

**INFLUENCE OF AGRICULTURAL EXTENSION SERVICES ON
HOUSEHOLD FOOD SECURITY IN NYAMIRA DISTRICT,
NYAMIRA COUNTY, KENYA.**

BY:

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DECLARATION

This research Project Report is my original work and has never been presented for a degree or any award in any other University.

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L50/61470/2011.

This Project Report is submitted for Examination with my approval as the University Supervisor.

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DEDICATION

I dedicate this project Report to my Dear Wife Nancy Ndanu; my Children, Cynthia Moraa, Nevin Monene, Myra Bonareri , Amara Waridi and Alex Migika Junior for their constant support and encouragement during my studies. I also wish to appreciate my Mother, Mary Bonareri and my sisters, Beatrice and Dolphine for the moral support they offered me.

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LIST OF ABBREVIATIONS AND ACRONYMS

A.I	: Artificial Insemination
CBS	: Central Bureau of Statistics
CGA	: Cereal Growers Association
CRS	: Catholic Relief Services
FAO	: Food and Agriculture Organization
HCDA	: Horticultural Commodity Development Authority
KRA	: Kenya Revenue Authority
MDGs	: Millennium Development Goals
MNCs	: Multinational Corporations
NCPB	: National Cereals and Produce Board
NGOs	: Non-Government Organizations

ABSTRACT

Agricultural extension continues to be in transition worldwide. Governments and international agencies are advancing structural, financial and managerial reforms to improve extension services for purposes of increasing agricultural production for addressing food security. This study sought to investigate the influence of agricultural extension services on household food security in Nyamira District. It was informed by the objectives; influence of training farmers on modern farming methods, provision of farm inputs, preservation and storage and marketing strategies on household food security. The study was grounded on the basic assumptions that the sample selected would represent the target population in its major features, data collection instrument would be valid and reliable in measuring the desired outcome and that the respondents would give information honestly and objectively. Literature was reviewed against the backdrop of previous scholarly works in line with key study variables. Adopted as a theoretical framework was the social action model propounded by Sloccam in 1962, which explains how an innovation can be introduced successfully in a frozen community until adopted by several members of the society. On research methodology, descriptive survey research design was employed, in which a target population of 5420 was identified from where a sample size of 542 was selected through stratified random sampling procedures on the basis of the seven locations of Nyamira District. Data was collected with the help of questionnaire, comprising of open ended, closed and matrix questions. The instrument was pretested to ascertain its effectiveness in obtaining the necessary data for the study and validity of the data collection instruments was established through adequate coverage of research objectives, peer review and expert judgment. Reliability was measured using split half method, in which the two parts were found to be highly correlated. Descriptive statistics such as frequencies and percentages were used in data analysis and the resultant information presented in frequency distribution tables. The study findings revealed that agricultural extension services, packaged in training of farmers, provision of inputs, preservation and storage and marketing strategies had significant influence on household food security. The study recommended that policies be formulated by relevant stakeholders to strengthen extension services in order to boost food production so as to effectively address issues of food security in a sustainable manner. For further research, the study suggested replication elsewhere to compare the findings.

CHAPTER ONE

INTRODUCTION

1.1 Background of the study

Agricultural extension continues to be in transition worldwide. Governments and international agencies are advancing structural, financial and managerial reforms to improve extension services for purposes of increasing agricultural production. Decentralization, pluralism, cost sharing, cost recovery, participation of stakeholders in development initiatives and the decisions and resources that affect them are considered crucial in achieving this noble goal, (Owuoth, 2010). In order to achieve food security, Agricultural sector must be strengthened by governments, for with insufficient availability of food, no country can claim to walk the path of economic development. It is on this account that agricultural extension service department has been acknowledged to link grass root farmers with governments to boost food production, (Woods, 2012).

Reporting from his study done in Singapore with its focus on the role of agricultural extension services on enhanced food security in the country, (Jamal, 2012), indicated that local farmers had been empowered to fully engage in productive agricultural practices making such practices very productive and highly sustainable. In China, Agricultural extension services were modeled in the form of offering informal training to farmers, providing information to create awareness on emerging issues in agriculture, availing agricultural inputs and other related resources, as well as offering assistance to farmers to find markets for surplus produce, (Wan-ju, (2012). In a manner that seeks to confirm the findings of Wan-ju, Adrian, (2011), noted from a survey focusing on the influence of extension services on enhanced agricultural output in Canada that local farmers were playing vital role in addressing food security and the government had put measures in place to support that initiative. He observed that these

extension services were packaged on the form of providing the necessary inputs to farmers, organizing training on modern and productive methods of agriculture, offering storage services for agricultural produce, giving relevant information on emerging trends on environmental factors and marketing assistance to farmers. In Zimbabwe, the white farmers established a strong nongovernmental agricultural extension department that was entrusted with all information related to agriculture, given that their main economic preoccupation was in this sector, (Aswal, 2012). Such agricultural extension services were mostly in areas such as provision of training to farmers, giving grants to boost the capacity of the farmers in agriculture and offering crucial information on general agricultural dimensions, besides seeking suitable markets and storage of surplus produce. Having done a study on food security in Senegal, Sembene (2011) reported that the government had encouraged establishment of agricultural extension services at the village levels to be in touch with local farmers for agricultural support. He noted that the services offered entailed training on agricultural issues, provision of farm inputs, giving soft credit facilities and seeking for suitable marketing opportunities to farmers. Food security is a great concern to most countries in northern Africa which are characterized by harsh climatic conditions. In order to realize this end, support must come from the government since most households lack the capacity to engage in productive economic ventures, (Haziz, 2012). While giving his findings from a study done in Egypt based on factors influencing sustainable food security in the country, Damizi (2010) established that Egypt being in the northern part of Africa experiencing harsh climatic conditions was faced with an uphill task of feeding its people, and hence the government had put in place effective extension department to offer guidance to community farming sector. He outlines the component of the agricultural extension services as giving training on emerging trends of modern farming methods, engaging in research to improve the requisite agricultural inputs, providing soft agricultural grants to boost farmer's capacities in agricultural practices and offering information link

with the central government on their feedback from the field. According to Felicen (2012), in her study focusing on the role of agricultural extension services on improved agricultural produce in Rwanda, extension officers roll out training to local farmers in order to engage in productive agricultural practices. Besides, this department is also provided with funds to advance to farmers in the form of soft loans. Moreover, subsidized inputs are also availed to ensure that farmers embrace low cost of production for sustainable food security. Considering the works of Taban (2011) focusing on sustainable food security in Uganda, it is noted that the fulcrum of strong agricultural practices is a functional extension department with the task of offering relevant training to local farmers to embrace modern methods of farming, giving agriculture a business dimension. In Tanzania, Amina (2012) with her study based on the influence of extension services on enhanced agricultural output for sustainable food security established that local community farmers must be empowered through grants and regular training to increase their ability in food production. She further observes that the department of agricultural extension should engage in regular research to generate more resistant and fast responding inputs to help food production keep pace with the ever growing population.

In Kenya, Agricultural extension services have been in existence since the establishment of British Colonial government with the objective of offering guidance to farmers in order to boost agricultural production in addressing issues of food security, Ominde (2010). However, most studies indicate that, whereas this department is deemed crucial in improving food production, it has not been effectively managed to realize its intended purpose. According to Wanjala (2012), reporting from a study based on factors influencing food security in Vihiga Constituency, it is common to periodically experience food shortage in Kenya to the extent that hunger periods are given local names just to underscore the magnitude of the lost battle of food security in the country. According Kirui (2010) in his study conducted in Marigat Division in Baringo District with its focus on factors influencing sustainability of

donor funded food relief in the ASAL regions in Kenya, painted a grim picture of food security in the country. He noted that most residents in the ASAL regions in the country have completely been debased humanely by ravages of hunger, yet through vigorous campaigns to promote modern agriculture, dignity can be restored these victims of perennial hunger. In Nyamira District, human population has grown beyond the carrying capacity of the limited available land and the result being consistent cries for food, (Mogire, 2012). This study therefore sought to investigate the influence of agricultural extension services on household food security in Nyamira District, Nyamira County

1.2 Statement of the problem

In Kenya, Agricultural extension services have been in existence since the establishment of British Colonial government with the objective of offering guidance to farmers in order to boost agricultural production in addressing issues of food security, Ominde (2010). However, most studies indicate that, whereas this department is deemed crucial in improving food production, it has not been effectively managed to realize its intended purpose. According to Wanjala (2012), reporting from a study based on factors influencing food security in Vihiga Constituency, it is common to periodically experience food shortage in Kenya to the extent that hunger periods are given local names just to underscore the magnitude of the lost battle of food security in the country. According Kirui (2010) in his study conducted in Marigat Division in Baringo District with its focus on factors influencing sustainability of donor funded food relief in the ASAL regions in Kenya, painted a grim picture of food security in the country. He noted that most residents in the ASAL regions in the country have completely been debased humanely by ravages of hunger, yet through vigorous campaigns to promote modern agriculture, dignity can be restored these victims of perennial hunger. In Nyamira District, human population has grown beyond the carrying capacity of the limited available land and the result being consistent cries for food, (Mogire, 2012). According to the Nyamira District Department of Agriculture

Report,(2013) on the food situation in the district, only 34% of food requirement was being produced locally, with the remaining 66% sought elsewhere. The report further established that with improved agricultural practices adopted by local farmers, the food deficit can easily be bridged and even surplus obtained for commercial purposes. This study therefore sought to investigate the influence of agricultural extension services on household food security in Nyamira District, Nyamira County

1.3 Purpose of the study:

The purpose of the study was to investigate the influence of agricultural extension services on household food security in Nyamira District, Nyamira County.

1.4 Objectives of The study:

The study was guided by the following objectives:

1. To investigate the influence of training of farmers on modern methods of farming on household food security in Nyamira District.
2. To explore the extent to which provision of farm inputs influences household food security in Nyamira District.
3. To assess the contribution of food preservation and storage on household food security in Nyamira District.
4. To examine how marketing of food surplus inputs influences household food security in Nyamira District.

1.5 Research Questions:

The study sought to offer responses to the following research questions:

1. To what extent does training of farmers on modern methods of farming influence household food security in Nyamira District?
2. How does provision of farm inputs to farmers influence household food security in Nyamira District?
3. What contribution does food preservation and storage have on household food security in Nyamira District?
4. Does marketing of food surplus by farmers influence household food security in Nyamira District?

1.6 Significance of the study:

It was hoped that the study would be important in providing necessary knowledge to be used by policy makers in identifying the best agricultural extension methods to adopt to realize food security in Nyamira District, in particular and the entire nation in general. Provide information that would assist extension staff in identifying the most appropriate extension services to offer to farmers in realizing food security in the district. Further, the study would also provide basic information to other stakeholders in the NGO sector focusing on food security such as World Vision on measures to embrace in addressing food conditions and ensure that focus of food provision to the hunger stricken communities shift from relief food to sustainable food production. Moreover, the study may facilitate the country's fight against food insecurity in other regions in Kenya and other parts of the world.

1.7 Limitations of the study:

The major limitation of this study was weather conditions in Nyamira District which is characteristically a rainfall prone area that before noon, when local farmers return home from their farms, these respondents become difficult to access. Weather issues also complicated data collection as

most roads remained impassable for relatively better parts of the day. However, weather phenomenon was addressed by timing visits to noon or thereabouts, just when farmers return home and also before afternoon torrents. Moreover, the research assistants used umbrellas and gum boots to protect them against rains and mud. They also accessed some rural places with poor road network on hired motor bikes, whereas other places were accessed on foot.

1.8 Delimitations of the study

The study sought to investigate the influence of agricultural extension services on household food security in Nyamira District, Nyamira County. It focused on provision of extension services as a remedy to boosting agricultural farming directly involving household farmers. Nyamira District was chosen for the study because despite the reliable environmental conditions in the district and availability of arable farming land, the district is not food secure. These household farmers were spread in the seven locations in Nyamira District, such as Siamani, Bomabacho, Bokiambori, Timi, Bundo, Ibucha and Ikobe

1.9 Basic assumptions of the study

The researcher assumed in the study the department of agriculture in the district had a functional extension services section that was in contact with the local farmers and offering basic farming guidance. It was assumed that the sample drawn for the study would be representative of the target population in its key characteristics, the respondents would be willing to volunteer information honestly and objectively and that the data collection instruments would be valid and reliable in giving the desired measurements.

1.11 Definition of significant terms as used in the study

Agricultural extension services: refers to agriculture related practices such as advice, training on best farming practices offered by the department of agriculture at local level to boost production.

House hold food security : ability of individual farming families to obtain necessary food enough to sustain their needs.

Training on modern farming : equipping local farmers with modern skills and knowledge in agriculture geared towards increasing food production.

Farm inputs : refers to items that form ingredients of farming practices such as seeds, fertilizer, pesticides among other such items, including grants.

