcher sought to determine the level of availability of food in the households of farmers. The captured results are shown in Table 4.34.

Table 4.34 Food availability

<b>Food availability</b>	<b>Frequency</b>	<b>Percentage</b>
Available	65	42
Unavailable	91	58
<b>Total</b>	<b>156</b>	<b>100</b>

The findings indicate that 42% of the respondents had access to food while the other 58% did not. This means that a significant number of households do not have access to food thereby significantly contributing towards food insecurity.

#### 4.8.1.1 Frequency of occurrence of lack of food

The researcher also sought to establish the frequency with which households failed to access food. The findings are captured in Table 4.35.

Table 4.35 Frequency of occurrence of lack of food

<b>Frequency of lack of food</b>	<b>Frequency</b>	<b>Percentage</b>
Rarely	0	0
Sometimes	65	100
Often	0	0
<b>Total</b>	<b>65</b>	<b>100</b>

The findings of the study indicate that 100% of the respondents lacked food sometimes. This implies that a significant number of households cannot access enough food occasionally, thereby contributing significantly towards food insecurity.

## 4.8.2 Food Sufficiency

The researcher also set out to establish whether farmers' households had lacked sufficient food supply. The results are shown in Table 4.36.

Table 4.36 Food Sufficiency

<b>Food availability</b>	<b>Frequency</b>	<b>Percentage</b>
Sufficient food	96	62
Insufficient food	60	38
<b>Total</b>	<b>156</b>	<b>100</b>

The findings indicate that 62% respondents had access to sufficient food supplies while the remaining 38% did not. This implies that a majority of households have access to sufficient supply of food.

### 4.8.2.1 Frequency of occurrence of lack of enough food

The study also sought to determine the frequency with which households lacked access to sufficient food. The findings are shown in Table 4.37.

Table 4.37 Frequency of occurrence of lack of enough food

<b>Frequency of occurrence</b>	<b>Frequency</b>	<b>Percentage</b>
Rarely	1	1.7
Sometimes	59	98.3
<b>Total</b>	<b>60</b>	<b>100</b>

The findings indicate that about 98% of respondents sometimes did not have access to sufficient food supply while approximately 2% of them rarely had access to sufficient food. These findings imply that majority of households have sometimes experienced lack of sufficient food supplies.

## 4.8.3 Food Quality

The researcher also sought to determine whether households had access to variety of food supplies. The results are shown in Table 4.38.

Table 4.38 Food Quality

<b>Food Quality</b>	<b>Frequency</b>	<b>Percentage</b>
Variety present	72	46
Variety absent	84	54
<b>Total</b>	<b>156</b>	<b>100</b>

The findings reveal that 54% lacked access to a variety of food supplies while 46% of them had access to a variety of food supplies. These results mean that a majority of households experienced lack of access to a variety of foodstuffs. This is a clear indicator of food insecurity.

#### **4.8.3.1 Frequency of occurrence of lack of food variety**

The study also sought to determine the level of occurrence of lack of variety of food in households. The findings are shown in Table 4.39.

Table 4.39 Frequency of occurrence of lack of variety of food

<b>Frequency of occurrence</b>	<b>Frequency</b>	<b>Percentage</b>
Rarely	2	2.7
Sometimes	72	97.3
<b>Total</b>	<b>74</b>	<b>100</b>

The findings indicate that 97.3% of the respondents sometimes lacked access to a variety of foodstuffs while the remaining 2.7% did so during rare occasions. These findings imply that majority of households sometimes lacked access to quality food supply thereby significantly contributing to food insecurity.

### **4.9 Answers to research questions**

#### **4.9.1 How does peri-urban agriculture influence food security of farmers in Naivasha municipality?**

The study sought to establish the influence of agricultural productivity on food security of farmers. In this regard, the dependent variable was food security while the independent variable was agricultural production. Therefore, simultaneous multiple regression was conducted to investigate the best predictors of food security. The results are shown in Tables 4.40, 4.41 and 4.42.

