UNIVERSITY OF NAIROBI

DEPARTMENT OF SOCIOLOGY AND SOCIAL WORK

HOUSEHOLD CHARACTERISTICS, FARM USE PRACTICES AND EFFECT ON HOUSEHOLD FOOD SECURITY IN KATHONZWENI SUB-COUNTY, MAKUENI COUNTY

BY

SALOME SYEKETHE MUTIE

C50/80465/2012

A PROJECT SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF MASTER OF ARTS IN SOCIOLOGY (RURAL SOCIOLOGY AND COMMUNITY DEVELOPMENT), UNIVERSITY OF NAIROBI

NOVEMBER, 2017

DECLARATION

This research project is my original work and has not been presented to any other examination body, university or institution of higher learning for any award.

Sign……. Date…….

SALOME SYEKETHE MUTIE

C50/80465/2012

This research project is submitted for examination with my approval as the university supervisor.

Sign……. Date…….

PROF. EDWARD MBURUGU

DEDICATION

This work is dedicated to my parents for their great love and motivation. May their concern and strong sense of education be a motivation to many and future generations.

ACKNOWLEDGEMENTS

Am grateful to God the Almighty who has given me the ability to undertake and accomplish this study. My gratitude also goes to my supervisor Prof. Edward Mburugu for his special guidance and inspiration at all levels during the preparation of this Project. I am also greatly indebted to the lecturers of the University of Nairobi, Department of Sociology and Social Work for guidance in throughout my MA studies.

Special gratitude goes to my parents Rev. and Mrs. Johnson Wambua for their encouragement, financial, moral and spiritual support. Special thanks to my siblings Catherine, Solomon and Faith who always motivate me to progress higher and higher as they follow.

Finally but not least, I convey my sincere gratitude to my husband Jackson and Daughter Abigail for their support, encouragement and sincere prayers.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABBREVIATIONS AND ACRONYMS

ASALS	Arid and Semi Arid Lands
BPS	Budget Policy Statement
CSTI	Centre for Science and Technology Innovation
CTP	Cash Transfer Programme
FAO	Food and Agriculture Organization
FHH	Female-headed households
GOK	Government of Kenya
IFAD	International Fund for Agricultural Development
KNBS	Kenya National Bureau of Statistics
MDGs	Millennium Development goals
MHH	Male-headed households
MOA	Ministry of Agriculture
NAAIAP	National Accelerated Agricultural Inputs Project
NALEP	National Agriculture and Livestock Extension Programme
NGO	Non Governmental Organization
OVC	Orphaned and Vulnerable Children
UN	United Nations
USAID	United States Agency for International Development
WFP	World Food Programme

ABSTRACT

Official reports indicate that majority of the population in Makueni County depends on household subsistence farming to cater for their foods. Yet, household food productivity has in the recent past declined by 70-90% due to crop failure of main staple crops. This study aimed to explore household farm productivity and its contribution to food security in Kathonzweni sub-county, Makueni County. The specific objectives of the study were: to identify the challenges faced by households in farm productivity; to examine household dynamics in land use practices; to assess the effects of farm practices on food production; to examine forms of post-harvest practices and their effects on food security; and to explore household factors in farm production that can enhance food security.

Quantitative data was collected through a structured and closed-ended questionnaire while qualitative data was collected by use of key informant interview guide. The quantitative data was then analyzed using the Statistical Package for Social Sciences (SPSS). Qualitative data on the other hand was done through thematic analysis. Out of the sample of 120 respondents, 97 managed to be interviewed, translating to an impressive 80.8% response success rate. Sixty two percent (n=60) were females while 38% (n=37) were males. Based on the study findings, it emerged that 100% (n=97) respondents had at least a goat, sheep or fowl but only 56 and 11 respectively had a cow or any other animal such as a rabbit, camel etc. Most of the households relied on maize but there was severe food insecurity in all the households. The study revealed that food production at the household levels was influenced by a number of factors which were both internal and external to the players. The residents of Kathonzweni sub-county generally harvested too little food to last them till next harvest season. Indeed it emerged that some households had gone for 3-4 years without any meaningful harvests.

Some of the specific challenges were as a result of failing rains and poverty. The fact that people here have low purchasing power they cannot even afford the government subsidized farm inputs. Other challenges included predators such as birds, poor farming methods, lack of ready markets for their fruits and cash crops such as cotton, resistant to change and ignorance of the farmers among other challenges. This included the fact that although majority, 81% (n=79) of the respondents owned farm lands, it was largely not fertile for food production. In conclusion, female-headed households had some difficulties accessing loan facilities as opposed to their male counterparts. This meant that women-headed households needed more capacity building. The study also concluded that most household heads were above 45 years, lending credence to the argument that most young people were not very keen on farming especially in rural areas. Besides, education level played a critical role in farm food productivity where educated farmers were more likely to adopt better technologies and superior general farming methodologies hence increasing farm output. Recommendations by the study included enhanced capacity building and sensitization for the female-headed households; encouraging of diversification on dieting; and relevant policy initiatives by the government to guarantee increased farm food productivity in among rural communities.

CHAPTER ONE: INTRODUCTION

1.0 Introduction

This chapter gives a highlight of the background to the study, statement of the problem, research questions, research objective, specific objectives, and importance of this research, scope and research limitations, structure of the study, defining terms and structure of the research.

1.1 Background

Food accessibility and availability are very fundamental concerns to all humans and societies (Hamm and Bellows, 2003). Normally, societies rely on the available resources to produce food locally, including use of simple subsistence farming and intensive subsistence farming methods. Nevertheless, local food production does not achieve sufficient diet by establishing a sustainable food program that drives self-reliance in the society (Hamm & Bellows, 2003). However, depending on climatic conditions of a region, any of these methods of farming is likely to be dominant in a given geographical area (FAO, 2003).

Based on the FAO estimates, planet earth is capable of producing adequate food to sustain every person, with at minimal 2,720 kilocalories in a day (FAO, 2010). This exceeds the FAO and UN recommended minimum of 2250 kilocalories (FAO, 2003). However, the level of food insecurity is still high and widespread, with over 900 million world citizens experiencing hunger (FAO, 2010). Of the hunger-stricken world population, about 855 million (95%) live in the developing world (FAO, 2010). Although agriculture provides livelihoods for about 80% of African population where majority practise subsistence farming, there are still many people in this region who remain food insecure even today (Hamm and Bellows, 2003). According to the Kenyan Ministry of Agriculture (MOA) estimates, over 218 million people in Sub Saharan Africa, live under acute poverty and hunger (MOA 2011). Three-quarters of persons affected reside in rural areas (FAO, 2006).

According to the Kenya Agricultural Institute (KARI), Kenya is one of the developing countries that are struggling with food insecurity challenges (KARI, 2010). The country does not produce enough food for its increasing population, and its food insecurity situation is largely as a result of overdependence on natural weather patterns to support agricultural activities. This implies that when the rains fail, the country has to experience severe food shortages. The country also faces food shortages due to lack of diversification in the farming methods by the farmers (KARI, 2010.) Furthermore, the recent global rise in prices of essential foods, erratic rains and drought have lead to severe impacts on household farm productivity and food security in Kenya in the recent past (USAID, 2009). Existing empirical studies indicate that the Kenya rural areas which fall in ASAL are the most affected by food insecurity (Nyangito et al, 2004). More than 10 million Kenyans are in the present times affected by persistent malnutrition and food insecurity, where two to four million of this number in need of emergency food assistance at any given time (MOA 2011). Progressively, farming is losing its popularity as an economic activity more so in marginalized areas owing to unproductive land, decreasing acreage of farming land and lack of adoption of technology in food production (Lemba, 2009). Left with minimal option majority of household in these areas rely on food aid (Fews Net, 2013).

In Kenya, most Arid regions depend on Livestock for food and it is in this region where the level of food insecurity is highest. These areas are frequently stricken by droughts and are characterized by highly unpredictable rainfall (GOK, 2015). These areas include Marsabit, Isiolo, Narok, Mandera, Turkana, Wajir, Samburu, Tana river and Garissa. Semi-Arid Counties such as Makueni, Kitui, Machakos, Taita Taveta, Kwale, Kilifi, Lamu, Embu, Meru, Tharaka Nithi, Baringo, Laikipia, and West Pokot are also faced with the problem of food insecurity due to overreliance on unreliable rain fed agriculture and climate change (FAO, 2012). The Arid areas commonly experience prevalence of Global Acute Malnutrition (GAM) and minimal amounts of rainfall (Fews Net, 2013). As established by Ministry of Devolution and Planning, the total annual precipitation in arid areas is recorded to be between 150mm and 550mm while in semi arid area it is recorded to be between 550mm and 850mm (GOK, 2015).

Makueni County fall within the ASAL region in Kenya, with widespread and chronic household food insecurity (Lemba, 2009). With a population of about 884,527 people (KNBS, 2009), the County is listed among the least developed region in Kenya with poverty index of about 63.8% which is higher than the average national poverty index of about 46.6% (KNBS, 2009). This implies that 63.8% of the populace in Makueni County lives below poverty level. According to African Women's Studies Centre (AWSC 2015), Makueni County has an average household size of 3-6 people. The big problem here is whether one dollar is enough to allow one to purchase sufficient food to meet his/her households (comprising of 3-6 people) caloric needs as well as provide sufficient buying power for the people to survive with a balanced diet. A significant proportion of the county's arable land is semi-arid yet the county largely depends on natural weather patterns for food production to feed its fast growing population (Mwadalu & Mwangi, 2013). This poses a great challenge to food production in the county.

The fact that many Makueni County residents still suffer food insecurity despite their continued involvement in agriculture and the fact that most of the farmers in the county still rely on rain-fed agriculture inform the goal of this research. This study attempts to look at the natural as well as human factors affecting household farm productivity which in turn lead to food insecurity in Makueni County, with Kathonzweni sub-county as a case study. Kathonzweni Sub-county is listed as one of the area where food insecurity is highest in Makueni County hence an ideal study site.

1.2 Statement of the Problem

Food insecurity is a global problem hence not unique in Kenya. In Kenya, this problem is known to be rampant in rural locality as compared to urban locality. Statistics show that in 2000, about 51% of household in rural area experienced food insecurity in contrast with 38% of the urban population (GoK, 2000; Lemba, 2009). According to Nyangito et al (2004), for Kenya to be able to meet the growing demand for food she has been increasingly dependent on food imports. At a household level, inadequate food production for domestic use and mounting prices in food commodities has made it difficult for majority of Kenyans to access food. Tiffens and Bartimore (2002) further argued that food production was particularly also threatened due to drought in Arid and

Semi-Arid Lands. Based on empirical evidence, approximate 3.5 million Kenyans needed emergency food relief in 2008 (USAID, 2009). Munyaka (2004) did a study and found that food security problem in Kenya was worsened as the agricultural activities increased to be were unviable and occurrence of famines especially in dry lands. The situation was aggravated following people's low purchasing power since most population in rural areas depended on agriculture as their main economic activity.

Several other studies have been done on food security and revealed varied outcomes. For example, Hamilton (2010) carried out a study on Southern Africa's response towards food security and international food crisis and established that protection of vulnerable consumers was critical. Nuncio (2013) also conducted a study on food security in Indonesia and found out that through combining local food production and imports the country realized sufficient food supply. Similarly, Maede and Rosen (2013) carried out a research on the international food insecurity where they established that in spite of some improvements over the years, sub-Saharan Africa still appeared as a food insecure region across the world. A study by Nyangito and Zuma (2004) on strategy development of food and nutritional security in Africa demonstrated that although a number of states have attempted to implement policies to address food insecurity, a lot still remains to be done.

Another study by Kigutha (1995) on Kenya's food insecurity and the country's potential for agriculture revealed that ecological factors such as insufficient rainfall and unpredictable weather patterns subjected households to food insecurity. This happened even in the country's high potential agricultural areas such as the Rift Valley. Research conducted by Narayan and Nyamwaya (1995) on gender and socio-economic factors leading to food insecurity discovered that female-headed households were ranked 'very poor' the highest compared with male-headed households. While the former comprised of 80%, the latter accounted for 58%. The study observed that women were more disadvantaged than men with regard to accessing means of agricultural production hence affecting their food situations and overall economic status.

At the farm level, a study by Ellis and Briggs (2001) revealed the farming methods also contributes majorly in determining the amount of production hence directly contributing to food security for respective households and the region. The findings showed that the

emergence of farm technology, systems of farming and research, and participatory research towards market driven research has been a little bit challenging. A research by Kirwa (2014) on the strategic responses by the Ministry of Agriculture and Livestock towards food insecurity in Kenya found that putting in place irrigation schemes and construction of rural roads were some of the strategies adopted by the Ministry. However, this has not been very practical in the country if, for example, the Galana (Kulalu) government irrigation project is anything to go by. According to Mulwa (2004), in practice, a number of factors influence the use the farming methods thus affecting household and community food security. Similarly, Mulwa (2004) holds that post-harvest practices are important for determining what happens to the food after it has left the farm. This touches on the storage means and the household behaviors when it comes how to use the food. While some farmers may not have good storage facilities to enable them keep the harvest long enough until they experience the subsequent harvest, some may decide to sell all the produce for one reason or the other.

Evidently, there are a various studies that have been done on farm productivity and food insecurity. However, most of these studies were done some time back, and therefore a lot of changes must have taken place. Hence there was need to ascertain the current food situation in Kathonzweni sub-county in Makueni county in respect to household farm productivity in the region. In view of the persistent poor food situation in Makueni County due to various agricultural factors, the county became an ideal site for this study. This study therefore sought answers to how household farm productivity contributed to food security for households in the region.

1.3 Research Questions

(i) What are the challenges faced by households in farm productivity in Kathonzweni Sub-County?

(ii) What are the household dynamics in land use practices in Kathonzweni sub-county?

(iii) What are the effects of farm practices on food production in Kathonzweni sub-county?

(iv) What are the forms of post-harvest practices and their effects on food security in

Kathonzweni sub-county?

(v) What are household factors in farm production that can enhance food security in Kathonzweni sub-county?

1.4 Objectives of the Study

1.4.1 Main Objective

The main objective of the study was to evaluate household farm productivity and its contribution to food security among households in Kathonzweni sub-county, Makueni County.

1.4.2 Specific Objectives

This study was guided by the following specific objectives:

(i) To identify the challenges faced by households in farm productivity.

(ii) To examine household dynamics in land use practices.

(iii) To assess the effects of farm practices on food production.

(iv) To identify forms of post-harvest practices and their effects on food security.

(v) To explore household factors in farm production that can enhance food security.

1.5 Significance of the Study

According to the KNBS, Kathonzweni sub-county has a population of about 224,074 people (KNBS, 2009). Available statistics show that more than seventy percent of this population lived below poverty line and were affected by food insecurity (Planning and National Development Department, Makueni, 2008). Further official reports indicated that a bigger part of the population depended on household subsistence farming as major source of food. Yet, household food productivity has in the recent past declined by 70-90% due to crop failure of main staple crops. Besides, according to Makueni County 2013 Long Rains Food Security Assessment Report, Kathonzweni sub-county residents were the biggest beneficiaries of relief food under the Food for Assets (FFA) program within the county. Out of 61,000 beneficiaries in the whole county, Kathonzweni accounted for 30,200, almost half of the total number.

Despite devolved government functions to the people in rural areas, there was still a gap in terms of improvement of people's lives. Considering that majority rural people depended on agricultural production for their upkeep, it would be expected that their farm production was gradually increasing in order to address their food situations. However, food security in rural localities, and indeed in the whole country, still remained a big challenge. The focus of this study was Kathonzweni sub-country against the backdrop of decentralized resources and services as a result of devolution government.

Evaluating household farm productivity and its contribution to food security in Kathonzweni sub-county, Makueni County would be instrumental in helping food security stakeholders in the county to plan well and effectively implement relevant strategies aimed at helping rural households achieve food security and improve their livelihoods. At a higher level, the findings of this study would help in formulation of policies to address household food productivity hence promoting food security not only in this particular region but also in Kenya as a whole. This research work would serve as a reference point by other researchers who wish to carry out research on food security situations among the rural communities in ASALs, either in the same area later, or as a comparative study with other research sites.

1.6 Scope and Limitations of the Study

This study was conducted in Kathonzweni sub-county, Makueni County. The study examined household farm productivity and its impact on food security in this sub-county. Specially, the study focused on the challenges faced by households in farm productivity; household dynamics in land use practices; the effects of farm practices on food production; forms of post-harvest practices and their effects on food security; and household factors in farm production that can enhance food security in Kathonzweni sub-county. Household heads or household members able to speak on behalf of household head were interviewed. The geographical area was chosen because of the researcher's good understanding of its social dynamics.

One of the limitations was the wide geographical distribution of respondents, making it difficult and expensive to collect data. The cost incurred due to the vastness of the area in terms of time and money may was not within the control of the study. Some respondents

were unenthusiastic in providing the right information lest they exposed their 'poverty' levels to strangers. There were also likely to be absence of respondents at home; a situation which affected the response rate. Furthermore, since the study was limited to the sample size in a single sub-county, generalizing the findings and its validity was considered a limitation in this research.

1.7 Definition of Significant Terms Used in the Study

Food access: food access is related to the household's food demand, and its ability to achieve dietary needs through production, procurements, or transfers from elsewhere. Food access is influenced by physical, sociological, and economic resources. Physical resources encompass infrastructure while sociological resources entail traditional rights to common assets. Economic access on the other hand involves the household's capability to buy.

Food availability: refers to food security with regard of the physical presence of food. This may have been through the household's self-initiated production efforts, or buying from the markets. Adequate availability of food is a precondition for households and individual to attain their basic dietary needs. However, mere availability of food does not guarantee sufficiency, and safety of food.

Food insecurity: limited availability of or access to well-balanced food in generally satisfactory ways.

Food Security: a situation in which each individual has access to well-balanced food all the time, to be able to meet their daily dietary requirements for active and healthy living. When there is inadequate food implying that the 4 complex pillar of food security including access, use and stability at play. This may occasion longstanding insufficient food in terms of both quantity and quality.

Hunger: uneasy situation brought about by not having food. This may be recurrent, and has the potential to lead to food insecurity.

Stability: underscores food availability, access, and use in relation to future disruptions that may occasion food insecurity. Some of the risks to food stability may include climatic uncertainties, socio-political conflicts, price fluctuations, and diseases, among other unforeseen circumstances.

***Utilization**:* can be described as how households use food that they produce. Body nutrient intake can be can be influenced by factors such as hygiene and sanitation status and diseases.

1.8 Organization of the Study

This research covers five chapters as follows: chapter discusses the introduction and the study background into perspective. It comprises the research problem and objective, it highlights the research objective, research hypothesis, importance, scope and limitations and definition of important terms. Chapter two gives a comprehensive coverage of the relevant empirical literature; it also presents a theoretical and conceptual framework. Chapter three covers a research methodology, it covers the design for this research, population, size of the sample and procedures for sampling, instruments for research, data collection approaches, techniques for data analysis, definition of constructs and ethical considerations. Chapter four encompasses data analysis, interpretations including discussions. Finally, chapter five describes the summary of findings, conclusions and study recommendation.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter highlights the relevant literature, focusing on household farm productivity and its contribution to food security. The chapter is divided into sub-sections where the review is specifically done based on the challenges faced by households in farm productivity; household dynamics in land use practices and their impact on food production; the effects of poor post-harvest practices on food security; and household factors in farm production that can enhance food security. The chapter also focuses on theoretical review, conceptual framework, research gaps, and lastly chapter summary. Literature review is critical as it helps put the study into perspective while highlighting what other researchers and scholars have said on the topic of study. It is through the process of literature review that knowledge gap is identified hence filled through the research process.