Storage and preservation : keeping farm produce which may be perishable in conditions in which these remain fresh and being kept for future use.

Surplus marketing : refers disposals of overproduced products for purposes of obtaining money to be ploughed back to farming activities.

1.11 Organization of the study

The study is organized into five chapters. Chapter one presents background of the study, statement of the problem, purpose of the study as well as objectives of the study. Chapter one also captures the research questions of the study, significance of the study, limitations of the study, basic assumptions of the study, as well as delimitations of the study and definition of significant terms as used in the study.

Chapter two features a detailed review of literature on the area of this study. It reviews such literature in relation to the study variables. This chapter also puts to focus the theoretical framework and the conceptual framework of the study. Chapter Three presents the research methodology used in the study. Research design, target population, sample size and sample selection, data collection instruments, instruments validity and piloting are outlined. Included also in this chapter are the data collection procedures, techniques of data collection, operationalization of the variables and the methods of data analysis. Chapter Four contains data analysis, interpretation and presentation, while Chapter Five offers summary of findings, conclusions and recommendations.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction.

This chapter gives literature related to the broad area of this study, done against the prism of other previous scholarly works conducted. Literature review was done in line with the major study variables. This section also puts into perspective the theoretical framework, a conceptual framework gaps in the literature and the summary of the literature reviewed.

2.2 The concept of household food security

When a household is food secure, this translates to reduction of poverty in a given area. One of the main problems is how the farmers can be food secure at the household level in the country, which can later lead to reduction in poverty index, (Owuoth, 2012). In addition, there has been problem to harness the knowledge available with the various stakeholders in order to boost food production for sustainable development. This has become an issue since those with the relevant level of education required in the agricultural sector have diverted their career to other professions, (Kiri, 2011).

Another problem that the agricultural sector is facing throughout the country is that, there are very few or almost no one is truly willing to indulge oneself in the farming business. Thus, this has become a major problem in the country at large, Odegi (2009). Therefore, if the food insecurity in the country has to be relegated to the past and enable the farmers focus on up to date crop growing, then there is a need to have willing members from the village who have the necessary farming knowledge to indulge themselves in agricultural development activities, (Jamila, 2009).

Considering the population ratio in the region, it is a clear indication that 0.6 ha per person is less land for adequate farming. Thus, more land space is required to cater for the agricultural activities that are involved in the crop growing in the region, (Mbithi, 2010). According to Mogire (2008), a larger

section of the Nyamira district is fully occupied by tea growing as the major cash crop, thus forgetting the food crops issue in the region. To that effect then, there is a need to focus on food crop growing in the region, which help in reducing the food insecurity and create food security. This is only possible if farmers are offered more extension services to turn the limited available land into food production so as to realize food security hence the need for this study. Widespread acceptance of cash crops such as tea in rural areas does not connote success. The assumption is that the perspective that cash crops had brought success to the highlands of Kenya, indicating that those who had instituted cash crops basked higher incomes and better lives. In the same strength, Vein (2010) indicates that cash crop growing is one important way to higher family incomes and thus a useful ladder out of poverty. Vein stretches the debate to mean that cash crop production lifts survival of the farmers in the market and subsequently transfuses disciplined specialty that brings about productive livelihoods. Reality in the study areas does not tally with the arguments of these and other economists.

Public sector extension was severely attacked in the 1980s for not being relevant, for insufficient impact, for not being adequately effective, for not being efficient and, sometimes, for not pursuing programmes that foster equity (M ongina, 2011). A critical turning point occurred by the way of information transfer that was affected, so far considered the horizon of public sector agricultural extension systems, was conceived and practiced. Not only did public extension systems come under public scrutiny and political attack but, as well, heightened competitive interests from the private sector confronted them (Diao, & Hazell, 2004). Input suppliers and output buyers became increasingly active in instructing farmers in the processes and standards desired by particular markets. Often enough, these information providers created demonstration plots and field trials, similar to public sector extension techniques but with a view to vertical technology transfer. In some cases, "contract farmers" turned into workers for the contracting companies.

Despite the high returns associated with extension found in a number of studies (Birkhaeuser, *et al* 1988; Anderson and Feder, 2003) there was a general feeling that public sector extension was overextended. The scarcities of financial resources for extension and in some cases the lack of skilled work force and dearth of organizational capacity (The World Bank 1981) led to major changes in ideological, economic and technical perspectives of agricultural extension. Also, the forces for worldwide structural adjustment resulting from massive debts by nations North and South, the onslaught of conservative ideology emphasizing efficiencies over welfare, the accelerating reaction against subsidies in agriculture, all these contributed to the critical assessment of extension, Woods (2010). Thus, governments began to discredit and withdraw their commitment to extension. In their eagerness to evade extension's institutional problems and to relieve the larger economic problems, in a sense many governments chose to ignore extension, Zuma (2008).

Following two decades of criticism and change, this led to the coming back of the extension services to the farmers by a way of a new awareness on the role of the public sector in funding, but not necessarily delivering non-formal agricultural extension, has occurred. The latent demand for agricultural extension services is evident in the developing countries, Kenya inclusive (The World Bank 1981). In high-income as well as middle- and low-income countries, governments are being pressured to reform and reprioritize public sector agricultural productivity programmes and confront related issues, such as the management of natural resources, rural development, the environment, and health. Extension institutions (public, private and third-sector) are important players in any effort to respond to these critical issues.

The role of government is critical for the reconstruction of agricultural extension, especially for fostering the public good. Only the public sector can effectively and efficiently carry out certain

functions and indeed, only national governments can assume the responsibilities that affect the state as a whole. Only governments can ensure that extension services work for the public good, even if those services are provided by contracting with private sector providers (Rivera & Zijp, 2012). Only national governments can promote increased institutional pluralism in extension service provision and oversee the quality enhancement and assurance necessary for rural development.

2.3 Influence of training of farmers on modern methods of farming on household food security

Strong, effective and efficient governments are essential to development, for they alone can create the enabling environment required for the private sector and civil society to flourish, (Mbithi, 2010). Essentially, the key consideration here is the prioritization of the cash crop ratio in the market that targets poverty eradication against production of food crops by adopting modern and effective farming methods, Owuoth (2012). Moreover, there is a need for the governments to consider financing the farmers to obtain training on requisite agricultural skills at all levels to attain the expected levels of production. This is to the effect that, if the fight is to grow crops and curb the food insecurity in the country, then support to the farmers through regular training would therefore be the only ideal means to achieve this goal. Farmers cannot be the only key players in the farming business, therefore, private sector and the government's involvement is the best way that the farmers can realize the need to indulge in the business.

All departments of agriculture have an extension unit that deals mainly with crops and mixed agricultural systems, as well as separate technical divisions; livestock, forestry, fisheries, among others, some of which also provide extension services. During the 1970s and 80s, efforts were made to unify ministerial agricultural extension operations but with limited success, Okuta (2011). This same diversity and separation of agricultural extension activities exists in international organizations.

Therefore, the involvement of these technical departments could improve the farmer's urge to improve motivation that they need to work hard in their farms. Integrating traditional smallholder farmers into the exchange economy is important for stimulating growth, rural and overall economic development, food security and poverty alleviation. Market orientation of smallholder agriculture provides an opportunity for addressing the numerous challenges that characterize subsistence production, low profitability, a high degree of uncertainty, lack of ability to meet the ever-changing consumer preferences, high transaction costs, lack of reliable and timely market information, and absence of economies of scale. In recognition of the contribution of agriculture to Kenya's GDP, various policy measures are required to facilitate implementation of the Strategy for Revitalizing Agriculture (SRA) 2004-2014 with the objective of reducing national poverty from 56 percent in the year 2000 to 26 percent in the year 2014. Moreover, it focused on reducing the number of food poor people from 48.4 percent in the year 2000 to less than 10 percent in the year 2014 (Ayuko, 2005).

By definition, food security is only if all people have physical, social and economic access to sufficient, safe and nutritious food that meets dietary needs and food preferences for an active and healthy life at all times (World Bank, 1986; FAO, 1983). Food security entails food availability through production, markets and safety nets for example relief food; access through own farm supply, better incomes, and efficient distribution systems; stability of access (value addition, for example through processing and storage, employment and income stability) and utilization (for instance, safe water, sanitation and health facilities) at all times for all people (Figure 1). Food security has spatial dimensions such as household, community, national or regional levels. Efforts to promote small-scale farming have been made in the past but much more needs to be done to make a positive difference in terms of ensuring integration to urbanized/globalized markets.

Extension is a non-formal educational function that applies to any institution that disseminates information and advice with the intention of promoting knowledge, attitudes, skills and aspirations—although the term "extension" tends to be associated with agriculture and rural development. No matter what the name of the system, approach or programme (e.g., cooperative extension, advisory services, and Special programme for Household Food Security, technical assistance or technology transfer), the function remains that of extension: the transfer and exchange of practical information. At the same time, extension is a political and organizational instrument utilized to facilitate development. Its purposes may differ, from technology transfer by companies organized around specific, usually mono-cropping farming systems to problem-solving educational approaches to participatory programmes aimed at alleviating poverty and advancing community involvement in the process of development. Internationally, extension is institutional (and at present generally pluralistic) systems tend to differ from country to country.

Even in a country, extension services differ from region to region based on the resultant outcomes from the process. It is on this background that the study was conducted to investigate the relationship between agricultural extension services and household food security in Nyamira district. This study focused on the ideal measures that are best to adopt to restore food security in the region. The study also focused on the extent to which the level of education is available in the region to help in mainstreaming the agricultural practices in the region. Another reason as to why the study was conducted is to help in determining the means of communication that has been rendered useful in the region by the relevant extension officers. These officers are the information bearers from the government on the charges and conveying any information to the farmers on any cases of outbreaks that might affect the crops and livestock production. Technological advancement in the region is the key issue that most farmers fail to adopt.

2.4 Influence of provision of farm inputs on household food security

A lot of the times, farmers encounter difficulties in accessing farm inputs, as these are found to be very expensive and generally beyond the capabilities of the majority. On this account, it become difficult to engage in productive farming since farming is seen as an investment, just like any other economic undertaking. The extension department has to bridge this gap by offering subsidized farm inputs as well as grants to aid poor farmers obtain the necessary farming requirements, Maina (2011).

The Government of Kenya has been able to post agricultural extension officers to all districts in the republic of Kenya. Despite this, many farmers have remained in dire need for food. The district has a population of 325,690 people (155,808 Male, 169,882Female) with a population density of 818 people per square kilometer and a land ownership of 0.6 ha per person with a poverty index of 46% (Source: Central Bureau of Statistics, Housing and population census , 2009). The district Agricultural department has a staff base of twenty-five with varying academic backgrounds. The district is 25% food deficient in most periods of the year (District Agricultural officer's annual report, 2012). This is seeable from the increasing level of poverty index in the district as households are not food secure.

The key policy question for researchers, government planners and other development partners is how smallholder farmers can be enabled to participate in sustainable commercial agriculture (ECAPAPA, 2010). Smallholder farmers and other stakeholders were actively involved in 'farming as a business' right from identification and prioritization of issues influencing agricultural commercialization.

Agriculture is, as McCulloch & Ota, 2012 makes it clear, is only one of four basic potential paths out of poverty in Latin America. Nonetheless, their analysis is likely to be the reality in other regions of the world. However, households that come out of poverty can usually be identified from one another. Identifying which path offers the greatest promise is important for designing differentiated rural

development interventions that can best help poor households escape poverty. The rural sector, however, remains under-served, despite the major and positive changes in the 1990s in the way governments and development agencies approached rural development and poverty. Various forces and effects of market-oriented changes in agri-food systems are discussed in this section. Emphasis is laid on commercialization processes in developing and transition economies in Latin America, Asia and Africa, with respect to observable trends in Kenya. This section aims to draw replicable lessons for Kenya from comparable experiences in other regions that share common features, such as a large rural population, a large share of the rural labour force employed in agriculture, and a declining share of agriculture in GDP.

The gap between the rich and the poor appears to have broadened over the last thirty years. In Latin America, according to World Bank 2003, slow economic growth and technological development that benefit only the highly educated are the biggest causes for the increase of the gap in the region. The region, which in the past had a competitive advantage because it offered cheap labor, now suffers as the industrialized world seeks highly qualified employees who know how to handle new technologies. As a result, millions in Latin America are unemployed. The same trend applies to Africa.

Governments with the assistance of international organizations are beginning to promote various decentralized programmes, including subsidiary-providing communities and rural producer organizations with the potential to develop their own programmes for local development. An interesting approach to local development is the World Bank's promotion of projects that empower rural people via community-driven development (CDD), encouraging communities toward self-determination. These CDD projects assist communities in the formulation of proposals that are then reviewed and if accepted, they are then funded.