Table 4.40 Summary of results on influence of agricultural productivity on food security

Model	R	R Square	Adjusted R Square	Std.Error of the estimate	Change statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	0.29	0.08	0.03	1.32	0.08	1.61	8	146	0.13

Key:

A. Predictors: (Constant), type of crop, level of mechanization, method used to water crops, type of field used for cultivation, yield, area of land under cultivation, growing media and income from selling farm produce

B. Dependent variable: food security

R. Is the multiple regression coefficient

R(square). Coefficient of determination

R(adjusted). Is the adjusted R square for the number of independent variables and cases.

Std error of the estimate. Is the standard error of the results, measures the extent of deviation of the scatter points around the estimating regression line, values close to 1 indicate a strong relationship.

Df. Degrees of freedom which is equal to the number of independent variables

F . Is the value computed as the ratio of the mean sums of squares of the regression equation and the residual

The value obtained under the adjusted R Square was 0.03. This implies that only 3% of the variance in food security could be predicted from the independent variables.

Table 4.41 ANOVA showing influence of agricultural productivity on food security

Model		Sum of squares	Df	Mean square	F	Sig.
1	Regression	22.49	8	2.81	1.61	0.13
	Residual	255.73	146	1.75		
	Total	278.21	154			

These results indicate that  $F=1.61$  at  $p > 0.13$ . Given that  $p > 0.05$ , then  $F$  is not statistically significant in this case. Therefore, the implication is that the combination of the identified independent variables did not significantly affect food security.

Table 4.42 Coefficients showing effect of agricultural productivity on food security

<b>Variable</b>	<b>B</b>	<b>B</b>	<b>Sig. (p)</b>
Type of field	0.75	0.18	0.03
Watering method	0.37	0.17	0.04
Mechanization	0.15	0.04	0.68
Type of crop	0.09	0.06	0.52
Acreage	0.09	0.12	0.35
Yield	0.00	0.05	0.58
Growing media	-0.521	-0.03	0.70
Income	-5.52	-0.05	0.65
<b>Constant</b>	<b>3.20</b>		<b>0.05</b>

*Note.  $R^2 = 0.03$ ;  $F=1.61$ ,  $p>0.05$*

The results indicate that the type of field was the only variable that had a uniquely significant contribution to the variance in food security. The other variables did not have a uniquely significant contribution to the variance in food security given that each had a  $p$  value greater than 0.05 (i.e.  $p>0.05$ ), as per the last column. However, according to the values shown under the column  $\beta$ , the variable with the highest influence on food security was type of field used for cultivation while the one with the least contribution was growing media. The values provided under column B are used to construct the regression equation for the model.

#### **4.9.2 How does organization capacity influence food security of farmers in Naivasha municipality?**

The researcher also sought to determine the influence of organizational capacity of farmers on food security. In this regard, the dependent variable was food security while the independent variable was organization capacity of farmers. Therefore, simultaneous multiple regression was conducted to investigate the best predictors of food security. The results are shown in Tables 4.43, 4.44 and 4.45.

Table 4.43 Summary of results on effect of farmer organizational capacity on food security

Model	R	R Square	Adjusted R Square	Std.Error of the estimate	Change statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
<b>1</b>	0.41	0.17	0.13	1.25	0.17	4.94	6	149	0.00

Key:

- a. Predictors: (Constant), NGO support, extension services, management training, level of education, information dissemination or communication, farm records.
- b. Dependent variable: food security

The value obtained under the adjusted R Square was 0.13. This implies that 13% of the variance in food security could be predicted from the identified independent variables.