2.2 Overview of Food Availability, Access, and Stability in Kenya

According to FAO (1996), Kenya mainly depends on agriculture to feed its fast growing population. The agricultural sector therefore serves as one of Kenya's economic pillars. In spite of barely about 20% of Kenya's total land being arable, farming is the country's leading food and income source, at both individual and household levels (Webb et al, 2006). Statistics show that farming directly and indirectly sustains over 75% of the Kenyans and accounts for about 25% of GDP. According to Webb et al (2006), farming supports about 80% of the country's rural population; serving as both food source and income.

Regardless of the importance of farming in the Kenyan economy in general, empirical evidence shows that there is a shortage in production of several staples, including maize a main food crop in Kenya. The situation calls for importations so as to bridge the gap, especially at the domestic level (GOK, 2011). The recent controversial maize imports from Mexico to address high food prices attest to the efforts by the government to mitigate food deficiencies. Yet, there are still gaps which need to be sealed so as to address the country's common food deficits. Some of these challenges include part of the

country's susceptibility to climatic related conditions such as droughts and floods, pests and diseases, limited access to farm inputs and lack of credit (FAO, 1996). In addition, investment in land improvements and productivity has been commonly hampered by uncertain tenure systems. According to IFAD (2012), the impact of climatic uncertainties in the country will be felt far and wide thus ultimately leading to a significant challenge to agricultural productivity.

About 20 million people are living below the line of poverty. Although the percentage of Kenyans living in abject poverty has decreased in the recent past, severe and rampant food security is evident in households living in ASALs (GOK, 2011). The ASALs are characterized by high levels of poverty, limited education, stifled general economic opportunities, and limited access to basic social services. Following repeated exposure to drought and other climatic hazards as well as depleted assets, households in these regions are not generally able to cope. According to Webb et al (2006), farming as a livelihood source is increasingly becoming less viable in some marginal areas. This is caused partially by decreasing land output, dwindling land holdings, and inadequate application of useful technologies (Webb et al, 2006). Government's records show that many households in ASALs depend on food assistance from the state and non-state operators in order to meet their basic food needs (GOK, 2011).

According to IFAD (2012), most households that live in the rural setting depend on farming for food consumption needs; with about 20% depending on markets as their source of foodstuff. The high reliance tendency of households on markets for their food expose poor households to regional and international price shocks. Because of high dependence on maize as their staple food, vulnerable households are particularly prone to this commodity's price shocks (GoK, 2011). The high unemployment rate that is estimated at 40% it makes a huge contribution to the capacity of households in order to ensure the flow of income. There are experiences of declined real wages as a result of high inflation rate, thus ultimately leading to a decline in power to purchase and access to food by the households. Besides, prices for staple domestic foods have been unpredictable of later and this has resulted to hunger (GOK, 2011).

Malnutrition in Kenya has been on the increase. Although the number of people under this threat is thought to have been on a fairly steady decline ever since 2001, population growth leading to increase on the number of undernourished people (GOK, 2011). Several factors attribute to Malnutrition including inadequate caloric intake, insufficient diversification of food production and utilization where there is a presumption towards maize. Malnutrition is largely associated to poor healthcare services and feeding habits, burden to diseases such as HIV and AIDS and malaria, inexistence of safe drinking water and poor hygiene (GOK, 2011). While there are noticeable differences geographical in the menace of acute malnutrition, this situation might be severe in the ASALs (FEWS NET, 2006). A 2006 FEWS NET analysis of malnutrition in some parts of northern Kenya unearthed that regular illness, pitiable hygiene, inaccessible drinking water and quality healthcare especially infant feeding practices are essential drivers to this condition.

Instability in the supply of good has been linked to weather interferences to animal and crop production and a decline in household income resulting into insecurity in food supply. Locally, farming production is holistically dependent on rainfall and this exposes many farmers to various risks of unreliable rainfall or extended drought (FEWS NET, 2006). Short of investment to fast-track harvests and appropriate ways to mitigate and adapt to these climatic changes can impact on the steadiness of food supply and capacity of households to achieve unsteady income (FEWS NET, 2006). Pricing instability due to uncertainty in world markets and dependence on maize as a stable food crop as well as the implications of droughts has contributed greatly to food instability. Other factors include pests and diseases, political insecurity, and fluctuations in the world markets among others. While sometimes dependency on global markets can lead to stability, prices of imports for example wheat, rice, and maize can increase radically subject to global price pattern. This level of unpredictability distresses the capacity of households' access to food on the markets (FEWS NET, 2006).

Disagreements arising from access and ownership of family properties including land and livestock are the major historical drawbacks that lead to limited or unpredictable access to food to economically disadvantaged families. Considering the fact that this problem is mostly experienced in ASALs including eastern and northeastern parts of Kenya, other

parts of Kenya including the southeastern and coastal marginal agricultural zones are currently expiring the same phenomenon (GOK, 2012). Such conflicts of basic resources that support human kind life are associated to dislocation and loss of assets. Citizens living in areas with conflicts are therefore exposed to higher prices of common goods and services owing to higher transactions costs. This affects household farm productivity hence a negative impact to the affected community security for food. In many instances, there are lots of factors that affect the availability of, access to and stability in food situations in Kenya at and beyond household levels.

2.3 Household Dynamics in Land Use Practices and their Effects on Farm Productivity

2.3.1 Natural and Human Factors, and Household Farm Productivity

There are several causes of Kenya's low agricultural productivity. Studies indicate that some of these included scarce and scant knowledge of improved farm practices. In addition, there was also use of uncertified seeds, low fertilizer use, and inadequate irrigation practices. Besides, high prevalence of diseases, lack of incentives, conflicts and weak institutions plus ineffective policies stood in the way of farm productivity (Lemba, 2009). Putting in mind that natural resources that support life are becoming scarcer, there is need for increased productivity through innovation to sustain food supply to the ever increasing human population. According to Lemba (2009), farmers input through the adoption of high yielding seed variety, provides a room for technological innovation to spread faster. However adoption of technology has not been easier more so rural farmers who among many other things are not connected to electricity.

In a study conducted to establish whether an individual farmer's fertilizer use are related to changes in information about the fertilizer productivity of his neighbor, Uaiene (2011), found out that a farmer increased or decreased his fertilizer use when a neighbor experienced higher than expected profits using more or less fertilizer than he did. These findings supported the importance of social learning. In yet another study Bandiera and Rasul (2006) revealed that the likelihood of adopting a particular farming methodology was higher amongst farmers who reported discussing agriculture with others. According to Fan (2011), most rural households lacked access to reliable and affordable innovations

which were bound to improve their livelihoods and food security status (Fan, 2011). In this sense, nonfinancial services such as extension services and marketing offered new opportunities for small scale farmers to enhance their yields and incomes.

Among other things, limited access to credit facilities primarily hampered farm productivity and curtailed incomes of rural farm households. Since access to institutional finance is very limited, the majority of the poor are forced to seek financial services through informal channels (Sisay, 2008). Often farmers seek credit from diverse sources, including from relatives, friends, varied lenders, traders, cooperative societies, banks and other governmental private agencies (Zeller, 2000). It is evident from the study by Adeola and Adebayo (2008) that over 84 percent of small scale farmers depended on co-operative societies for agricultural credits.

Adeola and Adebayole (2008) pointed out the borrowing behavior of respondents in Oyo state using the logit model and acknowledged the determinants of credit constraints. Their results indicated that the income, education level and predicted interest rates had a significant bearing on individual's borrowing behavior. The study also revealed that over 50 percent of the respondents had access to formal credit against about 41 percent who did not have access to formal credit. A study conducted by Mpuga (2004) in Uganda showed the impact of descriptive variables on the amount of credit received by the individuals. The outcome of the study indicates that household size, total asset, educational level and ownership of land were significant factors.

In addition, the output from the study made by Barslund and Tarp (2003) on analysis of formal and informal credit in Vietnam using the probit and Tobit model established that collateral is used for about 70% of formal loans and no collateral is needed for the informal loans. The result also showed that age, livestock and sex had positive influence on the demand for credit from formal and informal sources. Although the view that finance was not important for economic development is still held by some prominent economists, most now agree that financial markets play a central role in fostering growth, and that the financial system affected the behavior of firms and individuals (Holden and Prokopenko, 2001).

The already fragile food security situation in Kenya is at risk from emerging stress factors. To reduce poverty and hunger in the region, studies show that there is an urgent need for all actors at the regional and international levels to pursue innovative approaches to improve agricultural productivity (Nyangito, 2004). A number of different interventions have been shown to improve the food security situation. For instance, Lemba (2009) contends that practices such as irrigation have significant impacts on household food security, which was attributable to improved access to resources. Other studies for example found that food availability increased as a result of the use of improved seed varieties, with greater relative benefits to poor farmers compared to rich farmers (Lewin, 2011; Tiwari *et al*, 2010). Nyangito et al (2004) identified the economic and trade policy reforms introduced in Kenya as leading to improved market access for food imports although this did not completely make the country any more food secure.

Statistics from government records indicate that increases in agricultural output through higher land and labour productivity lead to lower food prices. This ultimately directly benefitted net food consumers in both rural and urban areas (GOK, 2011). Poor households typically spend a large percentage of their income on food. Consequently, reduced food prices allowed households to obtain more food, or potentially more varied, nutritionally rich food, which contribute positively on household wellbeing. The benefits of good nutrition are varied, including further increases to labour productivity for both current and future generations. The situation also helped in attainment of improved education and health services (Nyangweso et al, 2007). Improved agricultural productivity can also result in increased incomes for both small and large scale farmers as well as increase employment opportunities in the agricultural sector. A large body of evidence shows that higher agricultural productivity usually results in higher farming incomes (FAO, 2006).

Households living in the ASALs are continually exposed to drought and other adverse climatic conditions. According to FAO (2014), drought has turned out to be more recurrent and intense over the last several years. This resulted into weakened households' asset bases, reduced coping strategies, generally more frail livelihoods and destabilized social networks. Vulnerability to food shocks is evident in the recurrence of acute food insecurity in the ASALs. Based on study findings, what is worrying more is the fact that

Sub-Saharan Africa will in future be affected by climate change in a big way hence negatively impacting on the region's long-term agricultural output (Symons, 2014). This is because Kenyan food security greatly depends on farming production, which in turn mostly depends on the rainfall. Global warming is increasing risks, where weather conditions can no longer be predictable anymore. Other effects of the changing climate and additional global environmental changes, such as decreasing water quality and availability, and decreasing land productivity continue to be impediments to attaining of the state of food security for the most vulnerable. Unpredictable weather conditions impacts on food security at levels; that is on the individual, household, national and regional fronts (Waithaka, et al., 2013; Patel, et al., 2012). Environmental degradation in many parts of Kenya due to intensified land use has equally been witnessed as a threat to food systems hence jeopardizing households' capacity to be food secure (Gregory et al, 2005).

Although Kenya is one of the first countries in the Sub-Saharan Africa to establish national policy on climate change as part of its development agenda, the fruits of this initiative are yet to be realized by majority of Kenyan farmers (Symons, 2014). The 1997/98 floods and 1999/2001 droughts as some of the worst climatic conditions in the country's history, remain as painful reminders that the country is ill-prepared for such calamities. The floods, for example, caused costly destruction to the country's infrastructure. Although this later attracted foreign aid, permanent solutions have never been found. For instance, the droughts caused famine in some regions of the country, consequently calling for food and humanitarian aids (Mwendwa & Giliba, 2012). Persistent droughts force people to travel long distances looking for water and in the process waste many man hours that would otherwise be used in their farms. This is besides the fact that planting cycles are interrupted with hence definitely affecting households' yields (Ramin & McMichael, 2009).

The ability of the Agricultural sector to fine-tune to the unstable climatic circumstances and conditions will be determined by the extent to which climate change is capable of damaging or crippling the agricultural sector. The ability to adapt of Kenyan agricultural sector is low. This is basically because of being short of of financial capability to invest in more resilient production designs. There is also the question of poor technological

advancements, high dependence on rain-fed agriculture, incessant droughts and floods, and crop and livestock infections (Symons, 2014; Waithaka, et al., 2013). According to the African Institute for Development Policy (AFIDEP), the declining agricultural production and increasing degradation of environment caused by climate change pressure Kenya's economy and general food security not only at household levels but also at the national front (AFIDEP, 2012).

Famine is the major climatic condition that happens most frequently in Kenya, with disturbing consequences on households' food security, livelihoods and income. (Kenya Food Security Brief, 2013). In current years, drought has turn out to be a recurrent problem in many parts of Kenya. For example, severe drought in the years 2009 and 2011 caused emergency food crises touching millions of people. According to a multi-year effort by FEWS NET to monitor and map rainfall and temperature trends over a 50-year period (1960–2009), the frequency of drought is expected to increase both in intensity and extent as a result of climatic change (FEWS NET, 2010). This change is probably linked to warming in the Indian Ocean, and seems likely to continue (FEWS NET, 2010).

Flooding happens regularly in Kenya, predominantly in the ASALs. According to FEWS NET (2013), the situation can have both negative and positive impacts. In some areas, flooding can be beneficial to individuals and households by providing food and income sources. For example, according to World Resources Institute (2007), about 1 million people in the lower Tana River zones depended on the river's flooding season for their livelihoods. However, floods often occasion food emergencies due to destruction caused to property and loss of lives. Heavy rainfall and floods also increase the burden of human and livestock diseases, posing threats to human health and potential impacts on trade (GOK, 2011). For instance, the El Niño rains in the country tend to be very destructive. Cases in point are the El Niño events in 1997/1998 and 2006 which caused serious flooding and extensive destruction to land, infrastructure, and loss of lives in many parts of the country (GOK, 2011).

2.3.2 Gender Factors and Household Farm Productivity

According to FAO (2001), food Security possible at all levels when individuals and households are able to access sufficient and well-balanced food so as to meet their dietary

needs for healthy and active living. Food security calls for satisfactory food supply but also entails food availability, access, and utilization by all people regardless of age, gender or economic status. However, gender-related inequalities along with food production chain hamper the achievement of food and nutritional security (IFAD, FAO & WFP, 2000).

To maximize the impact of agricultural development on food shortages that entails improving the roles of women who are key players in farm production chain bearing in mind the significant role they played at household levels as caretakers of family affairs (FAO, 2006). According to World Bank, agricultural interventions are most likely to affect nutrition outcomes when they involve diverse and complementary processes and strategies while engaging both men and women, where women empowerment is given the attention it deserves (World Bank, 2007b). Successful agricultural projects therefore are those that invest broadly in improving human capital and endeavor to sustain and increase the livelihood assets of the poor, and focus on gender equality (World Bank, 2007b).

Gender inequities and failure to push for gender balance in production of food in the farm might result into a decline in productivity, high poverty level and under-nutrition (World Bank, FAO and IFAD, 2009; FAO, 2011). World Development (2012) warned on the failure to identify roles, differences and inequalities among men and women posed a major threat towards the effectiveness of agricultural development strategies. Women are a critical part in farm food production hence strengthening the foundation for a vibrant agricultural sector as a way of ensuring enough food at the household levels. Further research evidence shows that when women have an income, the income is more likely to be spent on food and children's needs. This is based on the argument that women are the cornerstone of family units hence charged with the important responsibility of feeding children. According to Quisumbing et al (1995), women are generally the key to food security for their households. However, due to other women domestic duties and the fact that farm fields are likely to be farther from home, it becomes difficult for women to dedicate enough of their time in direct food production. Recognizing women's role in farm food production and therefore creating enabling environment for them to participate

can further make it possible for women to have more time for child care among other household chores.

According to Kennedy and Peters (1992) poor households headed by women achieved a more nutritional balanced food for their children as compared to poor households headed by men. Kennedy and Peters findings can be attributed to the fact that, if men possess limited knowledge on food preparation, they are unlikely to offer nutrional needs to their families on their own. This in essence brings out the argument of gender based knowledge when it comes to food security. African countries have witnessed a considerable increase of of female headed household (FHH) in the recent past. Though African women play a major role in provision of food to their families in both Male-headed household (MHH) and female headed households, they in many instances have a limited access to land as compared to men. In addition, women are perceived to have limited access to education, and are expected to undertake most of tasks of child care and housework cores.

In addition to such easily observable gender inequality, there are also covert discriminations. For example, there are subtle forms of social, economic and cultural prejudices such as rationing out of credit markets among others (FAO, 2011). These kinds of biases have implications for technology adoption, food security and access to markets.

Increasing women's access to land, financial services, technology and rural employment among other services is critical in boosting women's farm productivity. Besides, access to education by women would enhance improved agricultural products which will translate to food security, economic growth and adequate social welfare (FAO, 2011; Meinzen-Dick et al., 2010). Nevertheless, this will offer solution to noticeable problems associated to discriminations noted above. The key elements of discrimination might well take ground thereby continued undesirable outcomes for female-headed households.

However, due to the patriarchal nature of the Kenyan societies, women lack as much rights as men to own instruments of wealth creation such as land. It has broadly been said that, owing to diverse natures of discrimination, female-headed households are more vulnerable to food security and non-monetary aspects of poverty. For instance, following

the cultural limitation of women participation in food production in a number of the poorest part of South Asia, households in those areas are regularly exposed to hunger and malnutrition more so in times of economic crisis (Kabeer 1990). In a study on analysis of gender-based vulnerability food insecurity in Nigeria, Babatunde (2008) established that female headed households were more vulnerable to food insecurity as compared to male headed households.

In a situation where female headed household make use of all the available resources including involving school going children in income generating activities, this will translate to poor academic achievement. In such situation there is a higher risk of transmitting poverty and food insecurity to the next generation. According to Kennedy and Peter (1992), the percentages of income controlled by women have a positive relationship on household caloric intake. Even though discrimination of women is evident in the literature, more work need to be done in order to sort out the diverse forms of discrimination women face with a focus on their impact on food security. Some forms of women discriminations that are likely to affect both agricultural and food security have been identified as lower levels of education and generally lower purchasing power..

2.4 Post-harvest Practices and Household Farm Productivity

Scarcity of drying facilities and storage at the farm level are thought to cause heavy post-harvest losses. Incidentally, most of these losses happen in highly food insecure marginal areas such as the ASALs (Nyangweso et al, 2007). Major producers of maize producers get access to the National Cereals Produce Board (NCPB). However, small scale producers who account for more than 80% of all the harvested maize in Kenya lose the cereals through spoilage. Most losses are due to insects and pests. For instance, aflatoxin (a toxic mold) the Lager Grain Borer is known to be very hazardous to the harvests (GOK, 2011).

In a study on dietary diversity among poor households in Vihiga district in Kenya, Nyangweso et al (2007) revealed that various factors affects farm food productivity. The outlined factors in the study include number of household members, household income, household purchasing power and household nutritional awareness. These factors were found to be very important when dealing with matters of food security. Pinstrup-

Andersen (2009) suggested that based on a given set of assumption of family behavior, hoarded household income and food prices could be utilized in determining household food security.