In other cases, governments ^{have} begun to initiate efforts toward nationally integrated and multisectoral extension networks to combat food insecurity. These incipient national system networks include public, private and third sector organizations as well as international projects aimed at food security goals. Governments have indulged in partnerships with other sectors of society, including multi sectoral providers of extension and information services, to foster conditions to end hunger. These governments expect a food security strategy to increase domestic food security and eventually to facilitate inter- and intra-regional trade in food items. They understand that poor farmers when organized can produce beyond their own needs and enter the export market.

Multiple approaches to poverty and food security are needed to stimulate rural development. Strategies for agricultural and rural development require situational analysis and needs assessments. Any design to fit the needs and potential of different countries necessarily need to be differentiated. This differentiation likely be necessary even within countries, within particular areas, and among similar but distinct populations. Studies in Bolivia, Colombia, India, Nicaragua, Uganda and Vietnam conclude that much broader and more carefully differentiated extension strategies are required if governments are to reduce poverty among the rural poor (World Bank, 1983).

During the process of agricultural commercialization, there is a shift by farmers from subsistence food production to cultivation of cash crops and rearing of livestock for commercial purposes. Commercialization also entails modernization of agriculture, which depends heavily on the intensification of production processes, as well as the introduction of new technology and mechanization. As marketed share of agricultural output increases, input utilization decisions and product combinations are progressively guided by profit maximization objectives. This process leads to systematic substitution of non-traded inputs with purchased inputs, gradual decline of integrated

farming systems and emergence of specialized farm enterprises (Bruan and Kennedy, 1994). The main forces that drive commercialization at the farm level include high opportunity costs of family labor (due to better alternative off-farm employment opportunities) and increased market demand for food and other agricultural products arising largely from rapid population growth. While modernization and mechanization can improve farm productivity and income, they can also reduce the need for manual labor and, therefore, reduce employment and income options in rural communities. Gender impacts vary from region to region depending on whose tasks are mechanized, how workloads are affected, and who loses opportunities for paid work (Haddad and Bouis, 1990).

2.5 Influence of food preservation and storage on household food security

Different levels of commercialization have been recorded by farmers across developing and transition economies in Latin America, Asia and Africa, often arising from various drivers and leading to location-specific implications, Otega (2011). Food security is not the absence of production, but improper preservation and storage of the surplus produce and agricultural extension department should come in handy to address this need. For instance, advances in biotechnology have transformed the Brazilian agriculture into a more commercially oriented sector, with improved contributions to the country's economy, while the influence of globalization has been noted as the key driver of agri-food systems changes in China, India, and other Asian countries. Most of the Asian countries (both the highly populated ones such as Bangladesh, China, India and Indonesia, as well as the smaller ones such as Cambodia, Sri Lanka and Vietnam) benefited from adoption of new high-yielding varieties of food grains—Green Revolution (World Bank, 2005). The strategies of ensuring that such food stuffs remain to cater for the populations even in durations of poor harvest is through effective and efficient preservation and storage.

The Chinese experience offers some replicable lessons of agricultural commercialization. First, emerging urban consumer class had huge potential for trade creation for the Chinese farmers. Second, between 1995 and 2003, per capita purchases by China's rural households increased for most food items due to strong growth in the rural economy and commercialization of rural food expenditures. Third, many households increased their consumption of self-produced pork, beef, mutton, poultry, eggs, milk, fruit, and nuts by 17 percent. The cash share of food expenditures rose for rural households at all income levels, but the increase was especially fast for low-income rural households while low-income households commercialized fastest (Gale *et al.*, 2005).

In Africa, Peters (1999) noted that between 1986 and 1997, although the process of agricultural commercialization led to a general increase in per capita household income in Malawi, the greatest benefits went to the better-off households. Changes in income sources indicated that households in the top income quartile increased the proportion of their income earned from agricultural sales relative to off-farm sources, while those in the bottom quartile made a reverse shift. The Malawian case showed that the proportion of households in each income mark selling maize was higher in the bottom decile than the middle deciles. However, as sellers, they sell early in the season when the prices are at their lowest, and as buyers, they buy in the deficit season in local markets or villages when prices are highest this poses a food security challenge as food is not available to the people. Similar experiences have been reported from Kenya's maize sub-sector (Mbithi, 2000).

Important changes have been observed in Kenya's agri-food systems during the colonial, post-colonial and post-liberalization periods. In the colonial era (1920-1960), commercial agriculture was limited to foreign-owned land (White settler farms). The restrictive Native Foodstuffs Ordinance of 1922, the Marketing of Native Produce Ordinance of 1935, and Provincial Maize Boards governed maize marketing in 1941-1962 (Thomas *et al.*, 1997).

The colonial government initiated measures to encourage production of horticultural crops, but marketing was purely done by private individuals (Minot and Ngigi, 2003). For dairy farming, there was commercial orientation by European settlers in the high potential areas of Central, Rift Valley and Eastern provinces from 1920s to 1954, when the Swynnerton Plan opened up participation in commercial agriculture by indigenous farmers (Muriuki *et al.*, 2003). With political independence in 1963, the policy focus shifted to increased participation by the indigenous Africans in commercial agriculture.

There was also increased state control on production and marketing of commodities. These changes served to increase both the commercial commodity range and scale of production in most parts of the country. The National Cereals and Produce Board (NCPB) were established with the mandate to achieve price stability and food security. The Board marketed 60 -70 percent of maize, the rest being sold by farmer cooperatives and private traders. In horticulture, the creation of the Horticultural Commodity Development Authority (HCDA) in 1967 to coordinate participants in the industry, and the flow of Foreign Direct Investments (FDI) from various Multinational Corporations (MNCs), for instance the Del Monte Company in Kenya's pineapple production and processing, contributed to rapid growth of the agricultural sector. Active government support in the provision of livestock clinical services and Artificial Insemination (AI) in mid 1960s contributed to growth of the dairy herd and milk output (Omiti *et al.*, 1993). The state-run Kenya Cooperative Creameries (KCC) then dominated a great share of the milk market.

Kenya's economic liberalization, which began in the early 1980s opened both the input and output markets to forces of demand and supply in most agricultural commodities. On a more general front, liberalization has led to increased input sources, increased output market channels, wide variations in both input and output prices, and wide fluctuations in seasonal commodity production (Freeman and

Omiti, 2003; Nyangito, 2001). Liberalization has also contributed to increased enterprise competition and farm commercialization. Widespread inefficiencies at the NCPB, together with liberalization of maize market in 1988, increased producers' options on maize marketing channels—cooperatives, private millers, roadside markets, etc. Over this period, the horticulture sub-sector experienced rapid growth arising mainly from changing dietary preferences, increased participation of women in the labour market, and emergence of various market outlets for fresh fruits and vegetables (supermarkets, wholesalers, retailers, assemblers etc (Katinka and Lumpkin, 2005). The milk market has undergone a major transformation since its liberalization in 1992. This ended KCC's monopoly in urban areas and opened up the dairy industry to private sector investors in input provision and marketing, with resultant redistribution of socio- economic pay-offs to smallholder farmers, market actors and consumers (Omiti and Muma, 2000; Omore *et al.*, 1999; Staal and Shapiro, 1994).

2.6 Influence of marketing of food surplus inputs influences household food security

Rising trends in urbanization, emergence of supermarkets and changing consumer preferences offer potentially high-value niche markets for smallholder farmers of developing economies such as Kenya, especially for dairy, maize and horticultural products (BIRTHAL *et al.*, 2005; Oli, 2005; Reardon *et al.*, 2005; Minot and Ngigi, 2003). However, Diao and Hazell (2004) observe that poorly functioning markets, weak domestic demand, and lack of export possibilities could constrain the potential for agricultural growth, marketing of agricultural products and to a larger extent food security at household level.

Technological innovations necessitated by commercialization require complementary investments in efficient rural factor markets. In addition to initiating various reform processes, and multi-stakeholder participation in the transformation of smallholder producers, the public sector has a crucial

responsibility to assist smallholders in developing market-oriented agriculture that is sustainable economically, socially and environmentally (Kisamba, 2005).

Governments and the international development community face a major challenge of ensuring that smallholder farmers and other rural people benefit from commercialization, either through participation in the market, or by successfully exiting agriculture and finding employment in different sectors (Pingali *et al.*, 2005). While most previous studies have focused on the process of agricultural commercialization, its determinants and impacts, no documented evidence exists on assessment of smallholder farmers' participation in prioritization of market-oriented issues. Addressing this gap would, thus, inform policy on the extent and desired strategies to strengthen local farmers' involvement in investment decisions and production priorities that address food availability and thus food security to all households.

2.7 Theoretical Framework

This study was based on the social action theory formulated by Slocam and Rodgers (1962) focusing on how an innovation can effectively be introduced into a frozen community, that is, a community that has not been opened up to adopt a new development idea. This theory explains the process of unfreezing such a community through the efforts of an external innovator or a member of the community with a new development idea. In their views, an innovation can only be embraced if introduced gradually and its benefits overtly observed, given that people attach importance to an initiative for which meaningful value has been attached. This theory also acknowledges that the ease with which the innovation can be implemented will determine the extent to which it can be adopted. Moreover, there is also the element of ability to try the innovation on a piece meal basis before being rolled out to several members of the community, given that people fear venturing into a new initiative that could turn out to drain their resources. This theory was found suitable to the study as attempts to

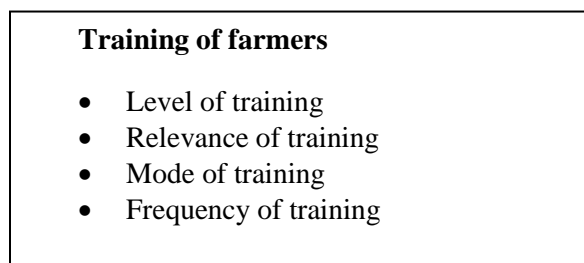
provide a comprehensive process and structure for introducing an innovation into a community through the efforts of an agricultural extension officer in order to strengthen produce for addressing challenges of food insecurity in Nyamira District.

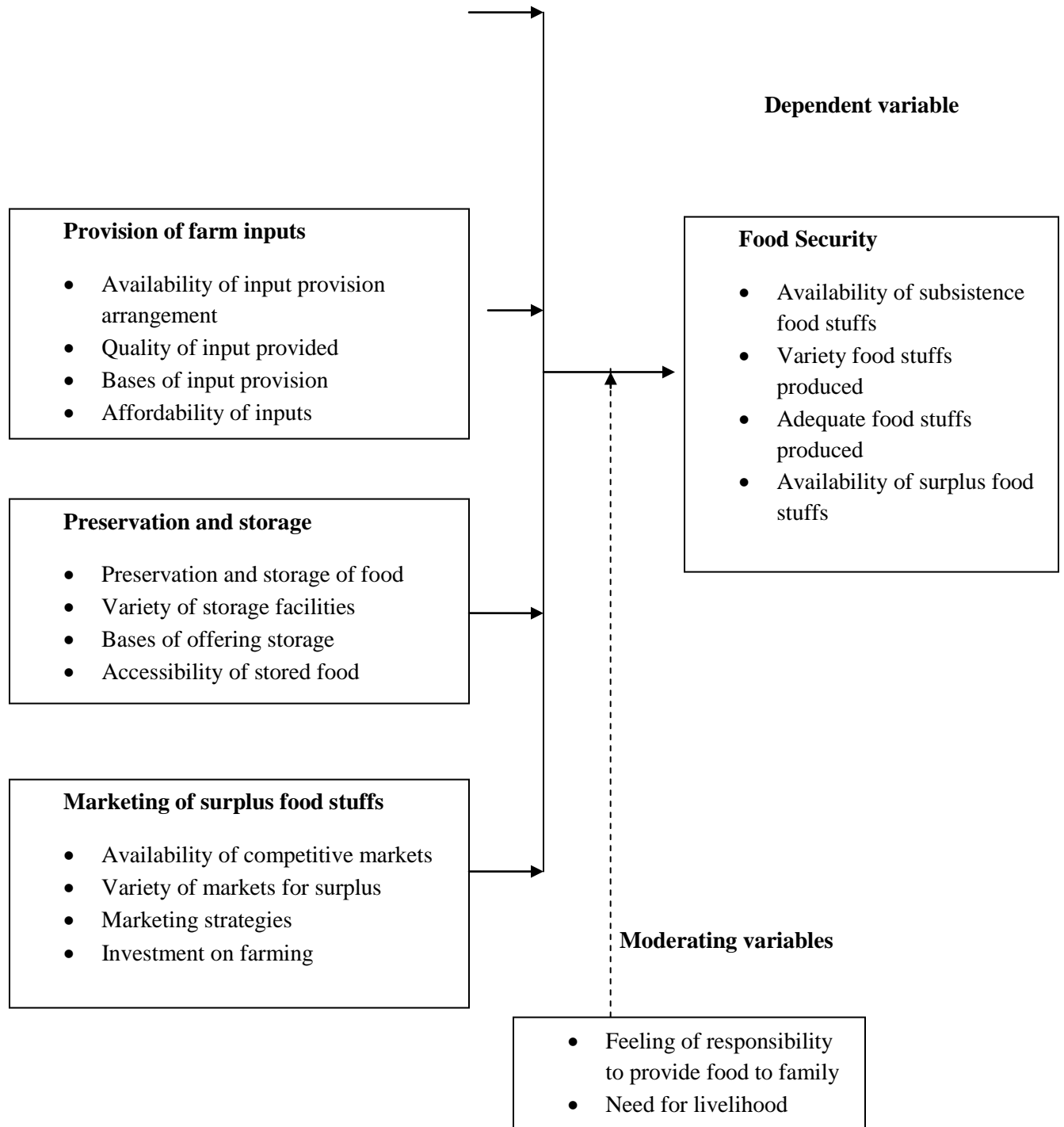
2.8 Conceptual framework

A conceptual framework describes a situation when a researcher conceptualizes the relationship between variables in the study and shows the relationship graphically or diagrammatically, Mugenda and Mugenda (2003). The conceptual framework is considered significant for it assists the researcher to quickly perceive the relationship established. The conceptual framework of the study is illustrated in figure 2.1

Figure 2.1 Conceptual framework of the study

Independent variables





In the conceptual framework in figure 2.7, food security is perceived to be influenced by training of farmers on modern methods of farming to ensure that agricultural production is given a business dimension for increased food output, given that land for farming has become scarce in Nyamira County

due explosion of population. Besides, the extent to which small holder farmers can access farm inputs would influence food security in the sense that affordability of these has posed difficulties in stepping up production, as most farmers are generally poor.