Table 4.44 ANOVA showing effect of farmer organizational capacity on food security

Model		Sum of squares	Df	Mean square	F	Sig.
<b>1</b>	Regression	46.49	6	7.75	4.94	0.00
	Residual	233.53	149	1.57		
	<b>Total</b>	<b>280.02</b>	<b>155</b>			

The results indicate that  $F=4.94$  at  $p < 0.00$ . Given that  $p < 0.05$ , then  $F$  is statistically significant in this case. Therefore, the implication is that the combination of the identified independent variables significantly predicted food security.

Table 4.45 Coefficients showing effect of farmer organization capacity on food security

Variable	B	$\beta$	Sig. ( $p$ )
NGOs support	2.36	0.24	0.00
Extension services	0.03	0.01	0.88
Management training	-0.07	-0.04	0.87
Level of education	-0.12	-0.07	0.40
Communication	-0.61	-0.08	0.29
Farm records	-1.03	-0.37	0.00



<b>Constant</b>	<b>2.62</b>	<b>0.15</b>
<i>Note. R<sup>2</sup> = 0.13 ; F=4.94, p&lt;0.05</i>		

The findings indicate that only two variables had a p – value of less than 0.05 (i.e.  $p < 0.05$ ). These were NGO support and farm records. Thus, it is these two variables that were considered to have statistical significance to the variance in food security. Thus, the other variables did not have a uniquely significant contribution to the variance in food security given that each had a p value greater than 0.05 (i.e.  $p > 0.05$ ), as per the last column. In addition, considering the values shown under the column labelled  $\beta$ , the variable with the highest influence on food security was farm records while the one with the least contribution was management training. The values provided under column B are used to construct the regression equation for the model.

#### 4.9.3 How marketing of crops influence food security of farmers in Naivasha municipality?

The researcher further sought to determine effect of marketing approaches on food security of farmers. In this regard, the dependent variable was food security while the independent variable was marketing. Therefore, simultaneous multiple regression was conducted to investigate the best predictors of food security. The results are shown in Tables 4.46, 4.47 and 4.48.

Table 4.46 Model summary showing effect of marketing on food security

Model	R	R Square	Adjusted R Square	Std.Error of the estimate	Change statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	0.55	0.30	0.27	1.15	0.30	8.99	7	148	0.00

Key:

- a. Predictors: (Constant), marketing difficulty, crop preservation, buyer specification, storage facility, value addition, pricing of farm produce, targeted buyer.
- b. Dependent variable: food security.

The value obtained under the adjusted R Square was 0.27. This implies that 27% of the variance in food security could be predicted from the identified independent variables.

Table 4.47 ANOVA showing effect of marketing on food security

<b>Model</b>		<b>Sum of squares</b>	<b>Df</b>	<b>Mean square</b>	<b>F</b>	<b>Sig.</b>
<b>1</b>	Regression	83.6	7	11.94	8.99	0.00
	Residual	196.42	148	1.32		
	<b>Total</b>	<b>280.02</b>	<b>155</b>			

The results indicate that  $F=8.99$  at  $p < 0.00$ . Given that  $p < 0.05$ , then  $F$  is statistically significant in this case. Therefore, the implication is that the combination of the identified independent variables significantly predicted food security.

Table 4.48 Coefficients showing effect of marketing on food security

<b>Variable</b>	<b>B</b>	<b><math>\beta</math></b>	<b>Sig. (<math>p</math>)</b>
Marketing difficulty	1.33	0.32	0.00
Crop preservation	0.04	0.01	0.88
Buyer specification	-0.21	10.07	0.31
Storage facility	-0.22	-0.07	0.42
Value addition	-0.44	-0.17	0.02
Pricing	-0.56	-0.17	0.02
Targeted buyer	-1.01	-0.29	0.00
<b>Constant</b>	<b>7.35</b>		<b>0.00</b>

*Note.  $R^2 = 0.27$ ;  $F=8.99$ ,  $p<0.05$*

The findings reveal that four variables had a  $p$  – value of less than 0.05 (i.e.  $p<0.05$ ). These included marketing difficulty, value addition, pricing and targeted buyer. Thus, these are the variables that were considered to have a statistical significance to the variance in food security. On the other hand, the other variables did not have a uniquely significant contribution to the variance in food security given that each had a  $p$  value greater than 0.05 (i.e.  $p>0.05$ ). In addition, considering the values shown under the column labelled  $\beta$ , the variable with the highest influence on food security was buyer specification while the one with the least contribution was crop preservation. The values provided under column B are used to construct the regression equation for the model.