This study findings further indicate that consumption estimates are resultant of food, household food acquisition and allocation behavior. Farmers require post-harvest handling and storage training to boost their understanding and capacity to employ technological advances and be able to store well (Naidoo, 2009). It is important to build local systems of knowledge, relating to particular locations, based on experience and understanding of local conditions of production. However, most farmers lack relevant training on how to handle their produce after harvest (GOK, 2011).

Farming experience is an important issue in post-harvest handling and management as this is thought to positively influence technology adoption (Babalola *et al.*, 2010). This impact is thought to emanate from inherent knowledge and know-how in farming systems got from experiments and observing different technologies. Adoption pay-offs takes place over a long duration of time while costs takes place in earlier stages, the farmer's experience have an impact on the form of technology adoptions and postharvest handling practices. Age and farming experience were found to be negatively related to adoption, or not significant in farmers decisions (Babalola *et al.*, 2010). Low levels of education are connected to the age of the farmers (Mdluli, 2013). Education is critical in internalizing the expectations of consumer quality in niche markets that is necessary since consumers might have diverse expectations and acceptance of new technologies (Miraux *et al*, 2007). However, because of language barrier, costly arrangements in marketing products outside their areas lead to an increase in transactional cost.

Age of the farmers is linked negatively to adoption of technology in agriculture; this means that old farmers might be reluctant to embrace technology. Older farmers might resist new innovations and fail to conform to the new change. Older and experienced farmers may be because of the duration of investing in a given practice might not jeopardize by trying a new method of farming. However, due to the age of the farmers, they might develop a wrong impression that they might not live long to enjoy the benefits of technology and opt to reject it (Caswell *et al.*, 2001).

In many developing nations, there are limited roads and infrastructure for efficient transportation of farm product especially horticulture (Kader, 2005). Many producers lack resources and thus cannot afford to purchase refrigerates trucks for transporting fresh produce to markets. Although public means of transport is usually accessible, impassable roads create a barrier to access the market (Ortmann & King, 2010). Homesteads are sometimes geographically dispersed and most residents are required to walk for long distances to access public transport. This might result into deterioration of produced and exposure to scotching sun. Although, in some cases cooperatives and marketing firms are able to acquire transport vehicles they experience challenges due to poor state of the roads (Kader, 2005).

Killick et al (2000) stated that accessibility to markets is influenced by information concerning product availability and pricing. However, inaccessibility to profitable markets is a key impediment even for those farmers with a potential to generate a surplus. They then end up being trapped in the poverty cycle as a result of being forced to sell for convenience (Magingxa *et al,* 2009).

2.5 Theoretical Framework

2.5.1 Social Systems Theory

This theory looks at the narrow perspective of social systems which explained as a cross-disciplinary body of scientific thought which was postulated by Niklas Luhmann. This perspective is a philosophical point of view that reflects the relationships that individual have in their social environment. A social system model is meant to be tested primarily by its adoption to professional practice. Systems perspective gives the best theoretical background for an investigation of human communication. It describes and integrates unrelated theories into one framework through suggestive leads to all industries of human behaviour and has a great potential to provide a common language. Household traits and their farm apply these practices in enabling them to feed their households. Social systems theory guides how much a given household can produce for its family; it is viewed as a set of constituents or parts that form a whole. A system is viewed as a complex unit that formed having several different parts that are subject to a common plan serving the same purpose. In this sense, a household is a system comprising of various components

including individuals and their ability to produce. Systematic thinking involves the use of mind to identify patterns, unite and create a clear wholeness so as to achieve a comprehensive picture. The elements in these systems can easily be understood as well functioning to achieve specified goals. Systemic form of thinking entails establishing the level of consistency and connectedness of all life. Though is framed and imposed across the world as experienced by the perceiver. This theory describes life a central tenant of systemic thinking whereby goals are mooted and obtained. A social system comprises of groups and individuals who intermingle with mutual effects on the behaviour of each other. A social system is joint set of interconnected activities that consist of a single household unit. Systems exist in all levels of our existence; such levels are individual, family, organisational, community, societal and cultural level. The primary level of a system might be looked from the perspective of macro and micro or holistically against part where the entire system determines actions of its parts. In view of this, people are perceived as being driven by the society and individuals shaping the society. This duality is perceived as inherent in other socio-behavioral disciplines. This is mostly manifested in the paradigm of how environment can be nurtured. In line with this study, the kind of individuals, their capabilities and resilience greatly determines their production level.

Polar positions are considered relevant especially when assessing human the plight of human beings. This argument was borrowed from the principle of Holon which is a Greek word that expresses the idea that each entity is simultaneously a part and a whole, implying that the social unit is comprised of several parts which is the whole and at the same time part a part of the whole implying that a social unit constitutes a social unit that composed of parts that include the whole and at the same time is a part of the larger whole. What is central is that fact that any system is by definition both part and a whole. This idea can best be expressed when viewed in the context of individuals who form a household together. Their level of unity and determination is an essential component of food production. From the perspective of individuals who make households that in turn make a bigger social unit. It means that each of the social unit's behavior impacts on the whole either negatively or positively. In case a household fails to generate enough food, it means that a larger group of individuals in all the levels might be affected and the reverse is true. It has been argued that in order to address this problem, the system is selected as

the focal point to receive primary attention where it can be analysed against the environment. The initial idea by Holon requires the observer to address both elements of the focal systems and the suprasystem to internalize it. Social system is looked at as holonistic meaning that its requires focal system specification, this also involves the specification of units or components that explains the specification of the key environment and specification of an individual's position relative to the focal system.

The underlying idea of this system is energy whereby the energy is in form of resources and information. The action of the system can then be understood as the movement of energy or information within a system or between a system and its environment. Information is ingested as energy to the same extent that food is able to fulfill its biological needs. What happens in and between social systems are transfers of energy or information between people or group of people.

Energy is defined as the capacity for any action, where this can be structured in order to be beneficial. Energy is driven from a complex source including the physical capacity of its members. This is also drawn from social resources such as loyalties, shared sentiments, and common values and resources from the environment. Sources of energy for personality systems entail the physical condition of the body and the rational expressive capabilities.

There is a high tendency of unaddressed system to move in an organized state which is characterized by a decline in interactions among components. Synergy is defined as available energy within a given system that is acquired through interaction among components. Systems require energy to in order to exist and synergy takes place living systems. Therefore, there are four basic roles of energy which are critical to execute the functions of a system. They include safeguarding energy from the environment, safeguarding energy internally, accomplishing goals outside the system and goal realization inside the system. In any exchanges between several parts and whole, all elements get some energy that results into realization of some goals. In cases one of the functions is prevailing, the other functions could be abandoned, and this could impact negatively on the entire system. Under the social system, organisations are essential components in ensuring proper functioning of the system. Organisations in this case are

involves arranging sections to form a whole or seemingly, to ensure a system is operational. If there lacks organisation, even if there is energy in and outside a system then there lacks a system. Organisation of a system conserves, disburses and secures energy to secure the system and further its functions. Such a system might not develop if the task of energy organisation is not realized. This measure of efficiency of organisation therefore entails the level of capability to achieve the goal of the system including all the other components.

Households with problems are generally perceived as disorganized families and the reason for this disorganization might emanate from internal or external sources. It might be useless to understanding human behaviour from one perspective, for instance in cause-effect relationship. This theory maintains that it serves a very limited purpose to ask 'why' individuals do what they do. Rather, a useful inquiry is based on how or in what way something could have occurred. The process that a system get internal or response from the environment towards its behavior and the response it gives by accommodating and assimilating energy gained by altering the structure of the system and then engaging in altered exchanges of energy information.

Systems that are maintained through great efforts by intense energy exchange internally and with their environment is an example of order.

2.5.2 Rational Choice Theory

Rational choice theory is found on the idea that people have their own preferences to choose based on their needs. Most people tend to focus more on their gains. If the costs involved outweigh their gains, most people opt for a better choice than that (Coleman & Feraro 1992). Hechter et al, (1997) explains that sociological rational choice an inherently multilevel form of an enterprise that seeks to account for social outcomes on account of both social and individual actions. People tend act from their own interests but this interest must be beneficial to them. In accordance to Levin and Milgrom (2004), a rational choice is regarded as a process that involves determining the options that are obtainable and then selecting the best based on a certain criteria.

All men are biological beings. As such, they are confronted with the realities posed by physical survival and maintenance. Economic institutions have their roots in this elemental fact. But men are not only biological beings; they are also social beings. Accordingly, human needs are seldom simply biological cravings. Regardless, however, of whether human wants derive from biological or social sources, men are confronted with the fact that many things are not available in unlimited amount; they are scarce. Hence, scales of preference - value priorities and hierarchies - are needed (Zanden, 1970). Parsons (1958) on motivation of economic activities noted that, a certain necessary assumption is that, rational choice theory forms part of the theoretical framework under which the study will be carried out. It is essential in meeting part of the objectives of the study to find out forms of utilization of the loans obtained from microfinance institutions on the part of the recipients, in terms of development and repayment of the loans.

This study focuses on household characteristics and farm use practices, which in turn may have some effect on household security in Kathonzweni sub-county. Based on the rational choice model, although the households may not have a choice in terms of what to plant and what methodologies they use to plant what they plant, whatever they do has a consequence on their food safety.

They may be several factors involved in the production of food in the sub-county but how much they harvest and how that is put into use thereafter will definitely have some repercussions on their lives. They have a rational choice to plant their crops in whichever given way, but that will at the end impact on their wellbeing whether directly or indirectly.

2.6 Conceptual Framework

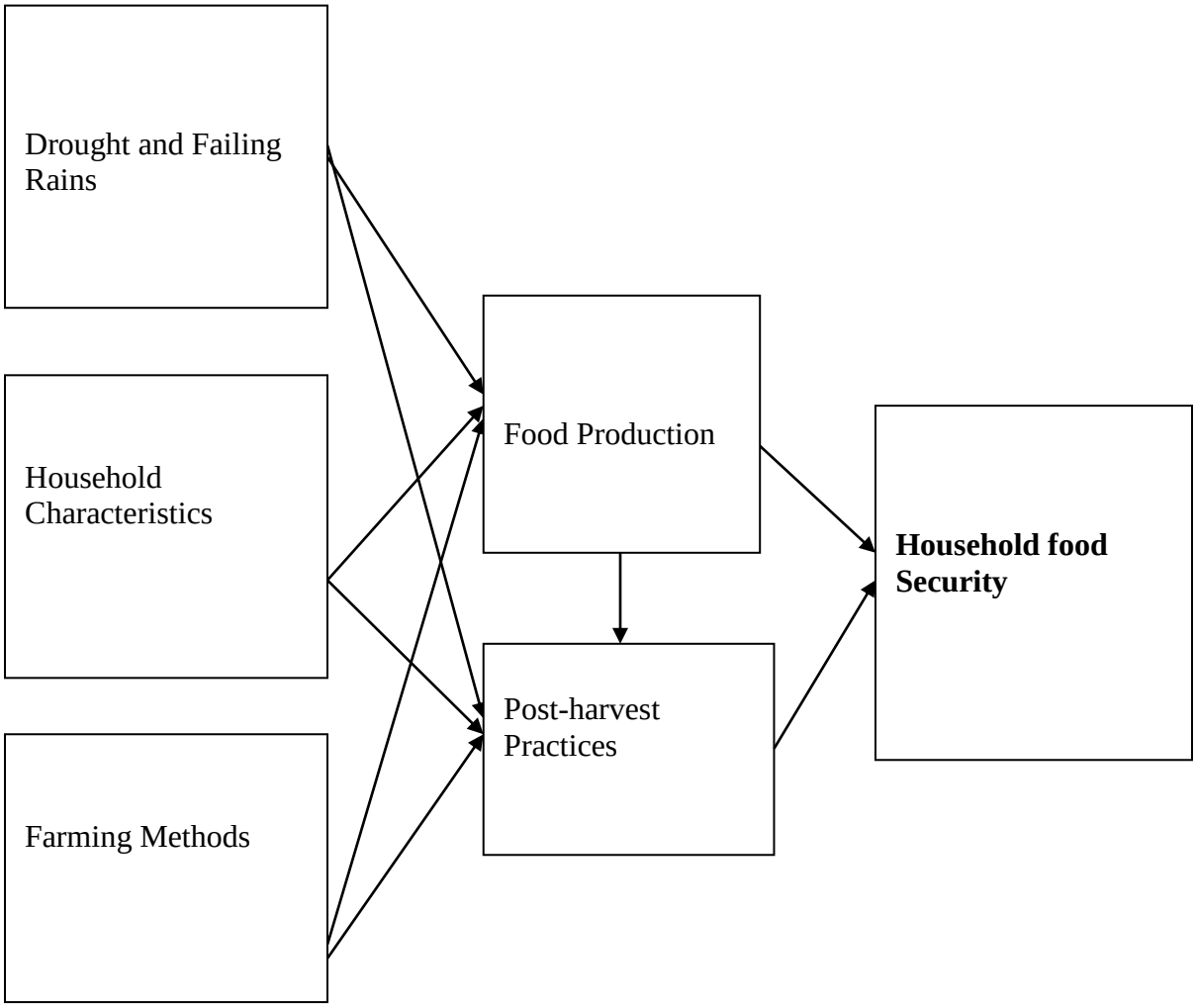
The goal of this research was to evaluating household farm productivity and its contribution to food security in Kathonzweni sub-county, Makueni County. The Conceptual Framework (figure 2.1) gave an illustration on how variables correlated to each other. The variables distinct here are the independent and dependent variables. Independent variable affects and determines the effect of another variable (Mugenda1999). Dependent variable is an element which is observed and measured to determine the contribution of independent variables (Nyandemo, 2011). The dependent

variable in this study is household food security while the independent variables are drought and failing rains, farming methods, and household characteristics. There are intervening variables that include input in food production and post-harvest practices.

Independent variable household farm productivity, containing three constructs that were deemed as subcomponents were considered to influence household security. By implication, if something went wrong with household farm productivity, or was indeed absent, household food security was negatively affected and the reverse was true. This implied that all undertakings of household farm productivity must be very reliable so that necessary information on how household food security was progressing would be provided.

Figure 2.1: A conceptual framework of independent and intervening variables that affect household food security.

(Independent Variables) ***(Intervening variables)*** ***(Dependent variable)***



CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This chapter gives the overall methodology used in the study, justifying the choice of research methods leading to an objective research process. Research design, site description, target population, sample size, sampling procedures and data collection instruments are also highlighted in this chapter. Other sub-titles also include data collection procedures, data analysis techniques, and ethical considerations.

3.2 Site Description: Kathonzweni sub-county, Makueni County

According to the KNBS (2010), Makueni County is situated in the Southern end of Eastern Province. Based on the 2009 national population census, statistics show that the county covers an area of approximately 7,965.8 square kilometers with a total population of approximately 883,671 people. The County is bordered by Machakos County to the Northwest, Kitui County to the East, Taita Taveta County to the South and Kajiado County to the West. Formerly known as Makueni district before devolution, the county has nine (9) sub counties namely; Kilungu, Makueni, Mbooni East and West, Nzaui, Kibwezi, Kathonzweni, Makindu and Mukaa. Kathonzweni sub-county is composed of Kithuki, Kitise, Mavindini and Kathonzweni administrative Divisions (GoK, 2011).

The three key livelihood zones in the County with respective populations are marginal mixed farming and two mixed farming zones. These are categorized as dairy/coffee/irrigation and cotton/food crops/livestock. Maize is the main staple crop planted in the County. Besides Maize, there are other crops planted in order of prominence are cow peas, beans, pigeon peas and green grams.

Majority of the Residents of rural areas within Makueni County practise agriculture at subsistence levels where they depend on largely on rainfall to grow their crops. This is despite the erratic rainfall in the region. According to the government-run Agricultural Sector Development Support Program (ASDSP), approximately 5042.69 Km^2 of the land in Makueni County is arable while 1,762.71 Km^2 is non arable (GoK, 2013). Most of this land is used for agricultural purposes as most people derive livelihoods from crops and livestock. By 2012, the total area under cash and food crops was 23,356 ha and 65,453 ha

respectively, which was 2.9% and 8.1% respectively of the total county area. On average, small scale farmers owned 8.6 acres of farm while large scale farmers owned 76 on average. According to African Women's Studies Centre (AWSC, (2015), farming is the major livelihood and source of revenue that drives the Makueni County's economy. Besides, it's the major source of food for households and provides raw materials to agro-based industries (AWSC, 2015).

According to Mwadalu & Mwangi (2013), initially Makueni County received reliable rainfall allowing local farmers to plant twice in a year in the long rain (March/April) and short rain (November/December) seasons. However, this trend has since changed. For instance, the long rains have become inconsistent and unreliable thus the community was left with one reliable annual harvest. (Lemba, 2009). The County's susceptibility to climate variations is intensified by the society's heavy dependence on drought-sensitive crops such as maize and beans (Mwadalu and Mwangi, 2013; Lewis, 2005). The occupations of most county people rely on rain-fed small-scale agriculture, a practice that is greatly susceptible to the effects of environmental degradation and climate change. Fast population growth places huge pressure on environmental and natural resources such as land, water and forests thereby leaving the community to be largely dependent on relief food provisions from donors (Lemba, 2009).

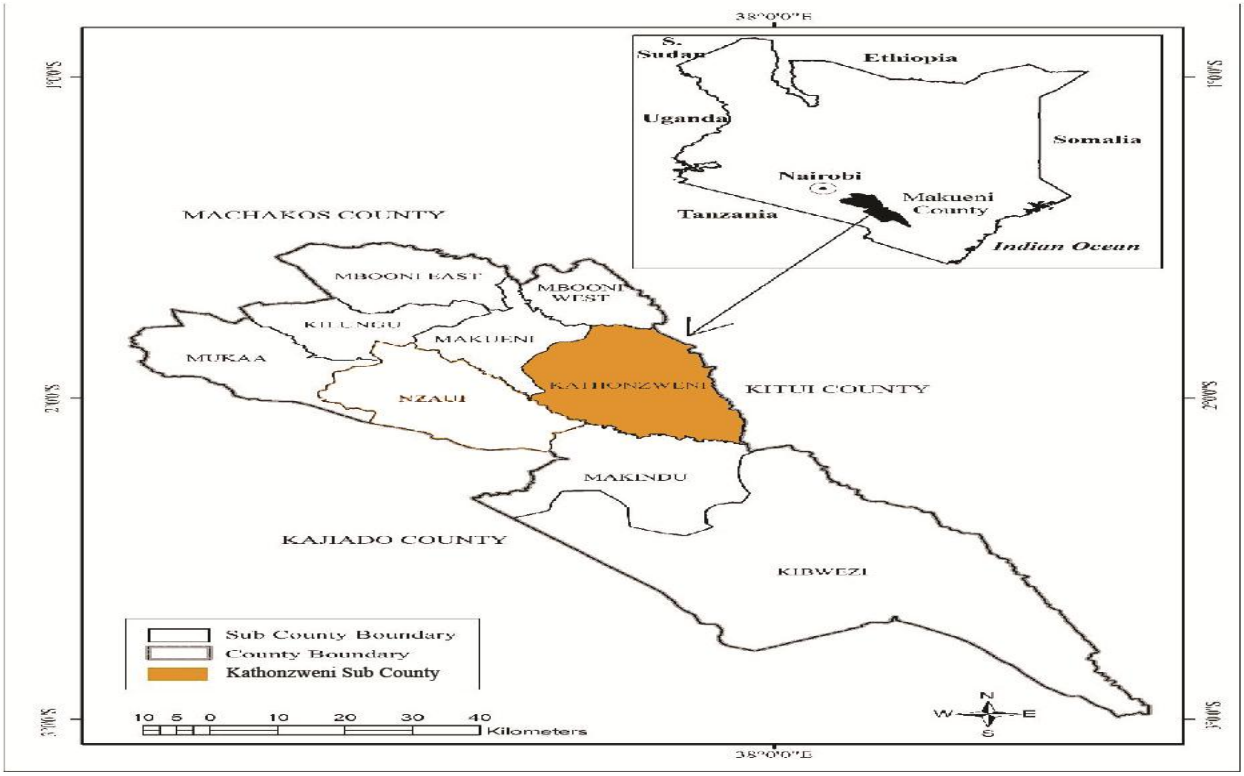
According to Economic Review of Agriculture (ERA, 2013), crops grown in Makueni County include maize, green grams, pigeon peas and sorghum. The county is also suitable for the growing of horticultural produce such as oranges, pawpaw and mangoes. Much of the crop-derived income however comes from maize, mangoes and cowpeas. This is besides dairy farming, which is common in the There is also dairy farming especially in the mountainous Kilungu and Mbooni west sub counties. The plains are popular for livestock keeping, cotton and fruit production (ERA, 2013). Despite these efforts, water shortage and high temperatures are the major challenges facing agricultural enterprise in Makueni County (AWSC, 2015).