More often, small holder farmers have realized sufficient harvest, yet a lot the times these go to waste because of lack of adequate preservation and storage facilities. In this respect, availability of preservatives and storage would ensure that during low production, the food stored can be accessed by the poor farmers. Moreover, it is prudent agricultural management that farmers don't have to entirely rely on the extension department for agricultural input all the time. In the light of this, surplus produce should be marketed in order to attain funds to be ploughed back for investment in agricultural production for sustainability.

2.9 Gaps in literature review

From the literature reviewed, it is very clear to notice glaring knowledge gap in the area of food security, particularly in Nyamira County and its environs. It is therefore crucial to engage in several studies to unravel the impediments to attaining food sufficiency for purposes of bringing up healthy citizens with the potential to engage in the county's economic development. As revealed, Kirui (2012) conducted a study on food security in Bomet County and established that small holder farmers must be supported to step up agricultural production in order to feed the ever growing population. Reporting from his study done in Vihiga with its focus on factors influencing food security, Wanjala (2011) noted that local farmers lacked the necessary resources to be invested in agricultural production, as inputs remained beyond the reach of the majority. On the other hand, Maina (2012) in his study based on factors influencing food security in Meru North Constituency observed that modern strategies of farming were crucial for boosting agricultural production in order to feed the citizens. This study

therefore seeks to add to the existing knowledge strategies to be embraced in addressing the challenges in registering food security in Nyamira District.

2.10 Summary of literature review

This chapter reviewed literature related to the broad area of this study, done against the prism of other previous scholarly works conducted in other regions. Literature review was done in line with the major study variables, influence of training of farmers on modern methods of farming, preservation and storage of produce, provision of farm inputs as well as marketing of surplus products on food security in Nyamira District. This section also put into perspective the theoretical framework, a conceptual framework and gaps in the literature.

In the literature review, food security is perceived to be influenced by training of farmers on modern methods of farming to ensure that agricultural production is given a business dimension for increased food output, given that land for farming has become scarce due explosion of population. Besides, the extent to which small holder farmers can access farm inputs was found to have significant influence on food security in the sense that affordability of these had posed difficulties in stepping up production, as most farmers were generally poor.

More often, small holder farmers have realized sufficient harvest, yet a lot of the times; these go to waste because of lack of adequate preservation and storage facilities. In this respect, availability of preservatives and storage would ensure that during low production, the food stored can be accessed by the poor farmers. Moreover, it is prudent agricultural management that farmers don't have to entirely rely on the extension department for agricultural input all the time. In the light of this, surplus produce should be marketed in order to attain funds to be ploughed back for investment in agricultural production for sustainability.

CHAPTER THREE
RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents a detailed research methodology that the study adopted. Features of the research methodology employed include; research design, target population, sample size and sample selection. Included also in this chapter are data collection instruments, instruments pretesting, instruments validity and instruments reliability. Besides, procedures of data collection, methods of data analysis, operationalization of the variables and ethical considerations are also outlined.

3.2 Research Design

Kothari, (2005) defines a research design as the arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose with the economy to the procedure. It is the conceptual framework within which research is conducted and constitutes the blue print for the collection and analysis of data, Mugenda and Mugenda, (2003). In this study, a descriptive survey design was used. A descriptive survey is an attempt to collect data from members of the population in order to determine the status of that population with respect to one or more variables. Moreover, a descriptive survey research design was considered suitable for the study as it is the best method available to social scientists and other educators who are interested in collecting original data for purposes of describing a population which is too large to observe directly, Mugenda and Mugenda,(2003).

Owing to the fact that the study was descriptive in nature, targeted a large population geographically dispersed in the entire Nyamira District and sought to investigate the influence of agricultural extension services on household food security, a description survey research design was considered most appropriate.

3.3 Target population

A target population refers to that population of subjects where a study sample is drawn and upon which results of the study is generalized, Kothari, (2005). According to Mugenda and Mugenda, (2003), a target population is that population to which a researcher wants to generalize the results of the study. In this study, the target population, based on the registration status of the small household farmers Record (2013) available at the Nyamira District Agriculture Office indicated 5415 house hold farmers. The study also targeted one key informant each among, agricultural extension officers, Non-Governmental Organizations (NGOs) and other stakeholders involved in the provision of Agricultural extension services to farmers in Nyamira district such as Agricultural Sector Development Support Programme (ASDSP), Food & Agricultural Organization (FAO) , International Fund for Agricultural Development (IFAD) and Kenya Agricultural Research Institute (KARI), fixing the total population to 5420.

Sample size and sample selection

According to Mugenda and Mugenda (2003), a sample is defined as a sub-set of a target population, Sampling on the other hand is defined as a selection of some part of the aggregate or totality on the basis of which a judgment or inference about the aggregate is made, Kothari, (2005). In the views of Tromp and Kombo, (2002), a suitable sample size is that which is representative to the target population in major characteristics.

Gay in Mugenda and Mugenda, (2003), suggests that for correlation studies, 30 cases or more are required; for descriptive studies, 10% of accessible population is enough and for experimental studies at least 30 cases are required per group. In this study, a sample size equivalent of 10% of the target population was used ($\frac{10}{100} \times 5420$) =542 farmers. Probability sampling design was used to ensure high objectivity in sample selection was achieved by giving each item in the target population equal chances of being selected and included in the final sample. On this account, stratified random sampling

technique was used by dividing the target population on the basis of the seven sub locations in the district as illustrated in the table 3.1

Table 3.1 Sample selection procedure

Location	Total population	Sample percentage	Sample size
Bomabacho	664	10	66
Bokiambori	765	10	77
Timi	598	10	60
Siamani	764	10	76
Bundo	568	10	57
Ibucha	675	10	68
	654	10	65
Ikobe			
Total	5,420	10	542

3.5 Data collection instruments

Questionnaire was prepared and administered as the major data collection instrument on the basis that the study was descriptive in its major characteristics, coupled with the fact that the sample size was relatively large. The questionnaire items were designed in such a manner that most items were close-ended and others open-ended. This was preferred, for it offered opportunity to obtain both quantitative and qualitative data, thereby giving increased chances for generating maximum information for the study.

3.5.1 Instrument's pretesting

Instrument's pretesting, similarly referred to as piloting is a preliminary study conducted on a small scale for purposes of establishing the effectiveness of data collection instruments, Mugenda and Mugenda, (2003). The questionnaire was pretested to a selected sample which was similar to actual sample used in the study. According to Mugenda and Mugenda, (2003), a pretest sample is between 1% - 10% depending on the sample size, A pretest of 10% of the sample was used ($\frac{10}{100} \times 542$) = 54 respondents.

3.5.2 Instrument's validity

According to Kothari (2005), validity is a measure of degree to which differences found with a measuring instrument depict true differences among the items being measured. Validity is the degree to which the result obtained from the analysis of data actually represent phenomenon under study, Mugenda and Mugenda (2003). In ascertaining the validity of the questionnaire, adequate coverage of the research objectives was emphasized in designing the questionnaire. Randomization was done in selecting items from the target population into the final sample to check the possible influence of any extraneous variables in the study. Validity of the research instruments was also determined through peer review and expert judgment.

3.5.3 Instrument's reliability

Reliability of an instrument is a measure of consistency with which a research instrument produces the same results when administered to the same group over time intervals, Kothari (2005). Reliability is a measure of the degree to which an instrument yields consistent results or data after repeated trials, Mugenda and Mugenda (2003). In this study, split-half reliability method was adopted in ensuring that data collection instrument produced the same results when administered to the same group over time. This method of measuring instrument reliability was considered ideal since it requires only one testing

session. Using the approach, the instrument was designed in such a way that there were two parts, that is odd and even appearances. Subject scores from one part were correlated with scores from the second part and a correlation factor applied in the computed coefficient using Spearman-Brown Prophecy formula, obtaining an Alpha value of 0.82 indicating that the questionnaire was highly reliable.

3.6 Data collection procedures

In Kothari (2005), data collection procedures highlight the steps and their sequencing as well as actions prerequisite in conducting research effectively. After presentation of corrected copies of research proposal, a research permit was obtained from the National Council for Science and Technology, Ministry of Education. The researcher then hit the ground for the collection of data collection in the field. The research permit was presented to the relevant authorities, such as the department of agricultural extension, the local provincial administration officials and agricultural cooperative societies, to seek permission and assistance in the process of data collection.

3.7 Methods of Data Analysis

Given the fact that the study was descriptive in its key features, the main data collection instrument put to use in data collection was questionnaire, descriptive statistics were used in data analysis. Such descriptive statistics took the form of frequencies and percentages and the data analyzed was presented using frequency distribution tables. The data analysis was aided by statistical packages for social scientists (SPSS) using computer.

3.8 Ethical considerations during the study

According to Otunga (2011), there are several reasons why it is important to adhere to ethical norms in research. First, norms promote the aims of research, such as knowledge, truth, and avoidance of error.

For example, prohibitions against fabricating, falsifying, or misrepresenting research data promote the truth and avoid error. Second, since research often involves a great deal of cooperation and coordination among many different people in different disciplines and institutions, ethical standards promote the values that are essential to collaborative work, such as trust, accountability, mutual respect, and fairness. In the views of Koech (2013), some of the ethical issues as informed consent, confidentiality and anonymity.

Given the importance of ethical issues in research, the researcher in conducting the study adhered to the following; the researcher carried out the research alone and did not take somebody's work. In cases where someone else's work was included in the research, it was acknowledged through quotations and citations. This was important to protect the copyright of other researchers besides avoiding the issue of plagiarism. The respondents were informed that there was no monetary benefit as a condition to giving information, since the study was purely being done for academic purposes only. This was important because some respondents may have volunteered to be in the research thinking that there was some corresponding monetary gain. The researcher presented the authentic findings as they were, avoiding temptations of doctoring such results.

3.9 Operationalization of the study variables

In the study operational definition of the study variables was done. Training of farmers on modern methods of farming was measured on the basis of Level of training, relevance of training, mode of training and frequency of training. Provision of farm inputs was measured upon, availability of input provision arrangement, quality of input provided, bases of input provision and affordability of inputs. Preservation and storage was considered on the ground of availability of preservation and storage of food, Variety of storage facilities, bases of offering storage and accessibility of stored food. Marketing of surplus food stuffs was viewed against such parameters as, availability of competitive markets, variety of markets for surplus, marketing strategies and investment on

farming. Food Security was seen in the light of availability of subsistence food stuffs, variety food stuffs produced, adequate food stuffs produced and availability of surplus food stuffs.