#### **4.9.4 Overall contribution of the independent variables to food security**

In order to determine the overall influence of agricultural productivity, farmer organization capacity and marketing of crops on food security, the researcher obtained the sum total of the adjusted R Square values so far obtained. This gave a value of 0.43. This implies that 43% of the variance in food security can be predicted from the combination of agricultural productivity (0.03); farmer organization capacity (0.13) and marketing of farm produce (0.27).

## **CHAPTER FIVE**

### **SUMMARY OF FINDINGS, DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS**

#### **5.1 Introduction**

The chapter gives summary of the findings with corresponding discussion of those findings. The conclusions for the study have been made in accordance to the research questions. It also gives recommendations for consideration based on the study findings. Further Contribution of the study to the body of knowledge is provided at the end of the chapter as well as suggestions for further research.

#### **5.2 Summary of findings**

Out of 204 questionnaires which were administered, only 156 (76%) were filled completely and collected. The sample size was representative of the initial sample to a high degree ensuring validity of the findings of the study. The findings revealed that majority of farmers who practiced peri-urban farming were males (53%) while the rest (47%) were females. The findings further revealed that Naivasha town had the highest number of individuals (22%) engaging in peri-urban farming, followed by Hell's Gate (17%), Lakeview (14%), Maela, Naivasha East and Viwanda (each with 12% of total respondents) and the last was Biashara area (11%). The findings also revealed that most farmers (67.3%) practiced peri-urban farming as a part-time venture while the rest (32.7%) did it on a full-time basis.

The majority of the farmers (62%) were found to have cultivated a maximum of two types of crops. Regarding the size of land under cultivation the average size was 1.186 acres. In addition, KShs 70459.74 was found to be the average income which a farmer earned from selling their produce. Furthermore, the findings indicated that most farmers (99%) made use of the soil medium to grow their crops. The study also found that majority of farmers (62.8%) relied on rain-fed method of watering their crops. On the type of field utilized for crop production, it was found that most farmers (95.5%) did use open fields to cultivate crops. The majority of farmers (85%) never employed any machinery during crop production.

Furthermore, findings from respondents showed that 49.4% of the respondents believed that the biggest challenge they faced during the growing period was reliability of rainfall, 19.9% said it was availability of fertilizers, 18.6% stated that it was availability of water, 5.8% indicated that it was soil/media

management, 3.8% indicated that it was availability of machinery while the remaining 2.5% indicated that the most influential variable was selection of the type of crop to grow.

Regarding farmers' level of education, most (85%) had secondary school education while only a few (3%) had university and post-graduate qualifications. On the farmer level of management training, majority (91%) lacked such training. Regarding record keeping, most farmers (63%) did not maintain any record. The most commonly kept record was the production record, as used by 75.4% of the interviewed farmers. The results also indicated that only 26.3% of farmers had been paid a visit by extension officers. On NGO support, most farmers (98%) had never received any support whatsoever from NGOs. It was also established that most farmers (96.8%) received information about how to boost productivity via available channels of communication which included the television, radio, internet and phones. The most frequently used channel for receiving such information was the radio while the least utilized was the Internet, with only 6% of them adopting it.