According to the Africa-Asia Drought Risk Management Peer Assistance Network (AADP, 2012), the County is divided into three major farming zones. These encompass marginal blend of cotton farming and livestock in a population of 463,404 estimated at

48.8%, cotton and livestock farming zone with a population of 298, 707 which is approximately 31.5%, as well as mixed coffee farming, dairy farming and irrigation agriculture in a population of 187,467 (19%).

The County's poor performance in food production was further reflected in the 2014 long rains season which recorded a decline of 72 percent for maize, 40 percent for cow peas and 16 percent for green grams due to poor performance of the long rains across the livelihood zones. The County of Makueni (2016) long rain food security assessment report demonstrates thathouseholds in Marginal Mixed farming areas were consuming 1-2 meals per day as opposed to normally consuming 2-3 meals per day. Besides, water consumption decreased from 20 litres to 10 litres per person per day in the Marginal Mixed Farming. Distance to water source increased to almost double in the Marginal Mixed Farming from 3-5 Kilometers to 6-10 Kilometers. Furthermore, 61,000 Makueni County residents became dependent on food assistance under the Food for Assets (FFA) initiative. FFA initiative supports community actions around strengthening resilience and providing solutions for risk reduction and adaptation to climate change. The initiative covers three sub-counties in Makueni County including Kathonzweni (30,200 recipients), Kalawa (4,800) and Kibwezi (6,000). The main food security threats in these sub-counties centered on high food prices, minimal or no household stocks, long distances to water sources, and poor road networks.

Figure 3.1: Administration map of Kenya and Location of Kathonzweni in Makueni County



Source: Kenya National Survey, 2009

3.3 Research Design

Saunders et al (2009) explains that research need to be carried out within a conceptual framework that acts as a guide in providing direction of a scientific research. Orodho and Kombo (2002) on the other hand hold that research design is a framework that is intended to give direction in generating responses to research hypothesis. Chandran (2004) explains that a research design seeks to gain an understanding of conditions for collecting and analysing data in a manner that combines relationships making easier to for understanding. Krishnaswamy (2009) proposes that research design describes events which are acceptable to conduct an investigation. Simply put, research design helps in planning, processing, measuring and analysing data in order to bring out the objective for this research.

Descriptive survey research design was utilized in this research. This design is most applied in exploratory research to facilitate researchers to garner information, do a summary, present and interpret that information for purposes of clarification (Orodho, 2002). Mugenda and Mugenda, (1999) corroborated this notion by giving the importance of a descriptive design is to determine the way things are. The Researcher collected data and presented the results the way things were without influencing any variables within the provisions of descriptive survey. Furthermore, the study was exploratory in nature, and looked for explanations for queries related to household farm productivity and its contribution to food security. Descriptive research design was appropriate given the study's objective of explaining inferences or causal relationship between household farm productivity and food security.

3.4 Target Population

Population comprises of a group of items from which the researcher can make several conclusions (Cooper & Schindler, 2003; Neuman, 2000). On their part, Cohen et al (2002) refer population as all elements within the target group from which a researcher intends to collect data. This line of thought is also supported by Sekaran and Bougie (2010) who define population as entire group of people the researcher wants to investigate. Ngechu (2004) argues that population could be a well-defined set of people, services, elements or events. The subjects in a target population all have some mutual noticeable features of a particular nature different from other populations.

This study targeted residents of Kathonzweni sub-county in Makueni County at household levels. Kathonzweni sub-county is one of the nine sub counties that constitute Makueni County. It is made up of three wards namely Kathonzweni comprising of Kathonzweni, Mbuvo and Kwakavisi locations; Kitise/Kithuki made up of Kitise and Kithuki locations and Mavindini made up of Mavindini, Kanthuni and Kanzokea locations (GoK, 2011). According to KNBS (2009), the sub county has a population of 76,603 people comprising of estimated 12,000 households occupying an area of 882.8 square kilometers. For the inclusion criteria, residents who headed households participated in the study since they were best placed to talk about food situations at the household level. Nonetheless, as an exclusion criterion, mature people but not heading

any household did not participate in the study. One hundred and twenty households spread across three of the six sub locations in Kathonzweni Sub County were scheduled to be interviewed.

3.5 Sample Size and Sampling Procedure

Cooper & Schindler (2001) define sampling frame as an entire list of populace from which the sample is essentially picked. A sample is a component of the general population, which represents the population. The sampling frame for this study was all household heads within Kathonzweni sub-county. According to Danida (2004), about 64% of the households in Makueni County were headed by females while 36% were headed by males. In numbers, this translated to 7680 and 4320 households headed by females and males respectively. A hundred and twenty households were picked from three locations (one location per ward). Table 3.1 presents a summary of the sample size.

A sample size is a subdivision of a given population that the researcher considers to generalize the findings. Orodho (2002) explains statements concerning a sample should be a reflection of the whole population. Thus, the size of a sample of this was considered to represent the population. A stratified random sampling was utilized in this research to accommodate male-headed and female-headed households. This is a probability sampling approach which was conveniently utilized in generating a sample of the respondents under this study. This approach involved dividing a population into small stratas based on similar traits. This involved non-overlapping strata that were chosen through some design within each stratum.

In this case, the three locations (picked from the three wards) of Kathonzweni Sub-County constituted the strata from which the sample of male and female heads of households was drawn. The sampling procedure entailed systematic selection of every kth household in each of the four compass directions from a central place in the location. Accordingly, the male and female heads of households were selected in intervals of 7 and 8 households respectively in each of the four compass directions (i.e. north, east, south, and west).

Through stratification of population elements into convenient groupings (male-headed and women-headed households) based on locations, this reduced cost of sampling as it was easier to identify the sub-groups and also reduced sampling errors to the minimum (Merriam, 2008). Purposive sampling was used to sample participants for in-depth interviews.

Table 3.1 Sample Size

Household Head Gender	Target Population (Households)	Percentage	Sample	
			No. of Households (n)	Percentage (%)
Male-Headed	4320	36	48	40
Female-Headed	7680	64	72	60
Total	**12000**	**100**	**120**	**100**

3.6 Data Collection Methods

This study used mixed approach method where both qualitative and quantitative data were collected to address the research question. For quantitative data, questionnaires were used as the main tools of primary data collection. A questionnaire is an official set of statements or questions intended to collect information from respondents that realise research objectives (Shao, 1999). The study questionnaire was divided into five main sections (A - E), where section A contained demographic details of respondents while section B to E each addressed one specific objective.

The questionnaire consisted of items applying Yes/No, the Likert Scale with the responses on a 1-5 rating scale, and specific questions to elicit responses relevant to addressing specific research questions. The respondents were expected to answer questions administered through closed-ended and open-ended questionnaire. While closed-ended questionnaire was easy to analyze statistically, open-ended questions offered opportunities for comments, suggestions and clarifications on unclear responses. Section B to E of the questionnaire, as the main part, was very detailed so that all relevant information for answering the research question was captured. The questionnaire was

conveniently used to collect data as it would be able to capture a lot of information with ease. Through its structured format, the questionnaire was less time consuming in terms of data collection and was an efficient and effective method of collecting information within a very short time. Furthermore, questionnaires aided easier coding and analysis of the data collected. Besides the questionnaire, key informant interview guide was used for in-depth interviews; to collect qualitative data from key informants such as agricultural officers, NGOs, and local administration officials working within the sub county.

After an approval for this study from the University of Nairobi, the study proceeded in the following manner. Two research assistants were recruited and inducted on the research instruments, a questionnaire and key informant interview guide. They were also briefed on the objectives of the study, the general data collection processes, and on how to administer the study instruments. Pilot testing was then done, giving an opportunity to revise the questionnaires. Enough copies of the questionnaire were then produced before beginning fieldwork. Interviews were then done before fielded questionnaires were scrutinized through serialization and coding for data entry. Thereafter data analysis was done before a report was written. This was in form of discussion; preparation of the conclusion and recommendations. The data was collected through interviews with identified respondents mainly on a one-on-one basis, and self-administered in a few cases. High level of confidentiality was assured to the respondents. In-depth interviews were conducted at places convenient for the participants.

In summary, activities carried out before fieldwork consisted of instrument design and piloting. A test of the questionnaire's reliability and validity was done in preparation for the actual interviews. An introduction letter was attached to the questionnaires clarifying the purpose of the study. The whole exercise was conducted within a month (Mid july to mid-August, 2017), and each questionnaire would take approximately 15 minutes to fill. On average, in-depth interviews would take approximately 20 minutes each.

3.7 Validity of Research Instruments

Cherry (2015) explains that validity is the level at which a research tool measure what it was intended to measure and performs exactly how it was design. Mugenda and Mugenda (2003), validity is metric of relevance and correctness. In general, validity depicts the

soundness of a research. To achieve validity, the researcher engaged into a discussion regarding the questionnaires particularly on how the questions were formulated and ensuring that they matched the objectives and the content of the object under investigation involving household farm productivity and food security.

Content validity is an important aspect in a research instrument as it referred to how sound a test evaluated the behaviour which it was meant for (Lune, Parke, & Stone, 1998). Therefore, only inferences that are connected to the constructs under investigation were considered when integrating the questions and the object under investigation. Techniques to collect data yielded the right information that was not only relevant to the research hypothesis but also correct. To enhance the validity of the questionnaire and the Key informant guide, pretesting was conducted to find out whether the questions were acceptable, well understood and answerable. Pilot testing of research instruments was important because it revealed vague questions, unclear instructions and empowered the researcher to improve the efficiency of the instruments (Nachmias & Nachmias, 2007). The research instruments were piloted in the neighbouring Makueni or Makindu sub-counties. This would involve administering the same questionnaire to at least five households a few days before the actual study. This enabled the researcher to check for any ambiguities and unclear questions. Additionally, the researcher closely consulted her academic supervisor for his expertise.

3.8 Reliability of Research Instruments

Reliability is the level at which a research tool is able to produce dependable results or data after repetitive trials (Cherry, 2015). It helps to standardize research instruments which in turn enable the results of a study to be generalizable to the larger population. A pilot study was done to understand where the questionnaire needed to be adjusted. In addition, reliability analysis was subsequently done using Cronbach's Alpha. The coefficient of alpha ranges from 0 to 1 and might be utilized in describing the reliability factors derived from questions with two possible answers and likert scale as follows (i.e., rating scale: 1 = poor, 5 = excellent). If the score is high, this implies a high reliability of the designed scale, 0.7 is the acceptable reliability coefficient although lower thresholds

are sometimes applied in the literature. The outcome of the pilot study determines how the questionnaire needs to be adjusted in accordance to the Cronbach's 0.7 theory.

3.9 Methods of Data Analysis

This study explored household farm productivity and its contribution to food security, a case study of Kathonzweni sub-county, Makueni County. The study used qualitative and quantitative data analysis methods where data was analyzed through descriptive statistics and thematic content analysis and the information represented in distribution frequency and percentage tables and figures (bar graphs and pie charts) in order to give a clear picture of the findings.

After the completion of fieldwork, questionnaires were given serial numbers and inspected for errors and gaps before data entry. The data was examined and checked for completeness and comprehensibility. After inspection, the data was coded, entered and analyzed using Statistical Package for Social Sciences (SPSS) version 21 software program. Also the researcher used correlation and regression analysis to measure the association between independent and dependent variables. A thorough assessment of each narrative response was examined using interpretation on thematic areas in accordance with the research objectives and then presented in narrative excerpts within the report.

3.10 Ethical Considerations

Ethical considerations are based on informed consent, confidentiality and anonymity. Informed consent involves informing of the participants of the pros and cons of a research so that they can make an informed decision before they participate in a study. Confidentiality is all abut treating participants' information with discretion and trust where information given is not leaked out for any other purposes other than for the research. Anonymity on the other hand entails using the information without revealing participants' identities. Under the principle of anonymity, what matters most is the credibility of the information obtained without personalizing it. The actual names of the respondents don't feature anywhere in the analysis. Ethical considerations are meant to protect the research participants from any harm.

In this study the respondents were assured that the responses they gave would be used with complete confidentiality without revealing the actual sources by way of mentioning names of individuals. The research respondents were guaranteed that their information would be used for the purpose of the research study only. The respondents' position and name if any were not captured in the questionnaire. This assurance was issue to the participants before their consent to take part in the study. Their participation in this research was based on their understanding of the goal of this research. Researchers took their own responsibility of their conduct and behavior of the researcher by complying with the time schedule as agreed with the participants. The researcher maintained openness and honesty when handing the respondents.

3.11 Chapter Summary

Chapter three captured the research methodology that was applied to accomplish the objective of this study. It contains the research design, study population, procedures for sampling, size of the sample, data collection approaches, validity and reliable of the instruments of research, data analysis methods and ethical considerations. In general, this chapter provides layout of how this research will be conducted from the beginning to the end.

CHAPTER FOUR: DATA ANALYSIS, PRESENTATION AND DISCUSSIONS

4.1 Introduction

This chapter presents an analysis, interpretation, presentation and discussion of the research findings. Analysis, interpretation and discussion are done in solidarity with the study objectives. Through descriptive analysis which is based on various factors that the study sought to investigate. Data is then presented by use of frequency tables, graphs, and pie charts as well as narrative reports. The chapter is divided into the following sections: introduction, research findings and discussions. Under research findings, the analysis is first done based on the general information given about the respondents. This included the respondents' age, gender, marital status, and highest level of education among other information vis-à-vis the specific research objectives. Subsequently, further breakdown is done based on specific research objectives.

Discussion is then carried out; where the study findings are put into context in relation to earlier studies that focused on similar subject areas.

4.1.1 Response Rate

This was basically a quantitative study but used triangulation of data in order to effectively address the research questions. The study sought to evaluate household farm productivity and its contribution to food security among households in Kathonzweni sub-county, Makueni County. Data were collected by use of a structured questionnaire that mainly consisted of closed-ended questions but also contained a few open-ended questions that provided an opportunity for narrative responses for purposes of clarifications or additional information. Besides, key informant interview guide was used to gather qualitative data so as to supplement the quantitative statistics.

The questionnaire was administered to household heads – based on gender – at Kathonzweni sub-county. On the other hand, key informant interview guide was employed to collect complementary information from such key individuals as community development officers, agricultural extension officers, NGOs' heads, and local government administrators like chiefs. Out of the sampling frame of twelve thousand (12000) household heads (target population) in Kathonzweni, a sample of one hundred

and twenty (120) respondents was intended to be used in the study. The study sample was split on male and female-headed households' basis, accounting for 48 and 72 respectively. This was based on statistics in the study area which had indicated that there were more female-headed households here than male-headed ones.

Out of the sampled 120 study participants, 97 of them managed to participate in the study by completing the questionnaires. This was an impressive 80.8% response success rate, which was appropriate for analysis. Research experts have argued that a response rate of 70% and above is very good (Mugenda and Mugenda, 2003; Kothari, 2004). Response rate summary is presented in table 4.1 below.

Table 4.1 Response Rate

Category	Anticipated Sample Size (n)		Response Rate	
	Frequency (n)	Percentage (%)	Frequency (n)	Percentage (%)
Male-headed Households	48	40.0	37	77.1
Female-headed Households	72	60.0	60	83.3
Total	120	100.0	97	80.8

4.2 Social and Demographic Characteristics

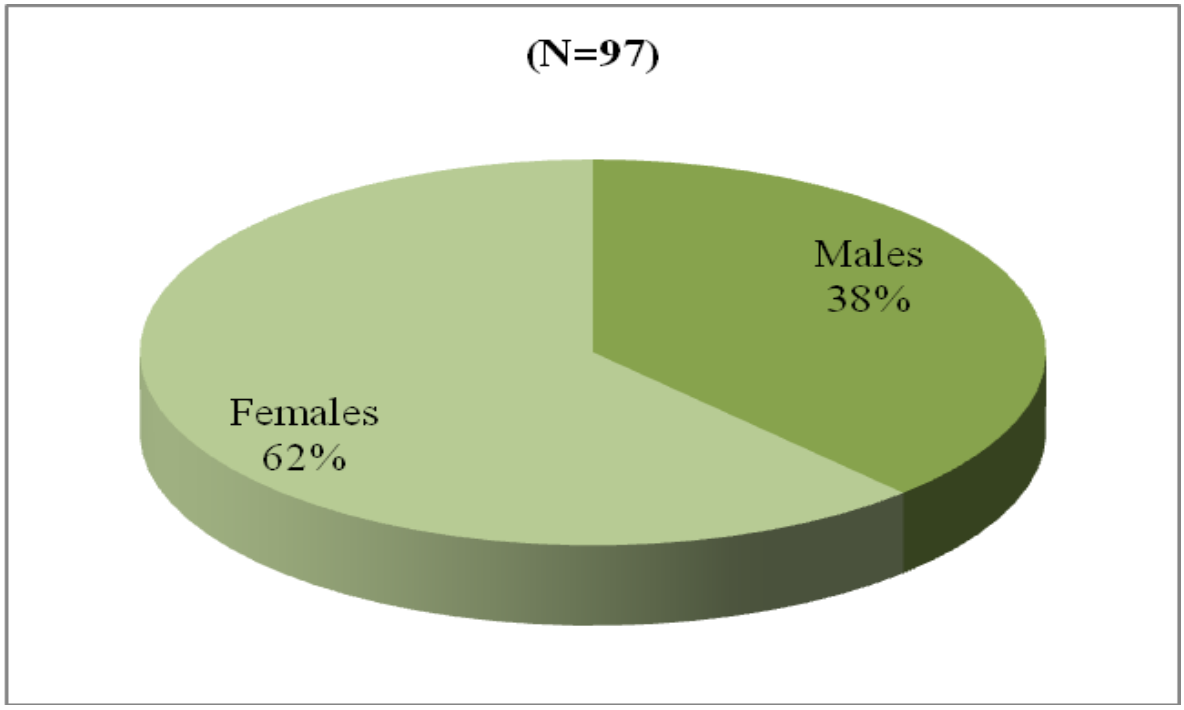
4.2.1 Gender Distribution of Respondents

Among the study participants, there was a variation in gender. The findings show that majority of the respondents were females as opposed to males. As summarized in figure 4.1, out of the 97 respondents interviewed in the study, 62% were females while 38% were males. This gender disaggregation is not on the basis of any bias during the sampling process but it is simply based on the availability and willingness to participate in the study by the respondents during data collection process. It was also generally informed by what emerged from the ground during the sampling stage where it had

emerged that female-headed were dominant than male-headed households in the study area.