Table 3.2 Operationalization Table

OBJECTIVES	VARIABLES	INDICATOR	MEASUREMENTS SCALE	DATA COLLECTION METHOD	DATA ANALYSIS
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To examine the extent to which training influences household food security.	Independent	*professional training *form of training *frequency of training *relevance of training	Nominal Ordinal Interval	Questionnaire	Descriptive statistics
	Dependant	*availability of sufficient food	Nominal Ordinal		
To determine the influence of provision of farm inputs on household food security	Independent	*types of inputs *quality of inputs *affordability of inputs	Nominal Ordinal	Questionnaire	Descriptive statistics
	Dependent	availability of sufficient food	Nominal		

To investigate how preservation and storage influences household food security	Independent	*storage arrangement *variety of facilities *accessibility of stored produce	Nominal	Questionnaire	Descriptive statistics
	Dependent	Household food security	availability of sufficient food	Nominal	Questionnaire
To assess the influence of marketing strategies on household food security	Independent	Arrangement for marketing produce *presence of competitive markets *types of markets *investment	Nominal Ordinal	Questionnaire	Descriptive statistics
	Dependent	Household food security	availability of sufficient food	Questionnaire	Descriptive statistics

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION, INTERPRETATION AND DISCUSSION

4.1. Introduction

This chapter focuses on an in-depth data analysis, presentation, interpretation, and discussion. Data analysis was done against the backdrop of the key study objectives; influence of training of farmers on

modern methods, provision of farm inputs, food preservation and storage and marketing of food surplus on household food security in Nyamira District.

4.2. Questionnaire Return Rate

Copies of the questionnaire were administered to the respondents by the research assistants, with close supervision by the researcher and the following return rate registered as illustrated in table 4.1.

Table 4.1: Questionnaire Return Rate

Target population	Sample size	Return Rate	Return Percentage
5420	542	448	85.13

Table 4.1 reveals that out of the 5420 copies of questionnaire administered to the respondents, 448 were received back duly completed giving a response rate of 85.13%. Response rate refers to the percentage of subjects that respond to a questionnaire. A response rate of 50% is deemed adequate for analysis and reporting, a response of 60% is good and a response rate of 70% and over is very good, Mugenda and Mugenda (2003).

On this account, the study is perceived to have returned an excellent questionnaire response rate. This was attributed to the fact that copies of the questionnaire were administered and collected back by two well trained and motivated research assistants, who consistently distributed the copies of the questionnaire to the respondents in batches of twenty until all were administered. The research assistants emphasized to the respondents the need to fill the questionnaire as instructed, as well as assisting some in completing the questionnaire in cases of either commitment or other forms of incapacities.

4.3 Demographic characteristics of respondents

The demographic characteristics of respondents were perceived as significant to the study on the basis that variations on such orientations would predispose individual farmers to engage in different farming activities for obtaining means of survival. In the light of this reality, demographic characteristics of the respondents were viewed against such parameters as, age, gender, marital orientations, level of education, area of agricultural engagement and the length of time in the engagements.

4.3.1 Characteristics of the respondents by age

In this study, it was believed that the age differences of the individual farmers could be crucial in determining drive to engage in agricultural activities, since relatively younger persons tend to look down upon economic engagements that go with manual work for white color jobs. On this account, the respondents were asked to complete the questionnaire indicating their ages and table 4.2 illustrates their responses.

Table 4.2: Age characteristics of respondents

Age in years	Frequency	Percentage
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Below 20	11	2.60
20 – 30	40	8.90
30 – 40	19	4.30
40 – 50	317	70.71
Above 50	60	13.40
Total	448	100.00

As indicated in table 4.2, 11 (2.6%) of respondents who completed the questionnaire were young persons below 20 years old, 40 (8.4%) fell in the age of 20 -30 years, 19 (4.3%) were in the age of 30-40, with 317 (70.71%) being in the age of 40-50 years and 60 (13.4%), having attained above 50 years. The findings in table 4.2 imply that more old respondents than younger ones are major participants in farming practices in Nyamira District. This was attributed to the fact that young community members incline to competitive jobs away from home as the old resort to local ventures as alternative to obtaining livelihood.

4.3.2 Gender attributes of the respondents

In this study, the researcher believed that gender differences would be significant, owing to the fact that engagement in careers also vary on the basis of sex, with males normally take preference on seeking for employment opportunities away from home and women generally remain performing local assignments. On the account of this assumption, the respondents were requested to fill the questionnaire stating their gender and table 4.3 displays their responses.

Table 4.3 Gender attributes of the respondents

Gender	Frequency	Percentage
Female	265	81.47
Male	183	40.83
Total	448	100.00

Table 4.3 indicates that of the 448 copies of questionnaire completed, 265 (81.47%) were females and 183 (40.83%) were males. The implication of the envisaged gender disparity is that, engagement in agricultural activities in Nyamira District is still a preserve of females and in that respect, agriculture is practiced at a small scale with little attempt to improve production to meet the challenges of food security in the District.

4.3.3 Characteristics of respondents on marital orientations.

Marital orientations of the respondents were considered critical to the study as these would reveal other key issues that determine engagement in agricultural ventures in Nyamira District. This was informed by the fact that choices for embracing economic undertakings are generally determined by the extent to which one bears the burden of providing for family members. The respondents were therefore requested to fill the questionnaire indicating their marital status and table 4.4 illustrates their responses.

Table 4.4: Marital status of the Respondents

Marital status	Frequency	Percentage
Single	84	18.47
Married	195	43.53
Widowed	135	30.13
Divorced	24	05.36
Other	10	02.51
Total	448	100.00

In table 4.4, of the 448 copies of questionnaire duly completed by the respondents, 84(18.47%) were single, 195 (43.53%) were married, 135(30.13%) were widowed and 24(05.36%) being divorced, with 10(02.51%) having fallen on other marital orientation. The statistics in the table reveal that majority of the household farmers in Nyamira District were married, hence engaged in these farming activities for purposes of fending for their families. Moreover, there was just a slight difference between the married and the widowed, which equally were bearing the responsibility of providing for their families as single parents.

4.3.4 Educational levels of the respondents

Education is a process that is meant to equip individuals with desirable knowledge, skills and attitudes which are basic in preparing individuals in pursuit for economic survival. Similarly, the researcher believed that the extent to which farmers acquire education would determine their ability to engage in more productive agricultural activities for food security in the District. In the light of such a reality, the

respondents were asked to complete the questionnaire indicating their levels of education and table 4.5 displays their responses.

Table 4.5 Characteristics of the respondents by education levels

Level of education	Frequency	Percentage
Primary and below	176	39.29
Secondary	160	35.71
Tertiary	64	14.29
University	16	03.57
Other	32	07.14
Total	448	100.00

Table 4.5 depicts that of the 448 copies of questionnaire completed by the respondents, 176 (39.29%) had primary and below level of education, 160 (35.71%) mentioned secondary level of education, 64(14.29%) indicated tertiary level, 16 (03.57%) stated having attained university education and 32(07.14%) indicated the ‘other’ category.

Reflected in the table 4.5 is the implication that most farmers in Nyamira District did not display substantial education, given that just a paltry 80 respondents had tertiary and university level of education. Addressing the challenges of attaining food security in the District was still hard to achieve, because improving agricultural output correspond with the level of embracing modern methods of farming, which in itself, is a function of education.

4.3.5 Respondent characteristics on the type of agricultural activities

It was assumed in the study that the type of agricultural activities farmers engage in would influence the level of attaining food security in the district, given that preference of cash crops to food crops would defeat this noble objective. On this platform, the respondents were then asked to complete questionnaire stating the agricultural activities they engaged in and their responses were illustrated in table 4.6

Table 4.6: Respondents characteristics on the type of agricultural activities

Activity	Frequency	Percentage
Cash crops	286	64.00
Food crops	123	27.50
Livestock	28	06.30
Poultry	03	00.70
Other	07	01.50
Total	448	100.00

As revealed in table 4.6, 286(64.00%) engaged in cash crop farming, 123(27.50%) participated in food crop farming, 28(06.30%) took part in livestock production and 03(00.70%) embraced poultry farming, with 07(01.50%) stating the other category. Implied in table 4.6 is that cash crops had become more popular agricultural activity in Nyamira District than food crops, thereby posing a challenge in meeting increased food production for addressing food security.

4.3.6 Respondents characteristics by length of engagement in agricultural activities.

Improvement in an undertaking can be realized effectively over time through gaining experience in the relevant field of operation, since individuals often grow with the growth of a venture. In this respect, the researcher believed that the length of time in which farmers had been in business could determine their ability to address issues of food security in Nyamira District. The respondents were asked to fill the questionnaire indicating how long they had been their various farming engagements and their responses captured as shown in table 4.7

Table 4.7. Characteristics of respondents by duration of farming.

Length in years	Frequency	Percentage
Below 1 year	102	22.77
1 - 5	105	23.44
6 - 10	100	22.32
11 - 15	101	22.54
16 - 20	20	04.46
Above 20 years	19	04.24
Total	448	100.00

Table 4.7 reveals that, of the 448 respondents whose questionnaire copies were received indicating the period of time they had been in operation of their farming activities, 102(22.77%) stated having been in

farming for below 1 year, 105 (23.44%) had been in farming for 1-5 years, 100(22.32%) indicated 6-10 years, with 101 (22.54%) stating 11-15 years and 20(04.46%) having been in been farming for 16-20 years, while 19(04.24%) had been in farming for over 20years. Implied by the statistics in table 4.7 is that most farmers in Nyamira District had not displayed a distinctive pattern of farming engagement, as it was difficult to tell if there was a steady rise in gaining farming experiences and hence there were high chances that food security could remain a challenge in the district.

4.4 Influence of training of farmers on modern methods of farming on household food security

In this study, training was measured on the grounds of the highest professional qualification obtained, type of training acquired, form of training embraced and the frequency of engagement in training by the small holder farming fraternity in Nyamira District.

4.4.1 Influence of professional qualification on food security

Modern agriculture has recently assumed business dimension, so much such that, with less training on modern methods of farming, one is surely bound to perform dismally in obtaining crop yields and training is basically the package of what agricultural extension department offers to the farmers. On this account, the respondents were asked to fill the questionnaire disclosing their professional qualifications and table 4.8 captures their responses.

Table 4.8: Influence of professional qualification on food security

Professional qualification	Frequency	Percentage
Certificate and below	294	63.63
Diploma	82	18.30
Degree	16	03.57
Post Graduate	14	03.13
Other	38	08.48
Total	448	100.00

Table 4.8 reveals that, out of the 448 respondents who completed the questionnaire, 294(63.63%) stated that they had certificate and below education, 82 (18.30%) obtained diploma education, 16 (03.57%) indicated having attained degree, with 14(03.13%) stated getting post graduate studies and 38(08.88%) indicating the other category. It is therefore deductible that the department of agricultural extension had not been strengthened enough, since the vast majority of farmers in Nyamira District were academically challenged and hence were less likely capable of adopting more modern methods of agriculture to enhance production of food crops.

4.4.2 Influence of type of training on food security

More often, training is regarded as more effective in improving performance especially when such is relevant to the area of operation. In the light of this fact, the type of training obtained by the farmers in

Nyamira District could offer to explain why food security has remained an elusive phenomenon, yet the department of agricultural extension office operates in the district. The respondents were hence asked to complete the questionnaire and their responses noted as indicated in table 4.9

Table 4.9 Influence of type of training on food security

Type of training	Frequency	Percentage
Agricultural extension	00	00.00
Business management	37	08.30
Community Development	13	02.90
Agricultural Engineer	00	00.00
Other	362	80.80
Total	448	100.00

Table 4.9 reveals strikingly that out of the 448 respondents who completed the questionnaire indicating the type of training they had, 362(80.80%) stated the other category, 37 (08.30%) studied business management, 13(02.90%) indicated having done community development and none either did agricultural extension or agricultural engineering. Implied by these statistics is that due to the fact that even the few farmers who provided information to the effect that they were trained did not have training relevant to their agricultural requirements hence were unlikely to use such knowledge in boosting agricultural production.

4.4.3 Influence of form of training on food security

The nature and form in which training is offered determine the effectiveness of knowledge and skills obtained from a training programme in the performance of a particular task. In the light of this reality, training forms vary from formal to informal aspects and whichever training package offered, there is bound to be some significant difference in knowledge display. The respondents were therefore asked to complete the questionnaire and their responses noted as illustrated in table 4.10

Table 4.10 Influence of form of training on food security

Form of training	Frequency	Percentage
Formal training	68	15.18
Informal training	146	32.59
Workshops and seminars	124	27.68
Other	107	23.88
Total	448	100.00

Table 4.10 reveals that, of the 448 respondents who filled the questionnaire disclosing the form of training commonly offered to farmers, through own arrangement and by the agricultural extension department, 68 (15.18%) mentioned engagement in formal training, 146(32.59%) indicated informal training, while 124(27.68%) stated training through workshops and seminars, with 107(23.88%) having indicated the other category. Implied by these statistics was that most farmers in Nyamira District, if

ever obtained training, then such could hardly be effective in improving agricultural produce for food security.

4.4.4 Influence of frequency of training on food security

Even after acquiring initial training needs relevant to a given field, changes often occur in every area of operation and there is need that training be embraced regularly in order to handle the emerging issues from time to time. On the account of this fact, the respondents were requested to complete the questionnaire stating how often they engaged in training and table 4.11 presents their responses.