Most farmers (82.7%) had no specific buyer for whom to produce, with (71%) of them targeting the local market. Most farmers (69.9%) sold their produce to direct consumers. Of significance, no farmer was found to be selling their produce to cooperatives. Furthermore, most farmers (80%) preferred to dispose their produce through market sellers and grain millers. On availability of storage facilities, very few farmers (29%) had this important resource, the general store and home store being the most adopted one. Also, most farmers (75%) lacked a means to preserve their produce. Packaging was the only value addition practice employed by some farmers (7.1%). However, majority (92.1%) did not bother to add value to their produce. Most farmers (88%) stated that they experienced very few difficulties during marketing of their produce. The nature of market difficulty found to be highly affecting the farmers was poor road network as recorded by 96% of them. On pricing, most farmers (80%) were not involved in setting prices of their produce. Furthermore, availability or seasonality of the produce was recorded as the most influential price determinant as captured by 50.6% of farmers. Other important price determinants included brokers and prevailing market prices.

On availability of food, most farmers (58%) indicated that their households had access to food. Regarding those who could not access food, all of them (100%) indicated that this happened at times. On food sufficiency, most farmers (62%) recorded that they had sufficient food supplies. Regarding those who lacked food, 98.3% indicated that it happened occasionally. Finally, on food variety, most farmers (54%) recorded that they could not access a variety of food stuff though this was noted to be happening occasionally.

### **5.3 Discussion of findings**

This section gives a discussion of the findings,

#### **5.3.1 Influence of peri-urban agriculture production on food security of farmers**

According to Kutiwa et. al. (2010) indicate that urban agriculture is one way to escape the food insecurity and poverty cycle in a cash intensive environment and develop a conceptual model to address three components of food security. Households involved in urban agriculture can produce their own food and get immediately the fresh product for consumption. Food security has been recognized as a major purpose of practicing UPA. Initiative UPA contribute to urban food self-sufficiency and nutrition by helping to provide all citizens with increased access to nutritious foods and reduce their food expenses which results in food security. The findings of the study revealed that the type of field used for cultivation of crops was the only variable that had a uniquely significant contribution to the variance in food security. In this regard, the study findings indicated that most farmers utilized open fields to cultivate their crops. Nevertheless, the level of mechanization, watering method, size of land utilized for crop production, growing media and yield per area of cultivation, did not have much bearing on variance in food security of households. However, the findings of the study showed that productivity did not have a very big impact on the variance in food security.

#### **5.3.2 Influence of organization capacity of farmers on food security**

Supply chains are changing rapidly, with transactions increasingly based on chains that involve coordinated links between farmers, traders, processors and retailers. It is against this background that organizations working with farmers, such as donors, NGOs and government extension services (“linking organizations”), are seeking to promote farmer welfare by using the “linking farmers to markets” approach. This approach usually involves organizing farmers into groups to supply identified markets. According to Machel (1996) access to important resources such as literacy, credit, information and local solutions does not only hinder development in general, but aggravates the insecurity of nations in various spheres like food security. The findings of the study revealed that NGO support as well as farm records were the greatest contributors to the variance in the food security of respective households. On the contrary, farmer level of education, management skills, access to extension services and means of communication were the variables with the least impact on variance in food security. However, the overall contribution of farmer organizational capacity to the variance in the dependent variable – food security – was larger compared to that made by agricultural productivity.

### **5.3.3 Influence of marketing on food security of farmers**

Efficient marketing infrastructure such as wholesale, retail and assembly markets and storage facilities are essential for cost-effective marketing, to minimize post-harvest losses and to reduce health risks. According to Immink and Alarcon, 1991 market liberalization and the resulting agricultural commercialization are seen as a good way to increase income and, thus access to food. Markets play an important role including economic development, household income generation as well as food security. The findings of the study revealed that four variables had a unique statistical significance on the depended variable – food security. These included: marketing difficulty, value addition, pricing of farm produce and targeted buyer. On the other hand, produce preservation, buyer specification and availability of storage facilities were the variables with the least influence on food security. Overall, marketing was the variable with the largest contribution to variance in food security as compared to the first two i.e. agricultural productivity and farmer organizational productivity.