The study, like previous ones, showed that there was a bias when it comes to accessing some farm inputs based on gender. This included accessing loan facilities. Given that majority of the households in Kathonzweni were female-headed, it therefore implied that food security faced a lot of challenges. This was because majority of the households stood minimal chances of accessing financial assistance in form of loans because of gender biases.

Figure 4.1 Gender Distributions in Percentage



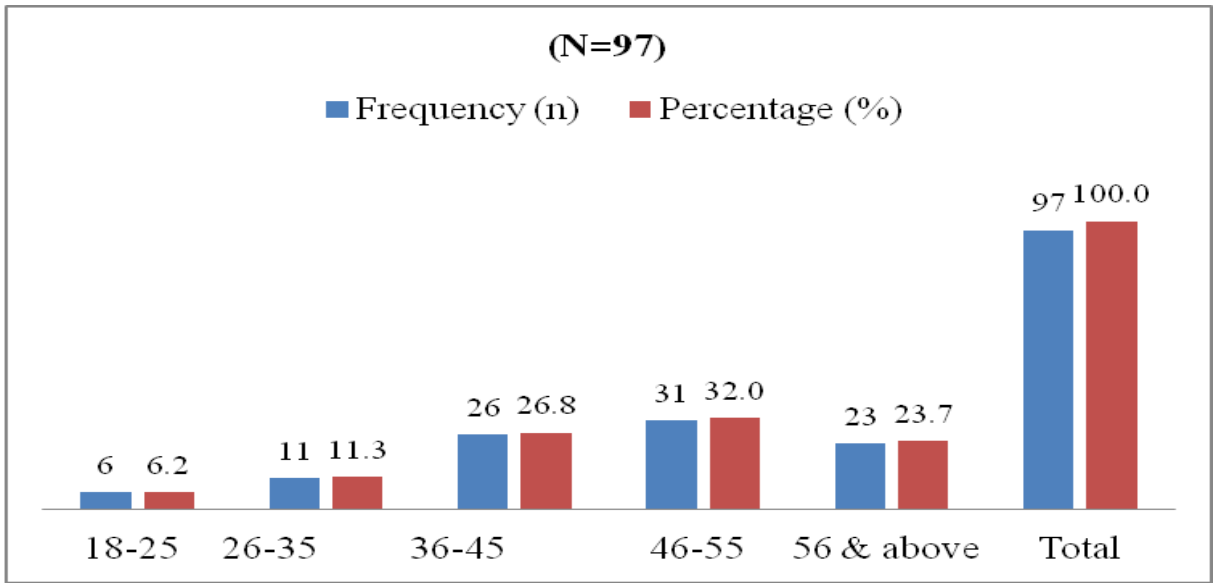
4.2.2 Age Distribution of Respondents

Age was an important factor in influencing how the respondents treated farm productivity in their efforts to ensure food security. Age was sorted in consistent ways, with a minimum of 18 years and a maximum of 56 & above years. Based on the study findings, majority of the 97 respondents who completed the questionnaires were aged 46-55 years which was 32.0%. They were followed by those aged 36-45 years at 26.8%, those aged 56 & above years at 23.7%, those aged 26-35 years at 11.3% while the minority were

aged below 18-25 years at 6.2%. Based on these statistics, it shows that overall a greater majority of the respondents were aged above 26 years.

The statistics imply that majority of the household heads were mature enough to know the implication of working hard to make their household food secure. On the other hand, the fact that cumulatively a simple majority (55.7%) of the household heads were aged 46 years and above means that farming was more practised by relatively older people thus appearing not to be a very promising undertaking. This was likely to threaten more food security in the community of Kathonzweni. Figure 4.2 presents a summary of age distribution of the respondents.

Figure 4.2 Age Distribution of Respondents in Frequency (n) and Percentage



4.2.3 Marital Status of the Respondents

The study inquired about the respondents' marital status so as to gauge the level of support and interdependency at the household level. As summarized in table 4.2, the findings showed that majority of the respondents, accounting for 59.8% were married while the minority, 5.2% were divorced. Besides, 14.4%, 10.3%, and 10.3% in that order were widowed, separated, and single. Generally, majority of the household heads were in a family relationship, implying that they took farming seriously so as to take care of their households. It also means that majority of the people who practised farming, in one way

or the other, had support in terms of labour and general interdependence of family members (spouses). Ideally, this was a good sign of fighting food insecurity since spouses were likely to complement each other when it came to accessing farm inputs such as fertilizers as well as labour.

Table 4.2 Respondents' Marital Status

Marital Status	Frequency (n)	Percentage (%)
Single	10	10.3
Married	58	59.8
Separated	10	10.3
Divorced	5	5.2
Widowed	14	14.4
Total	97	100.0

4.2.4 Highest Education Level of the Respondents

The respondents were also asked about their highest level of education. From the study findings, majority which was 44.3% had attained primary school education level. Twenty nine point nine (29.9%), 7.2%, and 1.0% respectively had acquired high school, tertiary, and university education status. On the other hand, 17.6% had 'other' education qualifications, which in this case consisted of no formal education or vocational training. From the study findings, cumultaively majority of the respondents either had primary education or 'other' (no education, vocational training). This meant that the bulk of the residents of Kathonzweni who ideally were supposed to fight food insecurity were not very well informed (learned). The implication was that they likely lacked the capacity to apply the best farming practices to be able to produce enough for their households and the society at large. The results as regards to the education level of the respondents are summarized in table 4.3 below.

Table 4.3 Education Level of Respondents

Education Status	Frequency (n)	Percentage (%)
Primary	43	44.3
High School	29	29.9
Tertiary	7	7.2
University	1	1.0
Others (no education, vocational etc)	17	17.6
Total	97	100.0

4.2.5 Religion of the Respondents

The respondents were also asked about their religion since this was likely to have an impact on their worldview in terms of how they dealt with food situations in their households. As outlined in table 4.4, the findings point out that of the respondents were Christians, accounting for 84.5% of those who were interviewed most. Seven point two percent (7.2%), 4.1%, 3.1%, and 1.1% respectively were practicing Islamic, traditional, no religion, and 'other' faiths. One participant indicated that though he believed in religion, he didn't particularly subscribe to a single faith hence placed under 'other'. Although the respondents belonged to different faiths, it was difficult to tell if this had any direct implications on their farm productivity hence food security.

Table 4.4 Religion of Respondents

Religion	Frequency (n)	Percentage (%)
Christianity	82	84.5
Islam	7	7.2
Traditional	4	4.1
None	3	3.1
Other...specify (more than one inclination)	1	1.1
Total	**97**	**100.0**

4.2.6 Size of the Households

Respondents were also asked about the size of their respective households in order to estimate their burden when it came to providing food for their family members. Forty

four point three (44.3%), 25.8%, 17.5%, and 12.4% of the households respectively had 4-6 members, 7-9 members, 1-3 members, and 10 & above members in their households. Cumulatively, a greater majority of households had between 4 and 9 members to feed. The high dependence burden at the household levels posed further challenges in terms of being food secure. Ultimately, the implication was that without having in place radical initiatives in terms of farm productivity, most households in Kathonzweni were likely to continue being food insecure because of the high number of people who depended on household heads. These statistics are summarized in table 4.5.

Table 4.5 Size of the Households

Size of Household	**Frequency (n)**	**Percentage (%)**
1-3 Members	17	17.5
4-6 Members	43	44.3
7-9 Members	25	25.8
10 & above members	12	12.4
Total	**97**	**100.0**

4.2.7 Households' Livestock Wealth

Respondents were asked about their livestock possessions in order to estimate if they had any fallback positions in case their crops failed. All the 97 respondents kept at least one domestic animal. As illustrated in table 4.6, while all the 97 respondents had at least a goat, sheep or fowl, only 56 and 11 respectively had a cow or any other animal such as a rabbit, camel etc. Based on these statistics it would appear that apart from crops produced in the farm, all households had at least one animal or the other.

Table 4.6 Household Livestock Possessions

Type of Animals	Number of Households	
	Frequency (n)	Percentage (%)
Goats	97	100.0
Sheep	97	100.0
Cows	56	57.7
Fowls	97	100.0
Other (rabbits, camel etc)	11	11.3

The households reported to keep livestock as an investment (they sell to pay school fees, buy food etc), for food and provision of organic manure for their farms. Cattle are used by households to provide labour in the farms during land preparation for planting (ploughing). Cattle and Donkey provided means of transport for household water, goods to the market area, and business facility for the water vendors. However, those who had more valuable animals such as goats, sheep or cows just had a negligible number (1-6 animals). This was not enough to cushion the households against famine in the event that crops failed.

4.2.8 Occupation of Household Heads

The study indicated that 75.3% of the household heads sampled were farmers and relied on natural resources for their basic needs. Further, the study established that 10.3% were business persons, 4.1 % were professionals while 10.3% were casual labourers. Based on the statistics, it was evident that majority of the Kathonzweni residents relied on farm productivity for the household food. With the very minority (4.1%) as professionals, it meant that a good number of households here were food insecure as they did not have a fallback position in the event that they experienced poor farm harvests. This put the residents in a precarious position in terms of food security. Generally, those not directly doing farming did not have high purchasing powers hence could hardly cushion themselves against hunger at the household levels.

Table 4.7 Occupation of Household Head

Occupation	Frequency (n)	Percentage (%)
Farmer	73	75.3
Business persons	10	10.3
Professional	4	4.1
casual laborer	10	10.3
Total	**97**	**100.0**

4.3 Challenges Faced by Households in Farm Productivity

4.3.1 Household Food Security

Asked if they were food secure at household levels, the respondents unanimously said 'no'. All of them said food insecurity was severe, with no surplus at any given season. Ideally, the households did not produce enough for the family. Based on the findings, most of the respondents said that their most recent harvest lasted households for a maximum 3 months. That left households to look for alternative ways to fill the gap as they waited for the next harvest season. However, in a unanimous way, the respondents expressed the fact that they faced numerous challenges in regard to their food security situations. Some of the challenges faced by the respondents included failing of rains since almost all of them relied solely on rain fed agriculture. There was also overreliance on maize and beans as the main food crops which are not drought resistant crops. Besides, there was lack of market to drought resistant crops such as cotton which would have been an alternative to cushion households against food insecurity.

In order to bridge the gap, the residents did this through purchases from the market, Government relief food, NGOs, and through schools feeding programs done by both the National and County governments. Besides, households adopted some coping mechanisms such as one meal per day, and having no food preference, with household members eating what was available at any given moment. They also survived through social welfare initiatives such as Inua Jamii initiative (cash given to the most vulnerable) and Pesa Kwa Wazee initiative.

Asked about what types of food crops they grew as their preference, the respondents said maize, 37.1%, legumes (beans, peas, & green grams) 24.7%, and fruits, 19.6% in a descending order in preference. There were also other crops such as sorghum, millet, finger millet, cassava, and other vegetables among other food crops. Table 4.8 gives a clear summary of food crops grown in the study area in terms of preferences as either determined by the residents or due to climatic conditions.

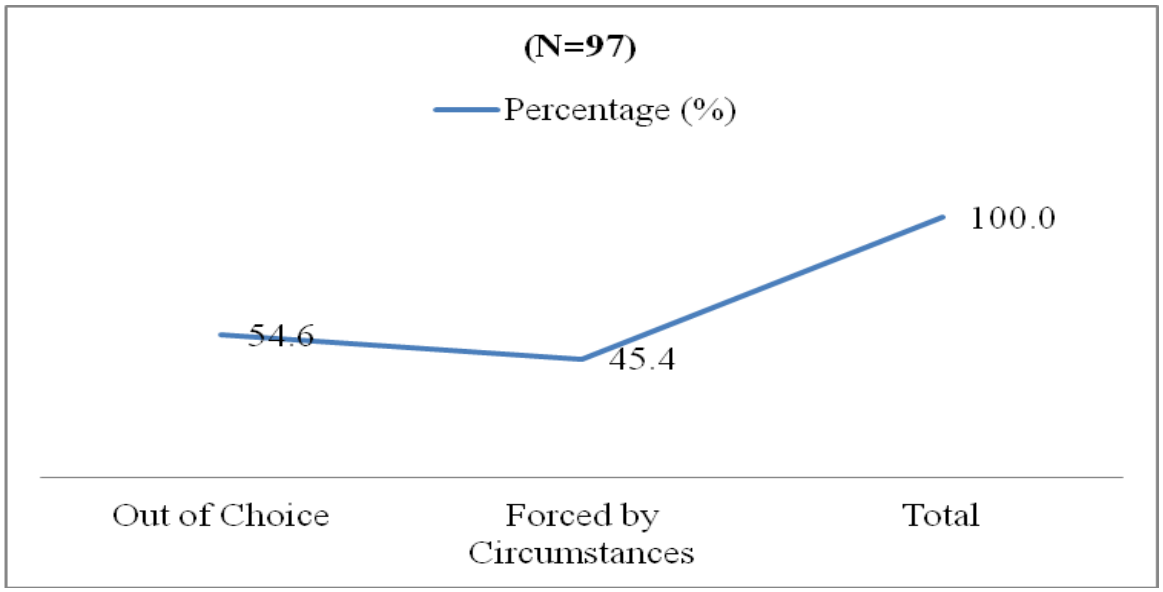
Table 4.8 Preference of Crops Grown

Food Crops	**Frequency (n)**	**Percentage (%)**
Maize	36	37.1
Sorghum	5	5.1
Millet	4	4.1
Finger millet	2	2.1
Potatoes	2	2.1
Legumes	24	24.7
Fruits	19	19.6
Vegetables	3	3.1
Other (e.g cassava)	2	2.1
Total	**97**	**100.0**

4.3.2 Reasons for Common Crops

Most respondents said that they grew the common crops out of choice rather than being forced by circumstances. In other words, a good number of the residents were resistant to change hence their reluctance to pursue better and drought-resistant crops as an alternative. Those that said they planted the common crops out of choice accounted for 54.6% while those who were forced by circumstances were 45.4% of the total. The fact that majority of the respondents implied they were resistant to new, perhaps better crops, meant that the residents were not in good stead to address food insecurity in their area. These sentiments are illustrated in figure 4.3.

Figure 4.3 Reasons for the Common Food Crops

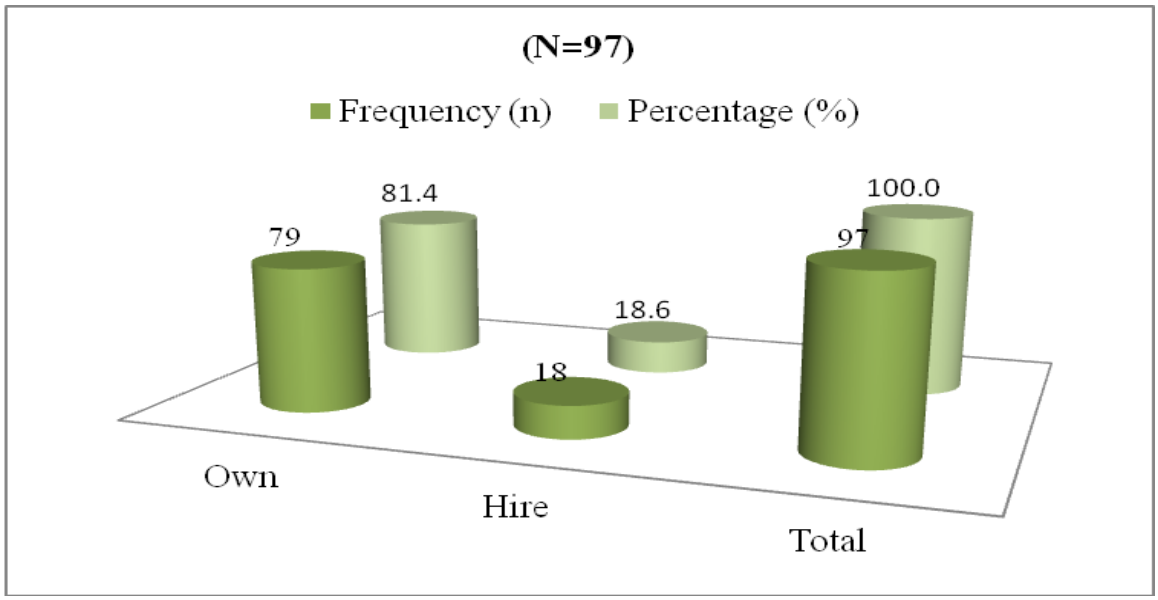


4.4 Household Dynamics in Land Use Practices

4.4.1 Farming Land Ownership

In relation to land ownership for farming, majority, 81.4% of the residents owned the land at the household level, with a few, 18.6% hiring during planting seasons. It is a good thing that majority of the residents owned the farmland which ideally meant that they did not incur extra cost in hiring land for farming. However, it may depend on how other factors play out in order to make it possible for enough farm productivity so as to make the households food secure. For instance, the study revealed that gender of the household heads affected the way they accessed loan facilities, among other factors.

Figure 4.4 Farming Land Ownership



4.4.2 Fertility of Farming Lands

Generally, the farms were fairly fertile. As illustrated in table 4.9, majority (40.2%) of the respondents said that the land they usually farmed were moderately fertile, with only 3.1% of them holding that theirs were very fertile. 5.1% said they didn't know to what extent their farms were fertile. Besides, as demonstrated on table 4.10, majority (91.8%) of the land owners observed that there was a considerable fertility decline on their property. The low fertility of land implied that this posed great danger to food security in the area especially given the general low economic status of the residents. In order to enhance the land fertility, ideally this would require considerable amounts of fertilizers inputs but which may not be affordable generally.

Table 4.9 Fertility Level of Farmlands

Degree of Farm Fertility	Frequency (n)	Percentage (%)
1= Not Fertile	22	22.7
2= Fertile	28	28.9
3= moderately fertile	39	40.2
4=Very fertile	3	3.1
5=don't know	5	5.1
Total	**97**	**100.0**

Table 4.10 Observation on Land Fertility Decline

Observation on Land Fertility Decline	Frequency (n)	Percentage (%)
Yes	89	91.8
No	8	8.2
Total	**97**	**100.0**

4.4.3 Enhancing Farm Productivity

In order to enhance or restore fertility, majority, 64.9% of the respondents applied manure followed by those who applied fertilizers, 22.7%. There were also respondents who consulted agricultural extension officers for advice, 9.3% as well as those who decided to practise shifting cultivation, 3.1% in order to restore fertility on their farms. Although majority of the respondents were actively trying to restore fertility in their farmland, they were basically using manure apposed to fertilizer. This implies that they can't afford fertilizers which would have been more effective. In the long run therefore, it will take great efforts to enhance farm productivity given the inferior ways applied by majority of the respondents to address the issue.