Table 4.11 Influence of frequency of training on food security

Frequency of training	Frequency	Percentage
Very frequently	00	00.00
Frequently	12	02.68
Less frequently	26	05.80
Occasionally	298	66.52
Other	112	25.00
Total	448	100.00

Table 4.11 indicates that of the 448 respondents who completed the questionnaire citing the frequency of engagement in regular training, 298(66.52%) mentioned engaging in training just occasionally, 112 (25.00%) indicated the other category , 26(05.80%) mentioning training less frequently and 12(02.68%)

stating training frequently, while none identified with very frequent training. The implication of these statistics is that most of the farming fraternity in Nyamira District were not keen on training as a means of enhancing agricultural productivity in addressing food security in the district.

4.5 Influence of provision of farm inputs influences household food security

Agricultural extension department is expected to offer various solutions to the farmers' problems related to agricultural production, if the objective of meeting food sustenance is noble goal for achievement, and among these functions, provision of farm inputs is critical. This variable was measured on the basis of the type of inputs given to farmers, suitability of their quality, the basis upon which inputs were given and the level of affordability of the inputs.

4.5.1 Influence of the type of farm input on food security

More often, the type of farm inputs offered to farmers either subsidized or in the form of grants play a significant role in boosting agricultural productivity and this should be the most important role of agricultural extension department. In this study, the researcher intended to establish the extent to which was being practiced in Nyamira District. The respondents were asked to complete the questionnaire indicating the type of farm inputs they were obtaining and their responses recorded as displayed in table

4.12

Table 4.12 Influence of the type of farm input on food security

Type of farm input	Frequency	Percentage
Seeds	22	04.90
Fertilizer	23	05.13
Fertilizer	26	05.80
Grant	20	04.47
Other	357	00.00
Total	448	100.00

Table 4.12 indicates that of the 448 respondents who completed the questionnaire citing the type of farm inputs they were getting from the department of agricultural extension in Nyamira District, 22(04.90%) stated that they obtained seeds, 23 (05.13%) mentioned getting fertilizer, 26 (05.80%) indicated farm implements and 20(04.47%) stated obtaining grants, with the majority indicating the other category. The implication of these statistics is that most of the farmers had hardly obtained substantial farm inputs from the extension department in the district and it appeared that just few farmers at about 5% of the entire sample size were able to access these inputs.

4.5.2 Influence of quality of farm inputs on food security

Normally, the quality of farm inputs determines the quantity of agricultural produce obtained by farmers, and hence the researcher found it significant to focus on this parameter in measuring the level of success in agricultural activities. On this account, the respondents were asked to complete the

questionnaire indicating the suitability of the quality of farm inputs available in the District and their responses recorded as displayed in table 4.13

Table 4.13 Influence of quality of farm inputs on food security

Quality of farm inputs	Frequency	Percentage
Extreme Suitable	00	00.00
Suitable	00	00.00
Neutral	28	03.13
Less suitable	68	15.18
Other	352	78.57
Total	448	100.00

Table 4.13 indicates that of the 448 respondents who filled the questionnaire disclosing how suitable the quality of the farm inputs were, 352(78.57%) indicated the other category, 68(15.18%) indicated less suitable and 28 (03.13%) stated that they were neutral, yet none mentioned that these farm inputs were suitable. Implied by these statistics was that most farmers who could access farm inputs from whatever source found them less suitable on the basis of quality, hence were unlikely to boost agricultural produce for addressing food security in Nyamira District.

4.5.3 Influence of basis of offering inputs on food security

It is general practice that even if farm inputs are offered to farmers by the department of agricultural extension, some parameter upon which this is grounded is crucial. Such parameters as size of the farms, extent of usage, availability of resources among others could justify how much of these input one is likely to access. In order to ascertain the basis upon which farm inputs were being given, the respondents were requested to fill the questionnaire and they responded as illustrated in table 4.14

Table 4.14 Influence of basis of offering inputs on food security

Basis of offering inputs	Frequency	Percentage
Type of engagement	62	13.84
Farming experience	41	09.15
Size of farm	56	12.50
Availability of resources	57	12.73
Other	232	51.79
Total	448	100.00

Table 4.14 reveals that out of the 448 respondents who completed the questionnaire on the basis of giving farm inputs, 62(13.84%) stated that the items were pegged on type of engagement, 41 (09.15%) indicated farming experience, with 56 (12.50%), while 57(12.73%) stating availability of resources, yet the vast majority 232(51.79%) indicating the other category. Implied by these statistics is that there was never put in a place a formidable parameter of determining how different farmers in Nyamira District

could access farm inputs for use to improve their farming output. In the absence of such crucial dimensions in the distribution of farm inputs, undeserving cases could take the advantage to fraudulently obtain these inputs even for sale to other people, thereby dealing a blow to the fight against hunger in the district.

4.5.4 Influence of affordability of inputs on food security

In order to effectively address food security issues through availing farm inputs to farmers, it is crucial to consider the extent to which such farm inputs would be afforded. Should these be out of reach of the ordinary farmers, who coincidentally are the majority in the farming lot, then improving productivity will remain just a dream never to be operationalized. In this context, the respondents were asked to complete the questionnaire indicating the affordability of the farm inputs and their responses captured as illustrated in table 4.15

Table 4.15: Influence of affordability of inputs on food security

Affordability of inputs	Frequency	Percentage
Very affordable	00	00.00
Affordable	00	00.00
Less affordable	149	32.26
Expensive	299	66.74
Total	448	100.00

Table 4.15 reveals that out of the 448 respondents who completed questionnaire stating the affordability of the farm inputs, 299 (66.74%) mentioned that these were expensive and 149(32.26%) stated that they were less affordable, with none stating that they were easy to afford. These statistics are actually a confirmation that most farmers in Nyamira District encountered serious difficulties in affording the farm inputs; hence find agriculture as an expensive venture, which in turn accounts for the prevalence of hunger among most households in the district and its environs.

4.6 Influence of food preservation and storage on household food security

The battle to defeat food insecurity in a community requires assembling different strategies and consistently applying for purposes of enhancing food production, as well as ensuring that during periods of good harvests, the surplus are preserved and stored to be accessed in times of poor harvests. On this account, the researcher considered food preservation and storage as a vital package of the department of agricultural extension and this was viewed against the presence of preservation and storage arrangement, type of the storage facilities offered, basis of giving the storage facilities and accessibility of the stored produce by farmers during periods of scarcity.

4.6.1 Influence of presence of preservation and storage on food security

It is important to improve agricultural produce to a level that that he output can effectively be handled, given that occasionally surplus farm products have gone to waste due to inability to adequately preserve and store them for future use. In circumstances when such eventualities arise, despite good harvests, food security may still not be addressed. In the light of this scenario, the respondents were requested to fill the questionnaire indicating the extent to which they agreed and disagreed that the extension department had the preservation and storage arrangement and they responded as illustrated in table 4.16

Table 4.16: Influence of presence of preservation and storage on food security

preservation and storage	Frequency	Percentage
Strongly agree	00	00.00
Agree	82	18.31
Neutral	58	12.95
Disagree	174	38.34
Strongly disagree	134	29.91
Total	448	100.00

Table 4.16 reveals that out of the 448 respondents who filled the questionnaire indicating their agreement or disagreement that preservation and storage of the farm produce were being offered by the department of agricultural extension, 174(38.34%) disagreed, 134(29.91%) strongly disagreed, 82(18.31%) agreed, with 58(12.95%) being neutral, yet none strongly agreed. Implied by these statistics is that, even though there may have been a provision by the department of extension to preserve and store excess farming products, these were hardly accessed by the farmers in Nyamira District, hence there were fewer chances that the best practices were used to improve the capacity of farmers to address issues of food security in the district.

4.6.2 Influence of type of storage and preservation on food security

In order to effectively measure preservation and storage of the excess farm produce, the facilities that farmers use to this end would be critical, such that with superior storage being provided, farmers in

Nyamira District would be in better position of addressing the challenges of food security. In view of this, the respondents were therefore asked to complete the questionnaire indicating the storage facilities in use and their responses noted as illustrated in table 4.17

Table 4.17: Influence of type of storage and preservation on food security

Type of storage	Frequency	Percentage
Sacks and Gunny Bags	331	73.88
Home Made Granary	69	15.40
Modern Stage facilities	48	10.72
Cereals Stores	00	00.00
Total	448	100.00

Table 4.17 reveals that, of the 448 respondents who filled the questionnaire giving the various storage facilities used for keeping excess farm produce, 331(73.88%) mentioned use of sacks and gunny bags, 69(15.40%) indicated using homemade granary and 48(10.72%) indicated use of modern storage facilities, yet none identified with keeping with the cereals stores. The statistics in table 4.17 give the impression that many farmers in Nyamira could hardly produce enough even for commercial purposes told by the use of simple storage facilities such as use of mere sacks and gunny bags.

4.6.3 Influence of basis of offering preservation and storage on food security

Generally the basis upon which storage of farm produce is offered would indicate the effectiveness of such undertakings as an attempt to address issues to do with food security. On this account the

respondents were therefore asked to complete the questionnaire indicating the bases on which preservation and storage facilities were being offered and their responses noted as illustrated in table 4.18

Table 4.18: Influence of basis of offering preservation and storage on food security

Basis of offering storage	Frequency	Percentage
Size of the farms	381	85.04
Farming experience	49	10.94
Resource availability	18	10.02
Professional training	00	00.00
Total	448	100.00

Table 4.18 reveals that, of the 448 respondents who filled the questionnaire giving the bases upon which preservation and storage facilities were offered, 381 (85.04%) stated size of the farms, 49(10.94%) mentioned farming experience, 18 (10.02%) indicated resource availability and none attributed offering of preservation and storage to professional training. The statistics in table 4.18 give the impression that many farmers in Nyamira District, operating small plots were unlikely to benefit from the storage facilities given that these were attached to size of farms owned.

4.6.4 Influence of accessibility of stored produce on food security

In order to sustainably address the challenges of food security in the District, arrangement should be in place to enable farmers to access stored food stuffs at reasonably affordable price during moments of

hunger. This is an initiative that can address both aspects of hunger, as well as motivating farmers to expand production for future use. In this context, the respondents were asked to complete the questionnaire indicating the extent to which they were able to access the stored produce and their responses captured as illustrated in table 4.19

Table 4.19: Influence of accessibility of stored produce on food security

Storage accessibility	Frequency	Percentage
Very accessible	00	00.00
Accessible	47	10.49
Less affordable	232	51.51
Hardly accessible	179	40.00
Total	448	100.00

Table 4.18 reveals that out of the 448 respondents who completed questionnaire stating how accessible the stored farm produce were, 232 (51.51%) mentioned less accessible , 179(40.00%) stated hardly accessible, and 47 (10.49%) indicated accessible. Table 4.18 is actually a confirmation that most farmers in Nyamira District, despite taking part in agricultural activities were hardly capable of accessing stored food, probably due to the fact that they could no longer afford these, as they were expensive.

4.7. Influence of marketing of food surplus inputs influences household food security

To effectively handle the challenges that come with availability of sufficient food in a community where majority engage in agriculture, proceeds obtained from the disposal of surplus should be invested in further agricultural production as well as other spending areas. This variable, marketing of food surplus was perceived on the parameters of the presence of competitive markets, accessibility of these markets by farmers, the type of marketing strategies used and investment of the proceeds on further agricultural activities

4.7.1 Influence of competitive markets on food security

It is common that many farmers, after harvesting their crops come to realize that they have to compete by selling in the same local markets returning poor economic gains. In the view of this eventuality, the respondents were asked to fill the questionnaire stating the extent to which they agreed or disagreed that they were able to access competitive markets for their farm produce and table 4.20 shows their responses.

Table 4.20 Influence of competitive markets of food surplus on food security

Competitive markets	Frequency	Percentage
Strongly agree	00	00.00
Agree	23	05.13
Neutral	25	05.58
Disagree	113	25.22
Strongly Disagree	287	64.05
Total	448	100.00

Table 4.20 reveals that, out of the 448 respondents who filled the questionnaire indicating the extent of agreement or disagreement that they were able to access competitive markets, 287(64.05%) stated that they strongly disagreed, 113 (25.22%) disagreed, 25(05.58%) stated that they were neutral, 23(05.13%) agreed and none strongly agreed. Implied by the statistics in table 4.20 is that most farmers in Nyamira District could obtain attractive returns from selling their produce due to lack of competitive markets. It was equally difficult for these farmers to obtain additional resources to invest in future improvement of agricultural produce.

4.7.2 Influence of accessibility of markets on food security

In this study, the researcher believed that accessibility of various markets could open more business opportunities for farmers to engage in more productive farming activities. In this respect, the

respondents were asked to fill the questionnaire stating the market types they often accessed and table 4.21 shows their responses.