### **5.4 Conclusions of the study**

The study examined factors influencing peri-urban agriculture and food security of farmers in Naivasha Municipality and the following conclusions were made:

1. Agricultural productivity has a minimal impact on household food security. The number of crops cultivated by farmers is low. The average size of land used for cultivation was 1.186 acres, which is acceptable in peri-urban crop production. The income realized by farmers on yearly basis was not that high as it would have been expected. Most farmers made use of the soil medium to grow their crops with majority of them relying on rain-fed method of watering their crops. Furthermore, most farmers utilized open fields to cultivate crops with very few of them employing use of machinery during crop production.
2. Organizational capacity of farmers plays a significant role in determining the overall food security of respective households. Most farmers had secondary school education with only a few having attained university and post-graduate qualifications. Majority of farmers lacked training in management skills needed for effective management of their production activities. Very few farmers kept record relating to crop production, with the most commonly kept one being the production record. Extension services to farmers were very minimal if not rare. Likewise, NGO support was uncharacteristically limited. Most farmers were utilizing radios, televisions and phones to obtain information that could be used to boost crop production. However, there were an uncharacteristic low number of farmers utilizing the Internet in securing information about productivity.
3. Marketing played a significant role in determining the variance in food security of households given. More specifically, marketing difficulty, value addition, pricing of farm produce and

targeted buyer, played an integral part to play in contributing towards the variance in food security.

### **5.5 Recommendations of the study**

The following recommendations were made from the study findings:

1. There is a need for adopting closed fields crop cultivation, stop-over-reliance on rain to water crops, as well as implement use of machinery during production in order to boost productivity. Farmers also need to migrate into production of cash crops and other crops which will earn them more money as compared to the returns realized from crops currently being grown.
2. The Government of Kenya, NGOs and other stakeholders should improve their support to farmers if food security is to be realized. Farmers should also be enlightened on the importance of maintaining relevant, accurate and updated records pertaining to crop production activities. Furthermore, the farmer should consider going for some induction courses in management, in order to gain some valuable knowledge in this important field. It is also important for the government to ensure farmer get adequate extension services they need to boost productivity. Farmers should also embrace use of the Internet as means of receiving information regarding the most recent technologies in crop production.
3. Effective marketing channels should be established so that farmers can earn more income from sale of their produce. This is to enable the farm produce to reach the market on time. In addition, they need to learn strategies of adding value to their produce before so that it can earn them more income. They should also time their productivity in such a manner that it will coincide with lack of produce in the market so that they can sell the same at reasonable prices. Furthermore, farmers should also venture in the export market to enhance returns.



## 5.6 Contribution to the existing body of knowledge

This section presents the contribution of the study to the existing body of knowledge.

**Table 5.1: Contribution to the existing body of knowledge**

No.	Objectives	Contribution
1.	To investigate how peri-urban agriculture crop production influences food security of farmers in Naivasha Municipality.	The most common crops that farmers in Naivasha Municipality are growing include cabbage, kales, potatoes, maize and beans. According to the findings the yields are below optimum and therefore farmers cannot make profits. Therefore the farmers together with all the stakeholders must improve the practices they are using in order to gain from peri-urban agriculture and sustain sustainable food security.
2.	To assess how organizational capacity of farmers affect their food security in Naivasha Municipality.	The findings of the study indicated that the farmers had very low assistance from the Government extension officers and NGOs; also they had very low managerial skills and these parameters need to be improve contribute to food security.
3.	To evaluate how marketing of peri-urban agriculture crop influences food security of farmers in Naivasha Municipality.	According to the research findings the farmers are not adding value to their produce; they have no role in determining their prices and also are not growing for any specific buyers. This makes them vulnerable to traders and thus cannot sustain their farming practices' putting at risk the food security. The farmers should be trained on value addition, contracted farming so that they can attain optimum prices that will enable them sustain their business and ensure food security throughout the year.