Table 4.11 Enhancing/Restoring Land Fertility

Enhancing/Restoring Land Fertility	Frequency (n)	Percentage (%)
Applying fertilizer	22	22.7
Apply manure	63	64.9
Consultation of extension officer	9	9.3
Other (e.g shifting cultivation)	3	3.1
Total	**97**	**100.0**

4.4.4 Preparation of Land for Planting

In regard to how the households prepared their land for farming, most, 58.8%) of the farmers used cattle/donkeys to plough, followed by those who used hoe & cutlass, 32.0%, a mixture of methods, 7.2% and those who used tractors, 2.1. The fact that majority of the people used bullocks/donkey for preparation of their land for planting means that they were not in a position to afford superior methods like tractors. This means that majority of the people were not able to do extensive farming as opposed to smallholder practices

which was not likely to guarantee the residents food security. Only a negligible 2.1% used tractors as a means of preparing their land.

Table 4.12 Methods of Farm Preparation for Planting

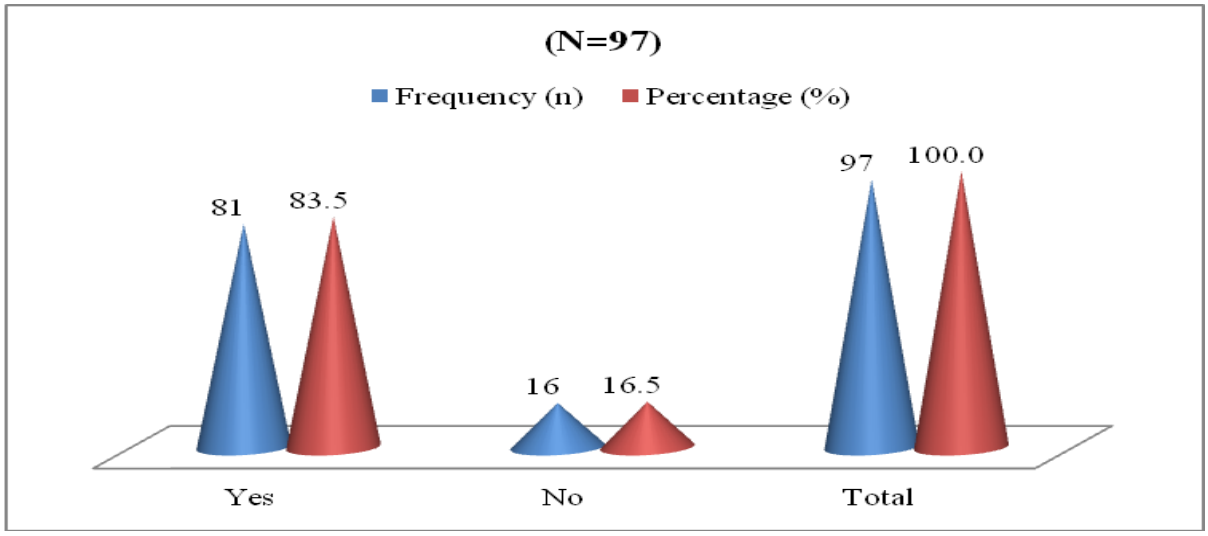
Methods of Farm Preparation	Frequency (n)	Percentage (%)
Hoe & cutlass	31	32.0
Bullock/Donkey	57	58.8
Tractor	2	2.0
Other (a mixture of more than on method)	7	7.2
Total	**97**	**100.0**

4.5 Farm Practices and Food Production

4.5.1 Methods of Farming

In relation to farm practices and food harvests, the respondents were also asked if they practised more than one farming methods in their farms. As illustrated in figure 4.5, majority, 83.5% used multiple methods of farming as opposed to the minority who accounted for 16.5% that did not practice multiple farming. Ideally, this was a good indication as the household would have fallback positions in the event that their crops failed.

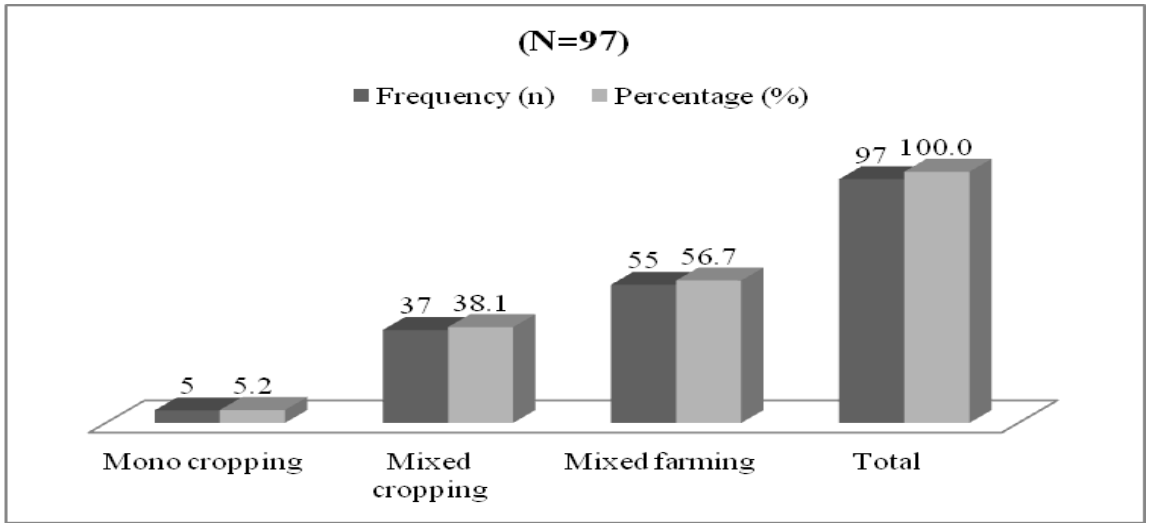
Figure 4.5 Use of Multiple Methods of Farming



4.5.2 Common Farming Methods

Asked about the common farming methods used in their food production efforts, majority, 56.7% of the households indicated to be practising mixed farming while only a few, 5.2% practised mono cropping. The fact that majority of the households practised mixed farming and mixed cropping was ideally a good indication as it provided farmers varied opportunities to cushion against which to address hunger in their households. However, this would depend on what else they did as an alternative to their common farming practices. Figure 4.6 is an illustration of these responses.

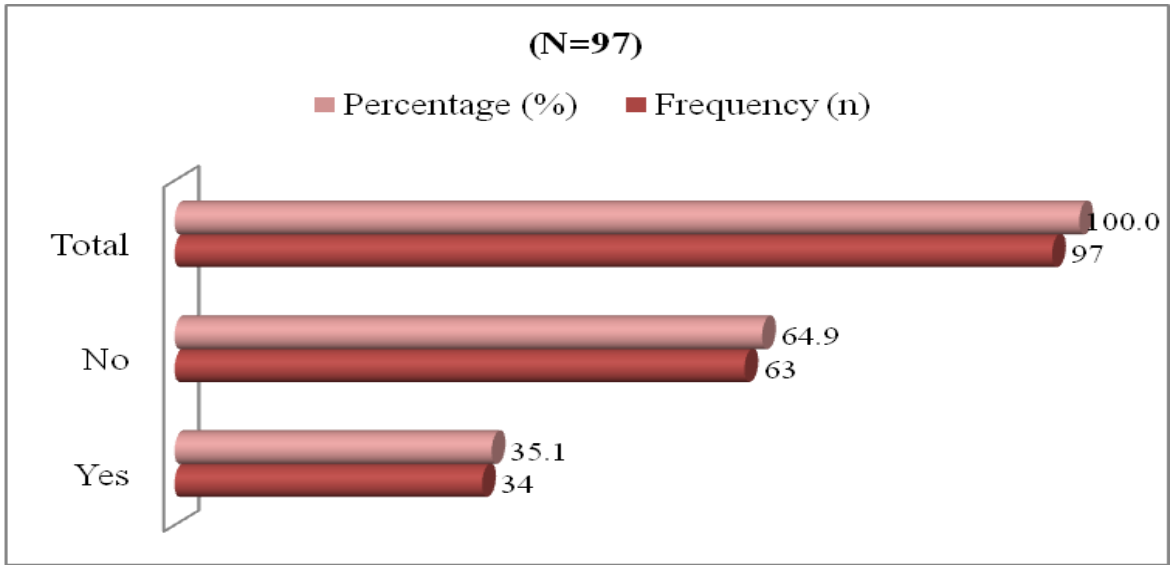
Figure 4.6 Common Farming Methods



4.5.3 Access to Farm Inputs

On access to farm inputs such as seeds, fertilizers, and pesticides among others, majority of the respondents indicated that it wasn't easy. As illustrated in figure 4.7, 64.9%) disagreed while 35.1% agreed that it was easy. Based on these statistics, it means that almost two thirds of the residents had difficulties accessing farm inputs to enable them enhance their farm productivity. In effect this implies that it is difficult to meet the food demands of the household members and by extension the community in Kathonzweni. A lot would then need to be done to salvage the situation so that food insecurity can be addressed.

Figure 4.7 Households' Access to Farm Input



4.5.4 Affordability of Farm Inputs

Furthermore, the respondents were asked specific questions in relation to their access to farm inputs based on a Likert scale. The questions included how frequently they bought farm inputs, how frequently they got free farm inputs, how frequently they afforded farm input, and through other means such as through friends and well wishers. As illustrated in table 4.13, there were varied responses given on all the questions. However, on average, on all the questions, 58% (n=56) of the respondents said they did not at all buy, get free farm input, afford farm input, or get any assistance from friends or well-wishers. Only 2% on all the variables said that they had those experiences very frequently.

Table 4.13 Affordability of Farm Inputs

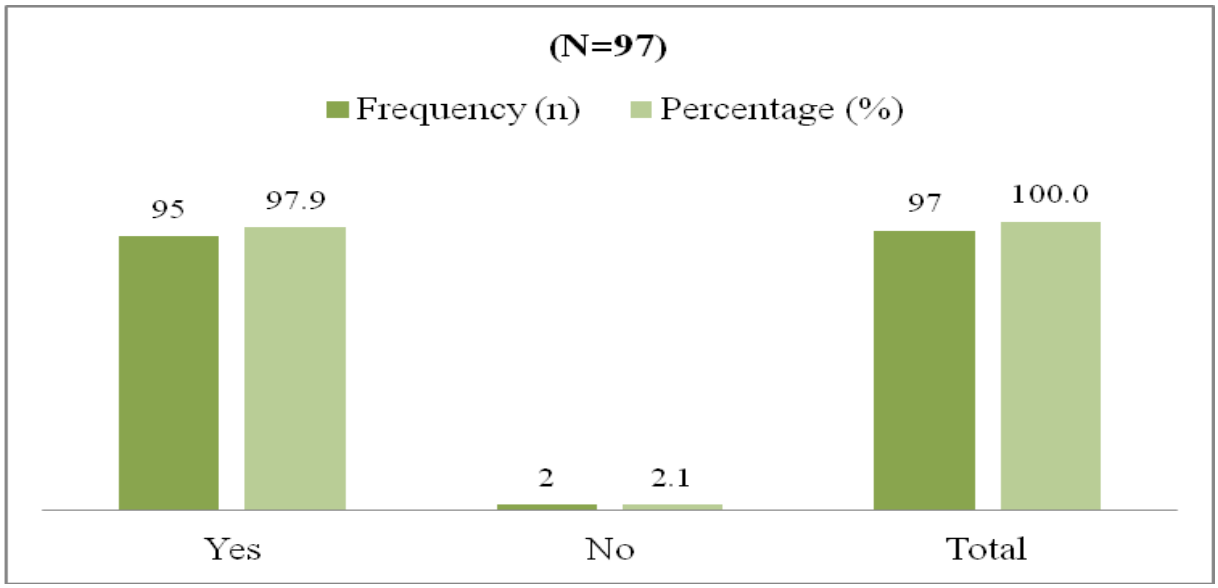
Statements	Responses (% & n)					
	1= Least Frequently	***2= Less Frequently***	***3=Not at all***	***4=Frequently***	***5=Very Frequently***	***Total (%& n)***
How frequent do you buy farm inputs?	12 (12)	42 (41)	28 (27)	11 (11)	6 (6)	100 (97)
How frequent do you get free farm inputs?	13 (13)	22 (21)	61(59)	4 (4)	0 (0)	100 (97)
How frequent do you afford farm input?	15 (15)	28 (27)	56 (54)	1 (1)	0 (0)	100 (97)
Other (Friends & well wishers)	9 (9)	3 (3)	88 (85)	0 (0)	0 (0)	100 (97)
Average	**13 (12)**	**24 (23)**	**58 (56)**	**4 (4)**	**2 (2)**	100 (97)

4.5.5 Level of Access to Labour

The respondents were also asked about their level of access to labour for their farm productivity. As captured in figure 4.8, a big majority, 97.7% answered to the affirmative while only 2.1% said they did not. Easy access to labour was a positive indicator to food productivity. However, for any meaningful outcome of this, the situation should be

critically assessed alongside other factors. For instance, what are other factors of production and how do they generally interact.

Figure 4.8 Households' Access to Farm Labour



4.5.6 Affordability of Farm Labour

Additionally, the respondents were asked specific questions in relation to their access to labour for their farm production based on a Likert scale. The questions included how frequently they accessed family labour, how frequently they accessed hired labour, how frequently they afforded labour for their farm production, and through other means such as through friends and well wishers. As illustrated in table 4.14, there were varied responses given on all the questions. However, on average, on all the questions, 38% (n=37) of the respondents said they did not at all afford to access family labour, access hired labour, afford farm labour, or get any assistance from friends or well-wishers. Only 21% (n=20) on all the variables said that they had those experiences very frequently.

Table 4.14 Affordability of Farm Labour

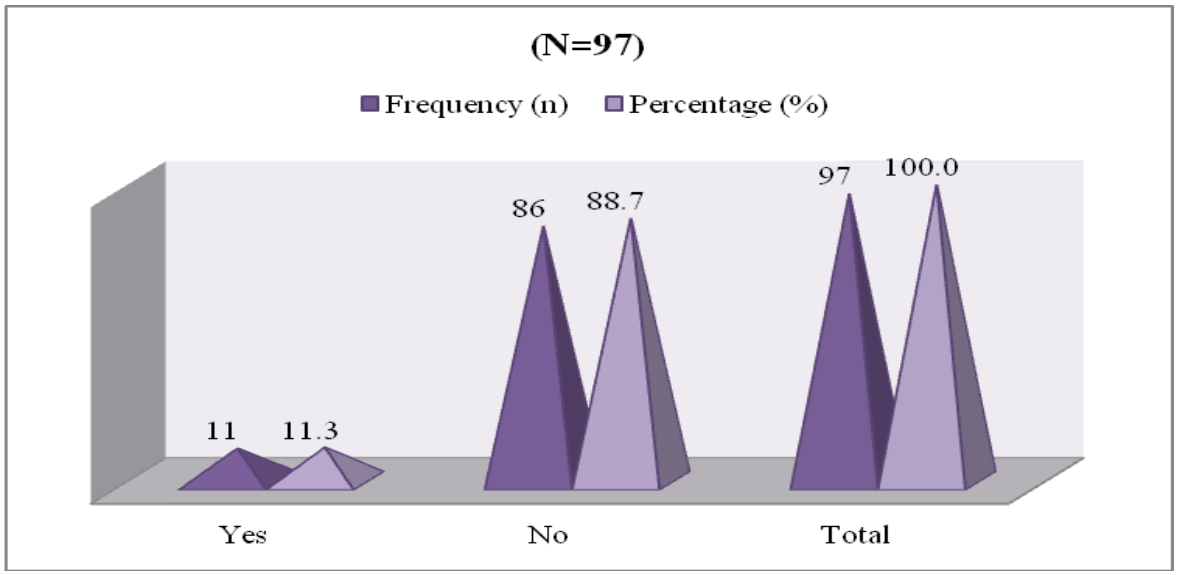
Statements	Responses (n & %)					
	1= Least Frequently	***2= Less Frequently***	***3=Not at all***	***4=Frequently***	***5=Very Frequently***	***Total (%)***
How frequent do you access family labour?	1 (1)	2 (2)	0 (0)	38 (39)	56 (58)	97 (100)
How frequent do you access hired labour?	21 (22)	13 (13)	59 (61)	4 (4)	0 (0)	97 (100)
How frequent do you afford labour for your farm production?	15 (15)	6 (6)	29 (30)	23 (24)	24 (25)	97 (100)
Other (Friends & well-wishers)	19 (20)	12 (12)	61 (63)	5 (5)	0 (0)	97 (100)
Average	**14 (14)**	**8 (9)**	**37 (38)**	**18 (18)**	**20 (21)**	**97 (100)**

4.6 Post-harvest Practices and their Effects on Food Security

4.6.1 Level of satisfaction with harvest

Concerning their post-harvest practices and their effects on food security, the respondents were asked if they usually got satisfied with their harvest every season. As illustrated in figure 4.9, majority, 88.7% said ‘no’ while only 11.3% answered to the affirmative. The high level of dissatisfaction with the harvests tells to what extent there is food insecurity in Kathonzweni. This means that a lot needed to be done to save the situation.

Figure 4.9 Level of Satisfaction with Season's Harvest



4.6.2 Household Food Surplus

On how often the households had surplus after harvests, majority, 40.2% of the households indicated to be having the surplus less frequently while none, 0.0% said they experienced this very frequently. These statistics confirmed the level of food insecurity in the area as a result of poor farm productivity. Table 4.15 is an illustration of these responses.

Table 4.15 Household's Post-Harvest Surplus

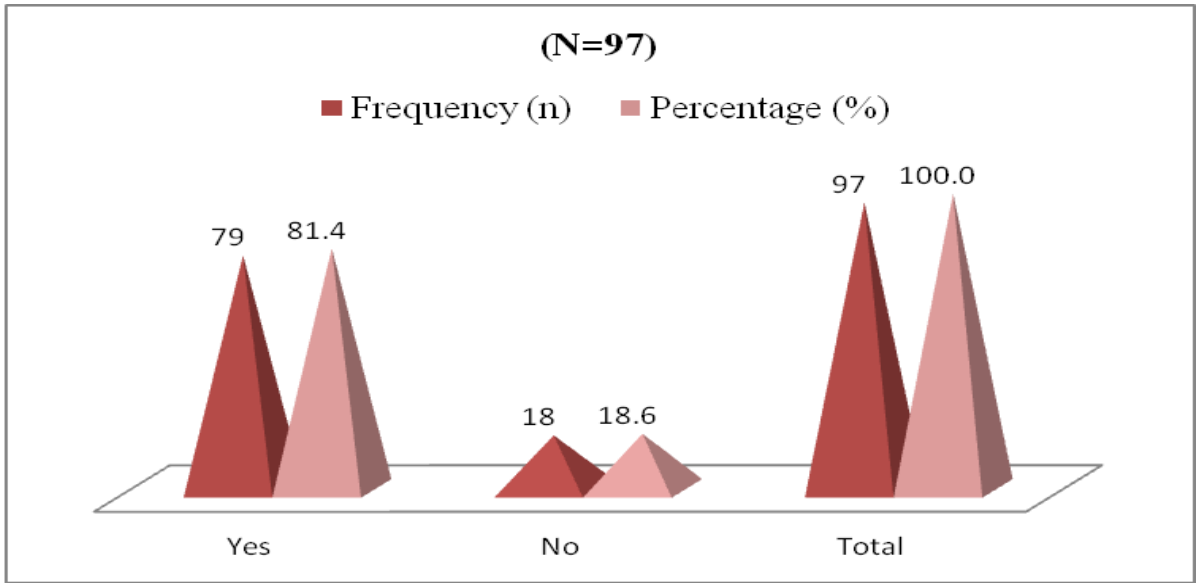
Harvest Surplus	**Frequency (n)**	**Percentage (%)**
1= Least Frequent	33	34.0
2= Less Frequent	39	40.2
3=Not at all	24	24.8
4=Frequent	1	1.0
5=Very Frequent	0	0.0
Total	**97**	**100.0**

4.6.3 Storage of Surplus

Asked if they stored their post-harvest surplus for future use, majority, 81.4% of the respondents affirmed as opposed to 18.6% who said they did not. These responses

indicate that there are acute food shortage as there was no surplus to be stored for later use. These responses are illustrated in figure 4.10.