Table 4.21 Influence of accessibility of markets on food security

Accessibility of markets	Frequency	Percentage
Village markets	302	67.42
Urban Centers	101	22.54
Regional Markets	45	10.04
Export Markets	00	00.00
Total	448	100.00

Table 4.21 reveals that, of the 448 respondents who filled the questionnaire disclosing the type of markets accessed, 302(67.42%) stated accessing local markets, 101(22.54%) indicated urban centers and 45(10.04%) mentioned regional markets, with none stating export markets. The implication is that, majority of the farmers in Nyamira District embraced farming at a subsistence level with little attempt to expand these in order to give their ventures a business dimension for profitability and subsequent food security.

4.7.3 Influence of type of marketing strategies on food security

In order to improve gains from agricultural produce, better marketing strategies must be thought out, since by selling in any form, a particular level of profit would be obtained. In this context, the

respondents were asked to complete the questionnaire indicating the strategies adopted in selling their farm products and table 4.22 illustrates their responses.

Table 4.22 Influence of type of marketing strategies on food security

Type of marketing strategy	Frequency	Percentage
Agency marketing	45	10.05
Individual marketing	265	59.15
Cooperative marketing	38	08.48
Brokerage	100	22.32
Total	448	100.00

Table 4.2 reveals that, out of the 448 respondents who filled the questionnaire indicating the strategies they use in marketing their farm produce, 265(59.15%) stated individual marketing, 100(22.32%) stated selling through brokers, with 45(10.05%) indicating agency marketing and 38(08.48) using cooperative marketing. Implied is that a relatively higher number of were engaged in either individual, or selling through brokers, hence lacked the bargaining power to fetch attractive returns.

4.7.4 Influence of investment of proceeds on food security

The researcher was interested in establishing the extent to which proceeds from farm surplus would be invested into future agricultural production in order to sustainably address the challenges of food

security in Nyamira District. In the light of this, the respondents were asked to fill the questionnaire indicating how the farming proceeds were spent and table 4.23 illustrates their responses.

Table 4.23 Influence of investment of proceeds on food security

Investment of proceeds	Frequency	Percentage
School fees	168	37.50
Medical needs	152	32.93
Investment in agriculture	28	06.25
Others	100	22.32
Total	448	100.00

Table 4.23 reveals that, of the 448 respondents who filled the questionnaire disclosing how they often spend their farm proceeds, 168(37.50%) stated school fees, 152 (32.93%) mentioned medical needs, 100(22.32%) indicated the other category and 28(06.25) spent on further agricultural investment. By implication, little proceeds from agricultural produce were being ploughed back in agricultural activities.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter focuses on summary of findings, conclusion and recommendations. The summary was done against the backdrop of the key study objectives; influence of training of farmers on modern methods, provision of farm inputs, food preservation and storage and marketing of food surplus on household food security in Nyamira District.

5.2 Summary of the findings

Copies of the questionnaire were administered to the respondents by the research assistants, with close supervision by the researcher and a response rate of 85.13% was realized. The demographic characteristics of respondents were perceived as significant to the study on the basis that variations on such orientations would predispose individual farmers to engage in different farming activities for obtaining means of survival. In the light of this reality, demographic characteristics of the respondents were viewed against such parameters as, age, gender, marital orientations, level of education, area of agricultural engagement and the length of time in the engagements, which were found significant to the realization of food security in Nyamira District.

On the key study variables, training was measured on the grounds of the highest professional qualification obtained, type of training acquired, form of training embraced and the frequency of engagement in training by the small holder farming fraternity in Nyamira District. It was established that modern agriculture had recently assumed business dimension, so much such that, with less training on modern methods of farming, one is surely bound to perform dismally in obtaining crop yields and training was basically the package of what agricultural extension department offers to the farmers. On this account, the it is deductible that the department of agricultural extension had not been strengthened

enough, since the vast majority of farmers in Nyamira District were academically challenged and hence were less likely capable of adopting modern methods of agriculture to enhance production of food crops.

More often, training is regarded as more effective in improving performance especially when such is relevant to the area of operation. In the light of this fact, the type of training obtained by the farmers in Nyamira District could offer to explain why food security had remained an elusive phenomenon, yet the department of agricultural extension office operates in the district. The study noted that due to the fact that even the few farmers who provided information to the effect that they were trained did not have training relevant to their agricultural requirements hence were unlikely to use such knowledge in boosting agricultural production.

The nature and form in which training is offered determine the effectiveness of knowledge and skills obtained from a training programme in the performance of a particular task. In the light of this reality, training forms vary from formal to informal aspects and whichever training package offered, there is bound to be some significant difference in knowledge display. Moreover, it was also observed that most farmers in Nyamira District, if ever obtained training, then such could hardly be effective in improving agricultural produce for food security.

Even after acquiring initial training needs relevant to a given field, changes often occur in every area of operation and there is need that training be embraced regularly in order to handle the emerging issues from time to time. On the account of this fact, most of the farming fraternity in Nyamira District was not keen on training as a means of enhancing agricultural productivity in addressing food security in the district.

Agricultural extension department is expected to offer various solutions to the farmers' problems related to agricultural production, if the objective of meeting food sustenance is noble goal for achievement, and among these functions, provision of farm inputs is critical. This variable was measured on the basis of the type of inputs given to farmers, suitability of their quality, the basis upon which inputs were given and the level of affordability of the inputs.

More often, the type of farm inputs offered to farmers, either subsidized or in the form of grants, play a significant role in boosting agricultural productivity and this should be the most important role of agricultural extension department. In this study, the researcher intended to establish the extent to which this was being practiced in Nyamira District. The researcher discovered that most of the farmers had hardly obtained substantial farm inputs from the extension department in the district and it appeared that just few farmers at about 5% of the entire sample size were able to access these inputs.

Normally, the quality of farm inputs determines the quantity of agricultural produce obtained by farmers, and hence the researcher found it significant to focus on this parameter in measuring the level of success in agricultural activities. On this account most farmers who could access farm inputs from whatever source found them less suitable on the basis of quality, hence were unlikely to boost agricultural produce for addressing food security in Nyamira District.

It is general practice that even if farm inputs are offered to farmers by the department of agricultural extension, some parameter upon which this is grounded is crucial. Such parameters as size of the farms, extent of usage, availability of resources among others could justify how much of these inputs one is likely to access. In order to ascertain the basis upon which farm inputs were being given, the Study noted that there was never put in a place a formidable parameter of determining how different farmers in Nyamira District could access farm inputs for use to improve their farming output. In the absence of such crucial dimensions in the distribution of farm inputs, undeserving cases could take the advantage

to fraudulently obtain these inputs even for sale to other people, thereby dealing a blow to the fight against hunger in the district.

In order to effectively address food security issues through availing farm inputs to farmers, it is crucial to consider the extent to which such farm inputs would be afforded. Should these be out of reach of the ordinary farmers, who coincidentally are the majority in the farming lot, then improving productivity will remain just a dream never to be operationalized. In this context, most farmers in Nyamira District encountered serious difficulties in affording the farm inputs, hence find agriculture as an expensive venture, which in turn accounts for the prevalence of hunger among most households in the district and its environs.

The battle to defeat food insecurity in a community requires assembling different strategies and consistently applying for purposes of enhancing food production, as well as ensuring that during periods of good harvests, the surplus are preserved and stored to be accessed in times of poor harvests. On this account, the researcher considered food preservation and storage as a vital package of the department of agricultural extension and this was viewed against the presence of preservation and storage arrangement, type of the storage facilities offered, basis of giving the storage facilities and accessibility of the stored produce by farmers during periods of scarcity.

It is important to improve agricultural produce to a level that that the output can effectively be handled, given that occasionally surplus farm products have gone to waste due to inability to adequately preserve and store them for future use. In circumstances when such eventualities arise, despite good harvests, food security may still not be addressed. In the light of this scenario, even though there may have been a provision by the department of extension to preserve and store excess farming products, these were hardly accessed by the farmers in Nyamira District, hence there were fewer chances that the best practices were used to improve the capacity of farmers to address issues of food security in the district.

In measuring preservation and storage of the excess farm produce, the facilities that farmers use to this end would be critical, such that with superior storage being provided; farmers in Nyamira District would be in better position of addressing the challenges of food security. In view of this, the study findings gave the impression that many farmers in Nyamira could hardly produce enough even for commercial purposes told by the use of simple storage facilities such as use of mere sacks and gunny bags.

Generally the basis upon which storage of farm produce is offered would indicate the effectiveness of such undertakings as an attempt to address issues to do with food security. On this account the study gave the impression that many farmers in Nyamira District, operating small plots were unlikely to benefit from the storage facilities given that these were attached to size of farms owned.

In sustainably addressing the challenges of food security in the District, arrangement should be in place to enable farmers to access stored food stuffs at reasonably affordable price during moments of hunger. This is an initiative that can address both aspects of hunger, as well as motivating farmers to expand production for future use. In this context, the study results confirmed that most farmers in Nyamira District, despite taking part in agricultural activities were hardly capable of accessing stored food, probably due to the fact that they could no longer afford these, as they were expensive.

To effectively handle the challenges that come with availability of sufficient food in a community where majority engage in agriculture, proceeds obtained from the disposal of surplus should be invested in further agricultural production as well as other spending areas. This variable, marketing of food surplus was perceived on the parameters of the presence of competitive markets, accessibility of these markets by farmers, the type of marketing strategies used and investment of the proceeds on further agricultural activities

It is common that many farmers, after harvesting their crops come to realize that they have to compete by selling in the same local markets returning poor economic gains. In the view of this eventuality, most farmers in Nyamira District could not obtain attractive returns from selling their produce due to lack of competitive markets. It was equally difficult for these farmers to obtain additional resources to invest in future improvement of agricultural produce.

In this study, the researcher believed that accessibility of various markets could open more business opportunities for farmers to engage in more productive farming activities. In this respect, majority of the farmers in Nyamira District embraced farming at a subsistence level with little attempt to expand these in order to give their ventures a business dimension for profitability and subsequent food security.

In order to improve gains from agricultural produce, better marketing strategies must be thought out, since by selling in any form, a particular level of profit would be obtained. In this context, a relatively higher number of were engaged in either individual, or selling through brokers, hence lacked the bargaining power to fetch attractive returns.

The researcher was interested in establishing the extent to which proceeds from farm surplus would be invested into future agricultural production in order to sustainably address the challenges of food security in Nyamira District. By implication, little proceeds from agricultural produce were being ploughed back in agricultural activities.

5.3 Conclusion

From the findings of the study, vital conclusions were drawn on the basis of the key variables. Given that the study sought to investigate the influence of agricultural extension services on household food security in Nyamira District, these services were packaged in, offering training opportunities to farmers

on modern methods of farming, provision of farm inputs, arrangement for preservation and storage of excess farm produce and provision of suitable marketing strategies to farmers.

Despite the presence of the department of agricultural extension in the district, with its mandate recognized by farmers and purportedly performing such roles, improvement in agricultural production that could address the challenges of food security, remained a tall order expectation. Whereas the farmers acknowledged that with strengthened extension services and Nyamira District being in high potential area, it was obvious that hunger could completely be eliminated.

Food security in the district was discovered to be positively influenced by rolling out training to farmers on modern farming methods and such training would be more effective if done regularly. Besides, provision of farm inputs and grants to farmers would also boost their capacities in expanding agricultural activities to meet the food requirements, as this would lower the cost of production. Moreover, arrangement for preservation and storage provided by the department of extension would address food security in the district. This could be achieved through storage of surplus produce during periods of good harvests and availed to the same farmers when harvests are not in their favor. Finally, agricultural activities ought to be given a business dimension in order to secure food sustenance. This can be achieved through effective marketing strategies that offer much gain to the farmers, which in turn leads to investing in farming.

5.4 Recommendations.

Focusing on the study findings, recommendations are made, both for policy considerations and further research.

5.4.1 Recommendations for policy formulation.

The study recommends the strengthening of agricultural extension department and equips them with the requisite personnel and other vital resources to assist farmers navigate their farming challenges for

purposes of attaining food security. Moreover, the study recommends that other key players in agriculture at the local levels be provided with necessary knowledge in identifying the best agricultural extension methods to adopt to realize food security in Nyamira District, in particular and the entire nation in general.

Further, the study also recommends to the NGO sector promoting agricultural practices to develop policies that are geared towards assisting farmers to step up their production to address food issues. It also important to provide basic information to other stakeholders in the NGO sector focusing on food security such as World Vision on measures to embrace in addressing food conditions and ensure that focus of food provision to the hunger stricken communities shift from relief food to sustainable food production. Moreover, the study may facilitate the country's fight against food insecurity in other regions in Kenya and other parts of the world.

5.4.2 Recommendation for further Research.

The study recommends the following areas to be considered for further research:

1. What is the influence of cultural practices on household food security in Nyamira District and its surrounding areas?
2. What alternative practices can be adopted in improving agricultural output in Nyamira District?
3. What factors influence the operations of the department of agricultural extension in Nyamira District?
4. Should this study be replicated in other districts in Kenya, what differences would be observed?