## **5.7 Suggestions for further studies**

The study identified various gaps and hence further research should be done in the following areas. A similar study should be carried out in another urban area in order to ascertain whether the findings thereafter realized can be corroborated with those established by the current study.

1. A study on the role played by Non-Governmental Organizations in promoting food security among the low class population.
2. An investigation into strategies that can be adopted to enhance productivity in peri-urban agriculture.
3. A study on the impact of peri-urban agriculture on the environment.

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## APPENDICES

### APPENDIX 1: LETTER OF INTRODUCTION

Paul Muteru.

P. O. Box 378, Naivasha.

15<sup>th</sup> May 2013.

Dear Respondent,

**RE: Research project**

I am a student of the University of Nairobi at Nakuru extra mural centre, and am pursuing a Master of arts Degree in Project Planning and Management. I am currently carrying out a research on: The factors influencing peri-urban agriculture and food security of farmers in Naivasha Municipality.

The purpose of this questionnaire is to gather information from the respondents regarding the peri-urban agricultural employment activities on poverty reduction.

The study targets farmers who reside within Naivasha municipality. The information you will provide will be treated with utmost confidentiality and will be used for academic purposes only. Your assistance will be highly appreciated.

Thank you in advance.

Yours Faithfully,

Muteru Paul Kahiga.

L50/71567/2011

## APPENDIX 2: RESEARCH QUESTIONNAIRE FOR THE FARMERS IN NAIVASHA

### MUNICIPALITY

#### Instructions

Please fill the blank spaces and tick inside the appropriate boxes.

#### Section A: Background Information

1. Name of the respondent (optional) : .....

2. Gender

( a) Male

(b) Female

2. In which County Assembly Ward do you reside at the moment?

(a) Biashara County Assembly Ward.

(b) Hells gate County Assembly Ward.

(c) Lakeview County Assembly Ward.

(d) Maeilla County Assembly Ward.

(e) Naivasha East County Assembly Ward.

(f) Naivasha Town County Assembly Ward.

(g) Viwanda County Assembly Ward.

3. Are you practicing farming full time?

(a) Yes

(b) No

( c) Specify what else you do.....

**Section B: Research Questions on agricultural productivity.**

1. Which types of crop do you grow?

- (a) \_\_\_\_\_ (c) \_\_\_\_\_  
(b) \_\_\_\_\_ (d) \_\_\_\_\_

2. What area in acres per crop?

- (a) \_\_\_\_\_ (c) \_\_\_\_\_  
(b) \_\_\_\_\_ (d) \_\_\_\_\_

3. What yield do you get per year?

- (a) \_\_\_\_\_ (c) \_\_\_\_\_  
(b) \_\_\_\_\_ (d) \_\_\_\_\_

4. What is the average price of your produce per unit?

- (a) \_\_\_\_\_ (c) \_\_\_\_\_  
(b) \_\_\_\_\_ (d) \_\_\_\_\_

5. What growing media do you use for your crop?

- (a) Soil   
(b) soil- less   
(c) Specify the type of soil-less media .....

6. What method do you use for giving water to the crops?

- (a) Irrigation   
(b) Rainfall

7. In which type of field do you cultivate?

(a) Open field

(b) Covered fields

8. Do you use any type of machinery in your operations?

(a) Yes

(b) No

9. What is the priority of challenges you face during your growing period? (Rank from 1 to 6)

(a) Selection of the type of crop to grow

(b) Water Availability

(c) Rainfall reliability

(d) Soil or media management

(e) Availability of fertilizers

(f) Availability of machinery

**Section C: Organization capacity of farmers**

1. What is your level of education the respondent?

(a) Primary level.

(b) Secondary level.

(c) College/Vocational/Professional level.

(d) University graduate level.

(e) University postgraduate level.

2. Have you attended any management training courses?

(a) Yes

(b) No

(c) Specify where and duration:.....

3. Do you have any type of records in your farm?

(a) Yes

(b) No

(c) Specify type and period you have kept them.....