Figure 4.10 Post-harvest Storage of Surplus



4.6.4 Household Usage of Post-harvest Surplus

As captured in table 4.16, it emerged that a simple majority, 55.7% of the respondents later consumed everything after they harvested. On the other hand, 44.3% divided their surplus for home consumption and for sale. No respondents said that they sold everything. The fact that majority of the residents only had enough for home consumption means that they did not produce enough for home consumption and other usages such as selling so as to meet other financial obligations.

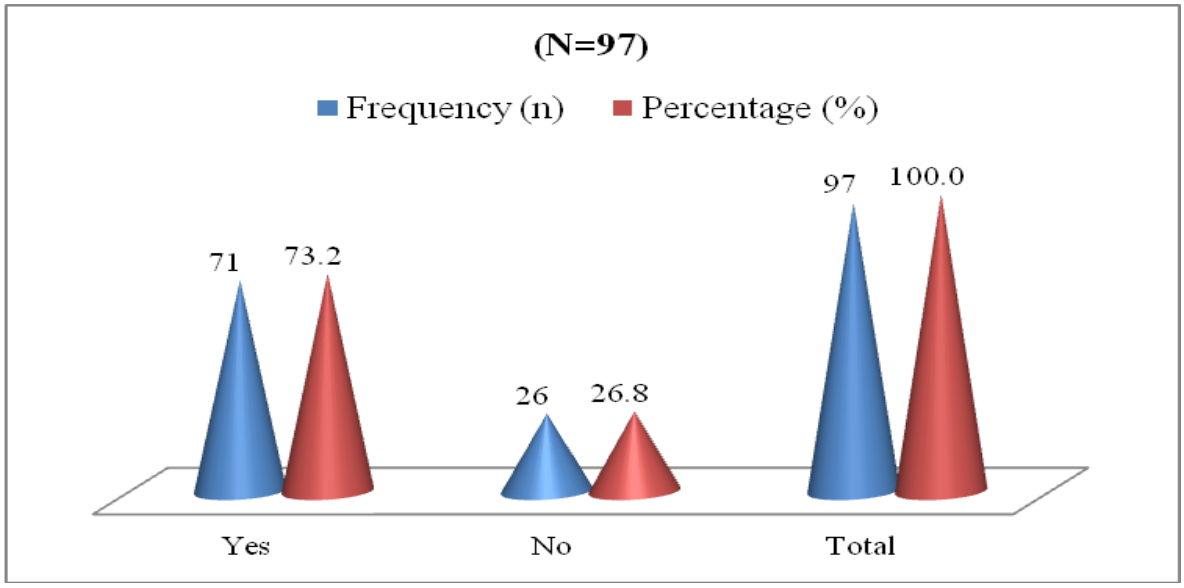
Table 4.16 Household's Usage of Post-Harvest Surplus

Usage of the Surplus	**Frequency (n)**	**Percentage (%)**
Consume Everything	54	55.7
Sell Everything	0	0.0
Consume & Sell a fraction	43	44.3
Total	**97**	**100.0**

4.6.5 Frequency of Harvest

There was a possibility of some households completely failing to harvest in a given season. As summarized in figure 4.11, 73.2% of the respondents said that they ever experienced a situation where they failed to harvest anything in a given season. On the other hand, a minority, 26.8% of the respondents said they had never experienced such a scenario. The fact that a greater majority of the respondents said that they ever experienced complete failure of their crops at any given season means that food insecurity in the region was indeed severe.

Figure 4.11 Possibility of not Harvesting



4.6.6 Households' Source of Food Surplus

In order to get the surplus for their families in the event they completely failed to harvest, the residents bought, solicited from neighbours, friends or well-wishers, or they depended on donations from the central and county governments or from other donors. Table 4.17 illustrates a summary of these responses. The findings show that majority, 69.1% of the respondents relied on the governments and other donors to revamp their food reserves while 25.8% bought food in case they ran out of their surplus. On the other hand, only 5.1% of the households sought help from neighbours, friends or well-wishers. Overreliance of the residents on both the county and national governments for food rations painted a desperate picture in terms of food security.

Table 4.17 Households' Source of Surplus

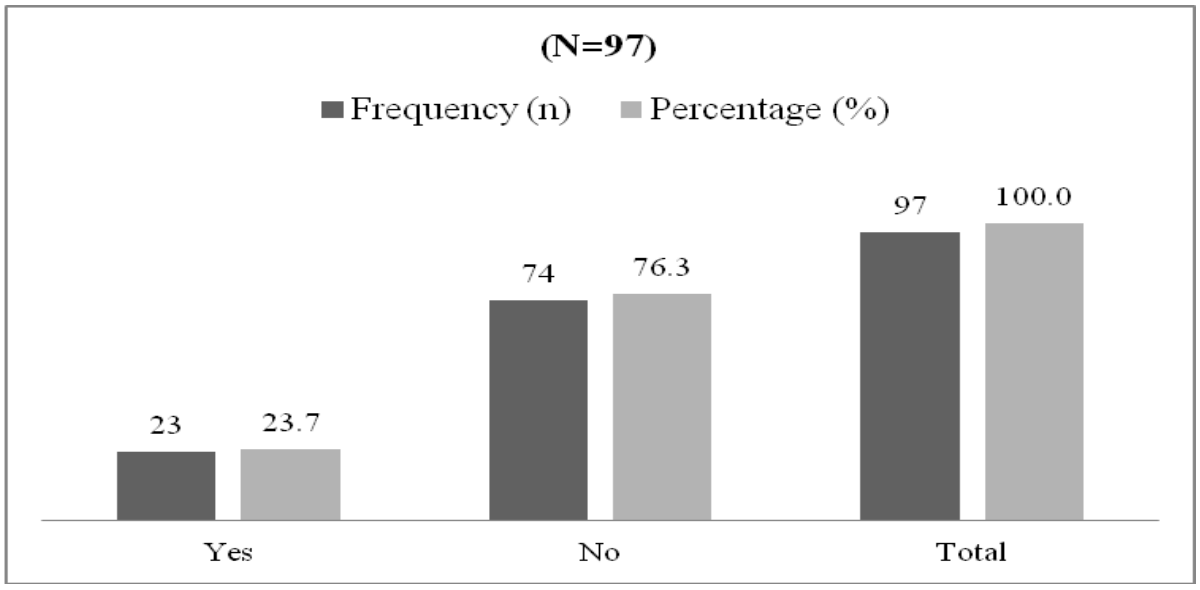
How to get Surplus	Frequency (n)	Percentage (%)
Buy	25	25.8
Neighbours, friends, or well-wishers	5	5.1
County government and other donors	67	69.1
Total	**97**	**100.0**

4.7 Household Factors in Farm Productivity and Food Security

4.7.1 Gender-Based Challenges

There emerged that some household heads had faced gender-based challenges when it came to farm productivity. As summarized in figure 4.12, the findings showed that majority, 76.3% of the respondents had not faced any gender-based challenges while 23.7% of them said they had. Although majority of the residents did not face any gender-based challenges when it came to farm productivity, it nonetheless required a close scrutiny especially given that some female household heads were at some point denied loan facilities on the basis of gender.

Figure 4.12 Household Gender-based Challenges



4.7.2 Types of Gender-Based Challenges

The respondents faced varied gender-based challenges including missing credit facilities, outsourcing of labour, and women denied opportunities as paid labourers or low payments among others. As illustrated in table 4.18, majority (57.7%) of the respondents who ever faced challenges based on their gender said that they missed credit facilities. On the other hand, only a few, 14.4% had any difficulty accessing storage facility because of their gender. Credit facilities are a critical factor in farm productivity. The fact that some household heads lacked access as a result of their gender implied that this should attract serious attention.

Table 4.18 Type of Gender-based challenges

Type of Gender-based challenges	Frequency (n)	Percentage (%)
Missing a credit facility	56	57.7
In outsourcing labour	27	27.8
Others (e.g storage facility, women denied opportunities as paid labourers or low payments)	14	14.4
Total	**97**	**100.0**

4.7.3 Enhancing Household Food Security

The study also sought to investigate how to enhance food security for the households. Some of the ways through which this was to be done included technical expertise, provision of materials such as quality seeds, fertilizer etc, provision of relevant skills and materials. Besides, this would be done through provision of irrigation facilities. As illustrated in table 4.19, a simple majority, 32.0% felt that irrigation facilities were very critical in enhancing households' food security. A minority (11.3%) felt that training was an important aspect in enhancing household food security.

Table 4.19 Ways of Enhancing Household Food Security

Enhancing Household Food Security	Frequency (n)	Percentage (%)
Technical expertise	13	13.4
Materials only (e.g. quality seeds, fertilizer etc)	18	18.6
Skills and materials	24	24.7
Training	11	11.3
Irrigation Facilities	31	32.0
Total	**97**	**100.0**

4.8 Discussion of the Findings

This study sought to evaluate household farm productivity and its contribution to food security among households in Kathonzweni sub-county in Makueni County. The study revealed that food production at the household levels was influenced by a number of factors which were both internal and external to the players. The residents of Kathonzweni sub-county generally harvested too little food to last them till next harvest season. Indeed it emerged that some households had gone for 3-4 years without any meaningful harvests. Some of the specific challenges were as a result of failing rains, poverty that people here have low purchasing power they cannot even afford the government subsidized farm inputs, predators such as birds, poor farming methods, lack of ready markets for their fruits and cash crops such as cotton, resistant to change and ignorance of the farmers among other challenges. As the area Chief in Kitise Location said,

> *"People here are faced with many farming challenges including the fact that they are ignorant on how to prepare their farms so as to maximize their outputs. They may also not have ready markets for their harvest especially fruits and end up selling the fruits at throw away prices to brokers. Majority of the people are poor and have low purchasing power to access even the government subsidized farm inputs".*

These sentiments were echoed by a government official (Assistant County Commissioner) in Mavindini ward who said that besides the natural factors such as failing rains, there was reluctance to adopt new and more rewarding farm practices. For example he said that,

> "*People here are resistant to change; they over rely on maize and beans as the main food crops despite availability of drought resistant crops. These crops require too much rainfall whereas they could try other kinds of crops which are drought resistant".*

The findings of the study especially on poor market for the farm produce as a big challenge, were in line the findings by Aiga and Dhur, (2006) who found out that in many parts of sub-Saharan Africa market was a big impediment for the farmers. Their study established that this was even more serious for farmers and pastoralists in ASAL where they were loosely connected to the marketing systems. Their recommendations on how to address these problems had been through improving physical infrastructure and market information systems.

The study further established that overreliance on rain-fed agriculture was one of the most serious tests to farmers in Makueni County. Infertility of the land and poor access to farm inputs such as fertilizers and pesticides curtailed households' efforts to produce enough for their families. These findings were in tandem with previous studies by Nyariki et al (2002), and Muyanga (2004) which had indicated that food availability had been restricted by insufficient resources for production and access had been undermined by non-farm factors. In order to overcome these challenges, they had suggested an integrated intervention mechanism where all factors were put into play. For instance, they had recommended that for sustainability, intervention processes should focus on building the capacity of rural households to overcome bureaucratic barriers and forge linkages with public service and private market institutions. Similarly, according to the Inter Academy Council (2004), the main challenge of food security in most African countries was related to the underdevelopment of the agricultural sector in general.

The households produced too little to sufficiently cater for their families hence this forcing them to rely on other sources for their surplus. Most of the mechanisms through which households recouped their reserves included through purchases from the market, government relief foods, NGOs such as World Vision and Kitise rural Development. Others also depended on schools feeding programs facilitated by both the central and county governments as well as cash transfer initiatives to vulnerable households and social groups.

Despite most households having huge lands, most of the land was not favourable for food production either because it was infertile or there were insufficient rains. As one key informant from Kitise/Kithuki Ward said,

> "*Yes, the residents here have big land sizes... The land has low fertility due to overuse. They use Manure and have a negative attitude towards fertilizers – they say fertilizers destroy the soil".*

These sentiments echo the findings by Kanyingi (2015) which indicated that the agricultural sector in Makueni County was characterized by insignificant use of external farm inputs and decline of soil fertility. The same study also revealed that farm productivity in this area was impeded by environmental degradations, considerable food crop loss at both pre and pos-harvest stages, inadequate food storage and preservation facilities that resulted in noteworthy commodity price fluctuation. This reinforced the fact that almost ninety five percent of food in sub-Saharan Africa was grown under rain-fed agriculture hence subjecting food production to unpredictable and adverse weather conditions. Despite efforts by the government and other stakeholders to invest in irrigation-based agriculture to ensure consistent farming and boost productivity, no meaningful tangible results were there to show. Harvesting of rain water to provide constant supply of water during dry seasons, and harvesting and conservation of fodder as well as crop diversification to avoid overdependence on a few crops that are not drought resistant, just remained on paper.

According to FAO (2008), the main strategies that can assist reduce food insecurity in Africa include investing in irrigation, planting different varieties of crop varieties especially those with ability to survive in drought conditions, developing through research new varieties of drought resistant varieties of crops, encouraging intercropping, training and developing the capacity of the people in drought prone areas to harvest water as well as implementing and improving existing irrigation systems. Similar sentiments emerged in this study where the respondents opined that something could be done in order to address the question of household farm productivity hence food insecurity. However, there were still several challenges that included widespread poverty, ignorance, and lack of ready market for the farmers' fruits, cereals and legumes and poor agricultural policies. Asked about the possible household factors that affected farm

productivity in the sub-county, a 45 years old community development officer from Mavindini ward summarized it thus:

> "*There is a lot of poverty where people can't even afford the subsidized farming inputs such as seeds and fertilizers given by the governments. Besides, despite the area producing a diversity of fruits such as mangoes tangerines and oranges among others, farmers sell them at throw away prices through brokers. Lack of ready market was also extended to the cash crops that would enhance the residents' food security in one way or the other. For instance, previously Kathonzweni used to plant cotton which was sold at Wote Ginery but which collapsed some years back. In addition, the existing policies on agriculture were not favourable to the locals. In some cases, national policies appeared to conflict with the county government guidelines. Yet, the County government should play a bigger role in agricultural issues since agriculture is devolved to the county government".*

The fact that farming was generally done by the old and illiterate people who were resistant to change explained why there less yields. Although some Kathonzweni residents were able to access farm inputs such as seeds, fertilizers, and pesticides from the government at subsidized prices, most of them were unable to access due to their limited purchasing power. In any case, there was need to initiate proper coordination amongst all stakeholders so as to realize better outcomes. This would result into significant impacts on the resource access, farm productivity, food security and technical efficiency of the participants. This argument agreed with the one advanced by Dercon (2003) who held that through coordination, the effects would have been significantly higher hence making it easier to achieve development. This proposition further draws support from social scientists who argue that knowledge is not static but evolving and observation of the behaviour of people constitute the best learning platform (Mulwa, 2004).

Another key finding in this study would be the interaction of farm and non-farm strategies in the livelihood of households, the inter-flow of resources, and in particular how credit could be made more reachable and helpful to agricultural households. It however emerged that gender-based challenges were rife in Kathonzweni sub-county especially when it came to access to credit facilities and, to a lesser extent, when outsourcing labour for farm productivity. To some extent, women were unable to access loans on the assumption that they were not likely to repay promptly for lack of the

wherewithal. This was contrary to their male counterparts who, stereotypically, were thought to stand a better chance to repay their loans. Other previous studies have also concurred that gender is a significant factor in household farm productivity and food security. For instance, Arend (2011) found that gender of household head regardless of age is a significant variable affecting postharvest losses in smallholder farming.

Another contribution of the study was that it provided the basis upon which to measure food consumption against productivity. The seasonality of food at the household level made it difficult for households to sustain food security. Indeed, a common view was that food crops were hardly available between one harvest seasons to another. In any case, those who ran out food were mostly required to buy yet they lacked the money in the first place. These views were echoed in a study by Nyariki et al (2002). Nonetheless, it would be interesting to measure the impact of intervention participation in actual food intakes, which is a more exhaustive indicator of individual food security (FAO, 2003). It would be imperative to identify what motivates changes in food consumption patterns of the community in order to create incentives for cultivation of nutritious foods. The suggestion is born from the observation that even though nutrition and health education would be the focus of some interventions, there was apparent disinterest to participate in the activity or adopt the skills which were imparted. Indeed, ignorance had been mentioned as one of the biggest challenges when it came to household food productivity. Despite agricultural extension officers and NGOs offering relevant trainings to the farmers, most of them did not practise what they were taught.

Poor post-harvest behaviours such as storing cereals without treating them first and unfavourable storage facilities emerged as a great impediment to food security at the household level. However, Shiundu (2011) suggests that governments must involve the private sector so as to boost their engagement in marketing and storage of food and agricultural products. The storage facilities such as silos should guarantee acceptable quality and service standards. In this study it emerged that despite availab8ility of varied food crops such as mangoes and tangerines, there was no ready market hence restricting the number of people who could benefit from the produce. Yet, Songwe (2012) argues that countries facing food insecurity must assist their farmers gain access to market so as to allow flow of the farm produce to areas with deficiency. This as has been evidenced in

countries such as Malawi, Nigeria, and Ivory Coast, would also stabilize the commodity prices.

FAO (2008) further points out that in order to alleviating food insecurity in drought prone areas in sub-Saharan Africa, certain strategies needed to be adopted. These included investing in irrigation, planting different drought resistant crops, developing through research new varieties of drought resistant varieties of crops, encouraging intercropping, training and developing the capacity of the people in drought prone areas to harvest water as well as implementing and improving existing irrigation systems (FAO, 2008; Songwe, 2012). These sentiments clearly emerged in this study where expansion of agricultural activities through introduction of irrigation schemes was seen as panacea to food insecurity in Makueni County, and specifically in Kathonzweni sub-county. Indeed, very few countries have achieved sustainable and complex economies without first developing a successful domestic agricultural sector.