REFERENCES

- Anderson, E., Ayala, F. and Bird, K. (2005). The social impact of improved market access and export promotion in agriculture. London: Overseas Development Institute (ODI).
- Ayuko, K.O. (2005). "Njaa marufuku Kenya". Elimination of extreme poverty and hunger: A call for action to eradicate hunger. A presentation to the National Conference on Revitalizing Agricultural Sector for Economic Growth "Kilimo Bora Kwa Ustawi", Nairobi.
- Balint, B.E. (2003). Determinants of commercial orientation and sustainability of agricultural production of the individual farms in Romania. PhD Dissertation, University of Bonn.
- Barrett, C.B., Moser, C.M., McHuhg, O.V. and Barison, J. (2004). "Better technology, better plots or better farmers? Identifying challenges in productivity and risk among Malagasy rice farmers", *American Journal of Agricultural Economics* 86 (4), pp869-888.
- Bruan, J. and Kennedy, E. (1994). 'Agricultural commercialization, economic development and nutrition'. Food Policy Statement No. 19. Washington DC: International Food Policy Research Institute (IFPRI).
- CBS (2003). Geographic dimensions of well-being in Kenya: Who and where are the poor? From districts to locations, Vol. I, Central Bureau of Statistics (CBS), Ministry of Planning and National Development, Nairobi: Regal Press Kenya.
- Chambers, R. and Jiggins, J. (1987). Agriculture research for resourcepoor farmers: A parsimonious paradigm, *agricultural administration and extension*, 27(2): pp109-128.
- Collion, M.H. and Merrill-Sands, D. (2005). "Farmers and researchers: The road to partnership". *The Netherlands Journal of Agriculture and Human Values*, Volume 11, Number 3.
- Davis, J.R. (2006). How can the poor benefit from the growing markets for high value agricultural products? Kent: Natural Resources Institute.

- Diao, X. and Hazell, P. (2004). Exploring market opportunities for African smallholders. 2020 Africa Conference Brief 6, Washington DC: International Food Policy Research Institute (IFPRI).
- Dijkistra, T. (1997). "Commercial horticulture by African smallholders: A success story from the highlands of Kenya". *Scandinavian Journal of Development Alternatives* 16 (1) 49-74.
- Diru, W. (2005). Kenya national food security programme. A presentation to National Conference on Revitalizing Agricultural Sector for Economic Growth "Kilimo Bora Kwa Ustawi", Nairobi.
- Dorward, A., Poole, N., Morrisson, J., Kydd, J. and Urey, I. (2003). "Markets, institutions and technology: Missing links in livelihood analysis", *Development Policy Review* 2(3):319-32.
- ECAPAPA (2006). "Agricultural growth and economic development: A view through the globalization lens". *Electronic Newsletter* Volume 9 Number 6, Entebbe: Eastern and Central Africa Programme for Agricultural Policy Analysis (ECAPAPA).
- FAO (1983). World food security: A re-appraisal of the concepts and approaches. Director General's Report, Rome: Food and Agriculture Organization (FAO).
- FAO (2002). Participatory approaches, methods and tools: Sharing our resources to support sustainable livelihoods and food security. Rome: FAO (CD-ROM).
- FAO (2006a). Participatory survey methods for gathering information. Food and Agriculture Organization (FAO) Corporate Document Repository.
- FAO (2006b). Participation and information: The key to gender-responsive agricultural policy. Food and Agriculture Organization (FAO) Corporate Document Repository.
- FAOSTAT (2006). *Statistical database*. Rome: Food and Agriculture Organization (FAO).
- Freeman, H.A., and Omiti, J.M. (2003). "Fertilizer use in semi-arid areas of Kenya: Analysis of

- smallholder farmers' adoption behaviour under liberalized markets". *Nutrient cycling in agro ecosystems* 66:23-31.
- Gale, F., Tang, P., Bai, X., and Xu, H. (2005). Commercialization of food consumption in rural China. Economic Research Service (ERS) report. Markets and Trade Section, United States Department of Agriculture.
- Geda, A., de Jong, N., Mwabu, G., and Kimenyi, M. (2001). Determinants of poverty in Kenya: A household level analysis, The Hague: Institute of Social Studies.
- Haddad, L.J. and Bouis, H.E. (1990). Agricultural commercialization, nutrition and the rural poor. A study of Philippine farm households. Washington DC: International Food Policy Research Institute (IFPRI).
- Heywood, P., Allen, B. and Fandim, T. (1986). A rapid appraisal of agriculture, nutrition and health in Wosera sub-district, East Sepik Province. Port Moresby: Papua New Guinea Institute of Medical Research.
- John, O. et al, (2006). Participatory Prioritization of Issues in Smallholder Agricultural Commercialization in Kenya.
- Kisamba-M, W. (2005). The politics and policies of smallholder agriculture. Washington DC: International Food Policy Research Institute (IFPRI).
- Krishna, A., Kristjanson, P., Radeny, M. and Nindo, W. (2004). "Escaping poverty and becoming poor in 20 Kenyan villages". *Journal of Human Development*, Vol. 5, No. 2.
- Marenya, P.P., Oluoch-Kosura, W., Place, F. and Barrett, C. (2003). Education, non-farm income and farm investment in land-scarce Western Kenya. BASIS Brief No. 14, Wisconsin: University of Wisconsin.
- Mbithi, L.M. (2000). "Effects of agricultural policy on maize production in Kenya". PhD Thesis,

Ghent: University of Ghent.

McCulloch, N. and Ota, M. (2002). Export horticulture and poverty in Kenya. Working Paper No. 174. Brighton: Institute of Development Studies, University of Sussex.

Muriuki, H., et al., (2003). "The policy environment in Kenya dairy subsector: A review." Smallholder Dairy Project (SDP) research and development report No.2, Nairobi: International Livestock Research Institute (ILRI).

Narayan, D. and Nyamwaya, D. (1996). Learning from the poor: A participatory poverty assessment in Kenya. Washington DC: World Bank Social Policy and Resettlement Division.

Ng'ethe, P., Katumanga, M., & Williams, G. (2004). "Strengthening the incentives for pro-poor policy change: An analysis of drivers of change in Kenya". Summary report, Nairobi: Department for International Development (DFID).

Nyamira District Annual reports (2009, 2010, 2011).

Nyangito, H.O. (2001). *Policy and legal framework for the coffee sub-sector and the impact of liberalization in Kenya*. KIPPRA Policy Paper No. 2, Nairobi: Kenya Institute for Public Policy Research and Analysis.

Odhiambo, W., Nyangito, H.O. and Nzuma, J. (2004). *Sources and determinants of agricultural growth and productivity in Kenya*. KIPPRA Discussion Paper No. 34, Nairobi: Kenya Institute for Public Policy Research and Analysis.

Republic of Kenya (2005a). Strategy for revitalizing agriculture (2004-2014). Nairobi: Ministry of Agriculture, Ministry of Livestock and Fisheries Development, Ministry of Cooperative Development and Marketing, pp23.

Republic of Kenya (2005b). National Development Plan 2002-2008. Effective management for sustainable economic growth and poverty reduction, Nairobi: Government Printer.

Reynolds, L. (1988). *Micro economics: Analysis and policy* (6th edition), Illinois: Irwin
Homewood Publishers.

SACHS, J.D. (2005). *The End of Poverty: How we can make it happen in our lifetime*. London:
Penguin Books Ltd.

World Bank (1981). *Poverty and hunger: Issues and options for food security in developing
countries*, Washington DC: World Bank.

World Bank (1983). *Poverty and hunger: Issues and options for food security in developing
countries*, Washington DC: World Bank

World Bank (1986). *Poverty and hunger: Issues and options for food security in developing
countries*, Washington DC: World Bank

APPENDIX A: LETTER OF TRANSMITTAL.

MIGIKA ALEX OMBETA,

P.OBOX 1920,

KISII.

14/6/2013.

Dear Sir/Madam,

I am a student of Master of Arts in project planning and management at the University of Nairobi. I am conducting a research study to investigate the influence of agricultural extension services on food security in Nyamira District. The study is being undertaken for academic purpose and not any other reason. Your opinion and views are important for the successful completion of this study. Your co-operation will be highly appreciated and any information provided shall be treated with privacy and confidentiality deserved.

Thanking you in anticipation

Yours Sincerely,

Ombeta Alex migika

APPENDIX B: RESEARCH QUESTIONNAIRE

SECTION A: DEMOGRAPHIC CHARACTERISTICS OF THE RESPONDENTS

1. Indicate your age in years

- a) Less than 20. []
- b) 20-30 []
- c) 30-40 []
- d) 40-50 []
- e) Above 50 []

2. State your gender

- a) Male []
- b) Female []

3 .indicate your marital orientation

- a) Single []
 - b) Married []
 - c) Widowed []
 - d) Divorced []
 - e) Others (specify)
-

4. State your level of education

- a) Primary and below []
 - b) Secondary []
 - c) Tertiary []
 - d) Degree []
 - e) Other (specify)
-

5. In which agricultural category are you involved?

- a) Root crops []
 - b) Livestock []
 - c) Poultry []
 - d) Grains []
 - e) Horticulture []
 - f) Other (specify) []
-

6. For how long have you been in agriculture industry?

- a) Below one year []
- b) 1-5 []
- c) 6-10 []
- d) 11-15 []
- e) 15-20 []
- f) Above 20 []

SECTION B: STUDY VARIABLES

7. Indicate your highest professional training

- a) Certificate and below []
- b) Diploma []
- c) Degree []
- d) University []
- e) Other (specify)..... []

8. Indicate the type of training you have obtained

- a) Agricultural extension []
- b) Business management []
- c) Educational studies []
- d) Agricultural Engineer []
- e) Other (specify)..... []

9. State the form of training you normally embrace?

- a) Formal training []
- b) Informal training []
- c) Workshops and seminars []
- d) Other (specify)..... []

10. How frequently do you engage in training?

- a) Very frequently []
- b) Frequently []
- c) Less frequently []
- d) Occasionally []
- e) Other (specify)..... []

11. To what extent do you agree or disagree that training of farmers on modern methods of farming influences food security in Nyamira District.

- a) Strongly agree []
- b) Agree []
- c) Neutral []

- d) Disagree []
- e) Strongly disagree []

12. In your own opinion explain the influence of training of farmers on food security in your district.

.....

13. State the type of farm inputs you have obtained from the department of agricultural extension in Nyamira District.

- a) Seeds []
- b) Fertilizer []
- c) Implements []
- d) Grant []
- e) Others (specify)..... []

14. How suitable are the quality of these inputs to your farming needs?

- a) Extreme Suitable []
- b) Suitable []
- c) Neutral []
- d) Less suitable []
- e) Other (specify)..... []

15. What is the basis upon which these farm inputs are given to farmers in your District?

- a) Type of engagement []
- b) Farming experience []
- c) Size of the farm []
- d) Availability of resources []
- e) Other (specify)..... []

16. How affordable do you find these inputs given by the department of extension office in your District?

- a) Very affordable []
- b) Affordable []
- c) Less affordable []
- d) Expensive []

17. In your own opinion explain how provision of farm inputs influences food security in Nyamira District

.....
.....

18. To what extent do you agree or disagree that the department of agricultural extension offers preservation and storage facilities to farmers

- a) Strongly agree []
- b) Agree []
- c) Neutral []
- d) Disagree []
- e) Strongly disagree []

19. Indicate the type of preservation and storage used to maintain quality of your produce

- a) Sacks and Gunny Bags []
- b) Home Made Granary []
- c) Modern Stage facilities []
- d) Cereals Stores []

20. Indicate the basis of offering preservation and storage facilities to farmers

- a) Size of the farms []
- b) Farming experience []
- c) Resource availability []
- e) Professional training []

f)Others (specify).....

21. How accessible is the stored food by farmers during periods of food scarcity?

- a) Very accessible []
- b) Accessible []
- c) Less affordable []
- d) Hardly accessible []

22. Explain, in your own opinion how preservation and storage of farm produce influences food security among small holder farmers in Nyamira District

.....
.....
.....

23. To what extent do you agree or disagree that there are competitive markets for your farm produce

- a) Strongly agree []
- b) Agree []
- c) Neutral []
- d) Disagree []
- e) Strongly disagree []

24. Which variety of markets do access for selling your surplus farm produce?

- a) Village markets []
- b) Urban Centers []
- c) Regional Markets []
- d) Export Markets []

25. Indicate the type of marketing strategies you often use for disposing your surplus farm produce

- a) Agency marketing []
- b) Individual marketing []

c) Cooperative marketing []

d) Brokerage []

26. Indicate how you often utilized the proceeds from disposing your surplus farm produce

a) School fees []

b) Medical needs []

c) Investment in agriculture []

d) Others (specify) []

27. In your own opinion, explain the influence of marketing of agricultural surplus produce on food security in Nyamira District.

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