4. How often do extension officers visit you?

(a) Two weeks

(b) Monthly

(c) Over one month

(d) Never

8. Are there any NGOS or private organizations involved in supporting your projects?

(a) Yes

(b) No

(c) Specify by names: .....

9. If any what kinds of support do they provide?

(a) Financial

(b) Information/training

(c) Marketing

(d) Specify any other: .....

10. Do you have any of the following in your household?

(a) Radio

(b) Television



- (c) Phone, either mobile or landline
- (d) Internet

**Section D: Marketing.**

1. Do you grow or produce for any specific buyer?

- (a) Yes
- (b) No
- (c) Specify if local or international .....

2. To whom do you sell your produce?

- (a) Consumer
- (b) Middle men
- (c) Cooperative society
- (d) Others: Specify .....

3. Do you have any type of storage facilities?

- (a) Yes
- (b) No
- (c) Specify the type:.....

4. Do you have any means of preserving your products?

- (a) Yes
- (b) No
- (c) Specify the type: .....

5. Which of the following value addition practices do you employ? (Tick where appropriate).

(a) Processing

(b) Packaging

(c) Branding

6. Do you have difficulties in accessing the market?  
(a) Yes

(b) No

(c) If yes specify the nature of difficulty.....

7. Do you determine the price to sell your produce?  
(a) Yes

(b) No

(c) If yes or no explain why.....

**Section E: Food security**

1. Which of these statements best describes the food eaten in your household in the last 12 month?

(a) We always have enough to eat and the kind of food we want

(b) We have enough to eat but not always the kind of food we want

(c) Sometimes we do not have enough to eat

(d) Often we do not have enough to eat

2. If your answer question one is sometimes or often not enough to eat please tick where appropriate to indicate the reason.

(a) Not enough money for food

(b) Too hard to get to the store

(c) On diet

(d) No working store available

(e) Not able to cook or eat because of health problems

3. If your answer for question one is enough food, but not the kind we want please tick in the correct boxes to indicate the reason.

(a) Not enough money for food

(b) Too hard to get to the store

(c) On a diet

(d) Kinds of food we want not available

(e) Good quality food not available

## APPENDIX 3: AUTHORISATION LETTER FROM THE NATIONAL COUNCIL FOR SCIENCE AND TECHNOLOGY

REPUBLIC OF KENYA



### NATIONAL COUNCIL FOR SCIENCE AND TECHNOLOGY

Telephone: 254-020-2213471, 2241349, 254-020-2673550  
Mobile: 0713 788 787 , 0735 404 245  
Fax: 254-020-2213215  
When replying please quote  
secretary@ncst.go.ke

P.O. Box 30623-00100  
NAIROBI-KENYA  
Website: www.ncst.go.ke

Our Ref: **NCST/RCD/10/013/42**

Date: **16<sup>th</sup> July 2013**

Paul Kahiga Muteru  
University of Nairobi  
P.O. Box 1120  
Nakuru.

#### RE: RESEARCH AUTHORIZATION

Following your application dated **11<sup>th</sup> July, 2013** for authority to carry out research on "*Factors influencing peri-urban agriculture and food security of farmers in Naivasha Municipality, Kenya.*" I am pleased to inform you that you have been authorized to undertake research in **Naivasha District** for a period ending **31<sup>st</sup> December, 2013.**

You are advised to report to **the District Commissioner, District Education Officer and District Agricultural Officer, Naivasha District** before embarking on the research project.

On completion of the research, you are expected to submit **two hard copies and one soft copy in pdf** of the research report/thesis to our office.

**DR. M. K. RUGUTT, PhD, HSC.**  
**DEPUTY COUNCIL SECRETARY**

Copy to:

The District Commissioner  
The District Education Officer  
The District Agricultural Officer  
Naivasha District

*"The National Council for Science and Technology is Committed to the Promotion of Science and Technology for National Development".*