The agricultural sector provides many employment opportunities, and it is a source of economic prosperity and good health to many people living in rural areas. Therefore the focus of most countries around the world is to ensure that the agricultural sector is given priority in order to increase agricultural productivity. For instance, the Kenya government has tried to adopt some strategic responses aimed at solving food insecurity such as by establishment of the Agricultural Sector Development Strategy (ASDS). The general purpose of this strategy is to strategically make the agricultural sector a key driver for achieving the 10 per cent annual economic growth rate expected under the economic pillar of the Vision 2030. According to KARI (2010), through the ASDS, the Government aims at transforming the agricultural sector into a profitable economic activity capable of attracting private investment and providing gainful employment for the common people. Devolving funds to the grassroots has been the cornerstone of this strategy where these devolved resources are aimed at assisting to implement food security plans, including moving towards introducing Genetically Modified Organisms (GMO) and commencement of multibillion irrigation projects at Galana Kulalu (Andae, 2014).

CHAPTER FIVE: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.0 Introduction

This chapter provides a synopsis of the study based on its findings, overall observation of the household food security in semi-arid areas. The researcher also gives conclusion and recommendation to policy makers, development partners and academia in relation to research problem statement, objectives and field findings.

5.1 Summary of Key Findings

This part discusses the key findings in brief in relation to the study objectives and field data. It briefly highlights the challenges faced by households in farm productivity, household dynamics in Land use practices, farm practices and food production, post-harvest practices and their effects on food security and household factors in farm productivity and food security.

5.1.1 Household Food Security Status

The research established that there is food insecurity in Kathonzweni Sub-county yet most of the population are farmers and rely on food production for their livelihood. All the respondents unanimously said food insecurity was severe with no or minimum surplus at any given season. Based on the findings, most of the respondents said that their most recent harvest lasted households for a maximum 3 months. That left households to look for alternative ways to fill the gap as they waited for the next harvest season.

5.1.2 Challenges faced by households in farm productivity

It was established that the major challenge by the households in food production is failing rains since almost all of them relied solely on rain fed agriculture. Poverty has also been a great challenge to the residents limiting their purchasing power. There was also overreliance on maize and legumes (beans, peas and green grams as the main food crops which are not drought resistant crops. Besides, there was lack of market to drought resistant crops such as cotton and fruits which would have been an alternative to cushion households against food insecurity.

5.1.3 Household dynamics in land use practices

Regarding land ownership for farming, majority, 81% of the residents owned the land at the household level, with a few, 19% hiring during planting seasons. Concerning farm fertility, 40% of the respondents said that the land they usually farmed were moderately fertile, with only 3% of them holding that theirs were very fertile. Five percent said they didn't know to what extent their farms were fertile. Most landowners observed that there was a considerable fertility decline on their property. So as to enhance or restore fertility, majority, 65% of the respondents applied manure, followed by those who applied fertilizers, 23% There were also respondents who consulted agricultural extension officers for advice, 9% as well as those who decided to practice shifting cultivation, 3% in order to restore fertility on their farms.

In regard to how the households prepared their land for farming, most, 59% of the farmers used bullocks/donkeys to plough, followed by those who used hoe & cutlass, 32% a mixture of methods, 7% and those who used tractors, 2%

5.1.4 Farm Practices and Food Production

In relation to farm practices and food production, the respondents were asked if they practiced more than one farming methods in their farms. Majority, 84% used multiple methods of farming as opposed to the minority who accounted for 16%. Asked about the common farming methods used in their food production efforts, majority, 57% of the households indicated to be practicing mixed farming while only a few, 5% practiced mono cropping. On access to farm inputs such as seeds, fertilizers, and pesticides among others, majority of the respondents indicated that it wasn't easy due to their low purchasing power to afford even the government subsidized ones. The respondents were also asked about their level of access to labour for their farm productivity where a big majority, 98% answered to the affirmative while only 2% said they did not.

5.1.5 Post Harvest Practices and their effects on food security

Concerning their post-harvest practices and their effects on food security, the respondents were asked if they usually got satisfied with their harvest every season. Majority, 89% said 'no' while only 11% answered to the affirmative. On how often the households had

surplus after harvests, majority, 40% of the households indicated to be having the surplus less frequently while none, 0% said they experienced this very frequently. On the other hand, asked if they stored their post-harvest surplus for future use, majority, 81% of the respondents affirmed as opposed to 19% who said they did not. It also emerged that a simple majority, 56% of the respondents later consumed everything after they harvested. On the other hand, 44% divided their surplus for home consumption and for sale. No respondents said that they sold everything. Seventy three percent of the respondents said that they ever experienced a situation where they failed to harvest anything in a given season. Further, the findings show that majority, 69% bought food in case they ran out of their surplus or did not completely have any while Twenty five percent of the respondents relied on the governments and other donors to revamp their food reserves while only 5% of the households sought help from neighbours, friends or well-wishers.

5.1.6 Household factors in Farm Production and food security

It was established that majority, 76% of the respondents did not face any gender-based challenges while 24% of them said they had. The gender-based challenges included missing credit facilities, difficult in outsourcing of labour and women denied opportunities as paid labourers or low payments.

The study also sought to investigate how to enhance food security for the households. Some of the possible ways through which this would be done included technical expertise, provision of materials such as quality seeds, fertilizer etc, provision of relevant skills and materials. Besides, this would be done through provision of irrigation facilities. The respondents gave varied responses, but a simple majority, 32% felt that irrigation facilities were very critical in enhancing households' food security.

5.2 Conclusions

Descriptive statistical analyses were used to present data in the study. The analysis was used to empirically show the determinants of food security among smallholder farmers in Kathonzweni sub-county in Makueni County. A number of factors played a significant role in determining farm productivity hence food security. Such variables included gender of the household head, farming methods, and post-harvest practices such as how food crops were stored. The study came up with the following conclusions.

(i) Female-headed households had some difficulties accessing loan facilities as opposed to their male counterparts. It was concluded that women-headed households needed more capacity building in terms of farm productivity and food, nutritional and income security.

(ii) Descriptive analysis of age revealed that most household heads were above 45 years, lending credence to the argument that most young people were not very keen on farming especially in rural areas.

(iii) Farmers with higher levels of formal education (tertiary and university) were very minimal. This led to a conclusion that a lot needed to be done to encourage even people with higher education to actively participate in farm productivity so as to address food insecurity in rural areas. Educated farmers were more likely to adopt better technologies and superior general farming methodologies hence increasing farm output.

(iv) In order to enhance farm fertility, most of the farmers applied manure as opposed to fertilizers. Technically, use of manure mainly was only possible on small scale hence limiting most households from ever achieving optimal output from their farms. The conclusion was that this explained why most households in the area were food insecure despite them actively engaging in farming.

(v) The study also concluded that the more difficult it was accessing ready markets, the higher the chances that most household would be discouraged from pursuing farming actively due to the huge losses which were likely to be encountered after harvest.

(vi) Another conclusion of this study highlights the importance of access to support services such as agricultural extension and training in good farming practices and postharvest loss reduction efforts. Despite their significant role in farm productivity, few farmers received these government services and often the frequency was not ample for farmers to fully adopt the required knowledge and skills. An example is the significant role played by postharvest handling training, time of harvesting, type of storage used and storage duration in reducing postharvest losses. Training farmers in suitable postharvest handling practices and technologies would go a long way in improving postharvest handling efficiency in the farmer's individual plots, resulting

in overall postharvest loss reduction. For example, there was need to help farmers understand the techniques which will prevent initial aflatoxin contamination.

5.3 Recommendations

5.3.1 General Recommendations

(i) Female-headed households had some difficulties accessing loan facilities as opposed to their male counterparts. It was concluded that women-headed households needed more capacity building in terms of farm productivity and food, nutritional and income security.

(ii) There is need to sensitize the public on the right seeds to plant for higher returns. Besides, seed developing companies also need to be sensitized on the need to produce seed varieties that are drought resistant, aflatoxin resistant, and fungal-attack resistant, suitable for specific geographical areas based on their unique climatic conditions.

(iii) There was need to encourage the diversification of the diet of Kenyans, including Makueni County residents. This would reduce both the reliance on maize and other common crops.

(iv) Consideration should be given to a national stakeholders' meeting to raise awareness among farmers.

5.3.2 Policy recommendations

The identified determinants of farm productivity at household levels that would guarantee food security provide useful insight for policy makers, advisers, developers and sellers of farm inputs and post-harvest handling technologies. This information can yield extensive products in terms of the development of quality seeds and post-harvest management and education programs as well as the design of more effective government policies. Due to the variation in socioeconomic, demographic, knowledge, skills and risk aversion, new technologies and smallholder development programs need to be tailored to the requirements of a particular group of farmers if they are going to be effective. Programmes can only be tailor-made if government and development agencies are knowledgeable of the production and postharvest handling challenges faced by the farmers, hence the need for continued research and development.

Continued research and development programmes should be undertaken by Government, NGOs and research institutions to provide a strong basis for knowledge dissemination and documentation. Improved farm inputs and post-harvest handling technology, its adoption, productivity and market access is a dynamic process that requires persistent research and development programmes. To maintain and further improve productivity, minimize postharvest losses and access to markets, continued investment in agricultural research aimed at generating new and improving old technologies is fundamental. Research findings must however be communicated to the farmers using appropriate means.

It is important to note that while information on farm inputs, practices and post-harvest handling is readily available at the relevant Government Agricultural departments and agencies, the challenge of accessibility, packaging and dissemination to smallholder farmers still remains a big challenge. This could be addressed through the use of frequent extension services, farmer or producer groups, farmer field days and forums for information exchange.

It is recommended that government and other players in the agricultural sector plan initiatives to educate smallholder farmers on the benefits of proper farm practices as an effective means to curb food insecurity. Government policy aimed at training and developing farmer capacity in farm productivity is essential to ensure that farmers meet the demands of their growing needs and those of the whole nation. Appropriate training of extension officers to ensure that they are well equipped is vital in farm productivity practices and technologies. Appropriate monitoring systems are also crucial in ensuring that frequent extension services are provided to the smallholder farmers as this will facilitate better adoption of farm practices and technologies.

In the absence of appropriate storage facilities, it is mandatory for farmers to use appropriate post-harvest handling practices to preserve their surplus in quality environments. Postharvest loss reduction could provide market access, additional income to the farmers and ensuring the availability of a healthy diet.

Road improvement projects can also play a crucial role towards post-harvest loss reduction in the study area. Smallholder farmers also need assistance in accessing

irrigation resources to improve their farm produce production. Irrigation, especially in the drier months, would improve yields and increase the proportion of farm produce. It is recommended that government policy with regard to smallholder farmer support should focus on facilitating the farmers to access reliable water supply for production. Rain-fed production confines farmers to only produce principally during the rainy season. However, irrigation would provide farmers with options of when and how much to produce, and how to avoid pests and diseases. Provision of irrigation opportunities should be coupled with farmer education on the water demands to mitigate disease damage and critical water demand periods in the production of food crops.

5.4 Recommendations for Further Study

Limited agricultural extension services and agricultural training in the study area was evident as the main source of information on smallholder farming, hence its role cannot be ignored. A comprehensive study on the state of agricultural extension and training and their efficiency as well as comparative studies between regions, provinces or even similar communities could be important when advising policy-makers on the approach they can follow in developing rural agricultural livelihoods.

A comparative analysis should be done to find if any differences exist in the food security, nutritional status and income gains from household from ASAL and non-ASAL areas.

Comprehensive data on farm production practices need to be gathered from different communities in different regions or provinces to have a clear map which can be applied towards targeted assistance to the farmers who are more vulnerable in any part of the country. Such data is also crucial for tailor-made training programmes since a ‘one size fits all’ programme may not apply.

REFERENCES

Adeola, R.G and O.O Adebayo (2008). *Sources and Uses of Agricultural Credit by Small Scale Farmers in Surulere Local Government Area of Oyo State.* Agricultural Economics and Extension Deparment, Ladoke Akintola University of Technology, Nigeria, 2008.

AFIDEP, 2012. *Pupulation, Climate Change, and Sustainable Development in Kenya.*Nairobi: AFIDEP.

Andae, G. (2014) Ministry clears 3,000 acres for Galana pilot irrigation scheme. Business Daily, Nairobi Kenya.

Babalola, D.A., Makinde, Y.O., Omonona, B.T. and Oyekanmi, M.O**.** (2010) Determinants of post- harvest losses in tomato production: a case study of Imeko – Afon local government area of Ogun state. *Journal of Life and Physical Sciences*, 3(2): 14-18.

Babatunde, R.O., Omotesho, O.A., Olorunsanya, E.O. and Owotoki, G.M. (2008). "Determinants of Vulnerability to food insecurity: A gender-based analysis of farming households in Nigeria". *Indian Journal of Agricultural Economics* 63:1, 116-125.

Bandiera, O., and Rasul, I., (2006). Social Networks and Technology Adoption in Northern Mozambique. *The Economic Journal* 116(514): 869-902.

Barslund, M. and Tarp, F. (2003). *Formal and Informal Rural Credit in Vietnam. Department of Economics .University of Copenhagen*. No. 07-07.

Caswell, M., Fuglie, K.O., Ingram, C., Jans, S. and Kascak, C. (2001) *Adoption of agricultural production practices: lessons learned from the US Department of Agriculture Area Studies Project.* E.R.S: USDA.

CBS. (2009).*Population and Housing Census.* Nairobi: Kenya Central Bureau of Statistics.

Central Intelligence Agency (CIA) (2012). "Kenya." The World Factbook. Retrieved from https://www.cia.gov/library/publications/the-world-factbook/geos/ke.html(Accessed September 27, 2016).

Cherry, N. (2015), Energizing Leadership. South Melboure, Victoria Oxford University Press.

Chu, S. (2009). *Global Food Crisis May Deteriorate: Tackling Climate Change.* Great Britain: Oxfam.

Cohen, L., Manion, I., and Morrison, K. (2002) *Research Methods in Education* 5th Ed. Routldge Falmer New York.

Cooper, D., & Schindler, P. (2003). Business Research Method (7th ed.). New York: McGraw Hill.

Daily Nation Correspondents. (2009, January 21). *Famine Pushes families to the Edge*: The Daily Nation. Living, pg 6-7.

Dercon, S. (2003). Poverty Traps and Development. The Equity – Efficiency Trade-off Revised. Paper prepared for the conference on Growth, Inequality and Poverty, organized by Agence française de dèveloppement and the European Development Research Network.

Devereux, S. and Maxwell, S. (eds) (2001). *Food security in Sub-Saharan Africa*. London: ITDG

FAO (1996) *Rome Declaration on World Food Security*. Rome: FAO.

FAO (2003). The State of Food Insecurity in the World. Monitoring progress towards the World Summit and Millennium Development Goals.

FAO (2008).the State of food Insecurity in the world: Eradicating Hunger- Taking Stock Ten Years after the World food Summit, Rome: FAO.

FAO, (2014). *The State of Food Insecurity in the World,* Rome: FAO.

FAO, AHP (2002). *Anti Hunger Programme: Reducing hunger through agriculture and rural development and wider access to food.* Rome: FAO.

FAO,(2006). *Policy Brief on Food Security,* Rome: FAO.

FAO. (2008). An Introduction to the Basic Concepts of Food Security. EC - FAO Food Security Programme.

FEWS NET (2010); GoK; WFP, 2014. *Kenya: Food Security Outlook,*Nairobi: FEWS NET.

FEWS NET (2013) Kenya Food Security Brief www.fews.net/centers/files/Kenya. Retrieved on 25th June, 2017.

FEWS NET and the U.S. Geological Survey (USGS). (August 2010.) "A Climate Trend Analysis of Kenya."

Food and Agriculture Organization (FAO). (2001). *FAO's State of Food Insecurity 2001.* Rome: FAO.

Food and Agriculture Organization (FAO). (2006). *The State of Food Insecurity in the World 2006: Eradicating World Hunger—Taking Stock Ten Years after the World Food Summit.* Rome: FAO. Also available at www.fao.org/sof/sofi.

Food Security and Nutrition. Administrative Committee on Coordination (ACC) Occasional Policy Papers. Rome: IFAD, FAO, and WFP.

Government of Kenya (2011.) National Food and Nutrition Security Policy. Retrieved from http://www.kilimo.go.ke/kilimo_docs/pdf/National_Food_and_Nutrition_Security_Policy.pdf. (Accessed September 27, 2017).

Gregory, P. J., Ingram, J. S. I. and M, B., (2005). Climate Change and Food Security. *Philosophical Transactions of the Royal Society,* Issue 360, pp. 2139-2148.

Hilton. (2010). The Southern Africa Response to Food Security and Global Food Crisis. *Trade Knowledge network, Series on Trade and Food Security Policy Report 7.*

Holden, P. and V. Prokopenko (2001). *Financial Development and Poverty alleviation: Issues and Policy Implications for Developing and Transition Countries*. IMF *Working Papers.* WP/01/60.The International Monetary Fund. Washington D.C.

Household Food Insecurity: Why it's So Important and Yet So Difficult to Do." *American Society for Nutrition*.

Human Well-Being." Retrieved from http://www.wri.org/publication/natures-benefits-kenya. (Accessed September 2016).

International Fund for Agricultural Development (IFAD), Food and Agriculture Organization (FAO), and World Food Programme (WFP). (2000). *System-Wide Guidance on Household.*

International Fund for Agricultural Development (IFAD). "Enabling Poor Rural People to Overcome Poverty in Kenya." Retrieved from http://www.ifad.org/operations/projects/regions/pf/factsheets/kenya.pdf. (Accessed September 27, 2016).

Iram, U. and Butt, M. S. (2004). "Determinants of household food security: An empirical analysis for Pakistan". *International Journal of Social Economics,* 31(8): 753 – 766.

Kabeer, N. (1990). Women, household food security and coping strategies. Nutrition Policy Discussion Paper (UN/ACC) No. 6, Geneva, Switzerland.

Kader, A.A. (2005) Increasing food availability by reducing postharvest losses of fresh produce. *Acta Horticulture,* 682: 2169-2175.

KARI (2010) Policy Responses to Food Crisis in Kenya. Accessed on 24/8/2015 from http://www.foodsecurityportal.org/kenya/food-security-report.

Kennedy, E., and Peters, P. (1992) Household Food Security and Child Nutrition: The Interaction of Income and Gender of Household Head *World Development*, 20(8) 1077-1085.

Kenya National Bureau of Statistics et al. (June 2010.) "Kenya Demographic and Health Survey 2008-09." Retrieved from http://www.measuredhs.com/pubs/pdf/FR229/FR229.pdf. Accessed April 20, 2017.

Kenya Population and Housing Census 2009. (2010). Kenya National Bureau of Statistics, Ministry of Planning, National Development and Vision 2030.

Kigutha, H. N. (1995). *Effects of Seasons on Household Security and Nutritional Status of Smallholder Rural Households in Nakuru District.* Food and Nutrition Studies Program, Report Number 55/1995.

Killick, T., Kydd, J. and Poulton, C. (2000) Agricultural liberalisation, commercialization and the market access problem in the rural poor and the wider economy: the problem of market access. *Background Paper for IFAD Rural Poverty 2000 Report.* Rome: IFAD.

Kimani-Murage, E.W., et al., 2011. 'Food Security and Nutritional Outcomes among Poor Urban Orphans in Nairobi.' http:// www.ncbi.nlm.nih.gov/pubmed/20945109.

Kirwa, N. (2014) Strategic Responses by the Ministry of Agriculture, Livestock and Fisheries to Challenges of Food Security in Kenya. An MBA project submitted to the University of Nairobi.

Lemba, J.K. (2009). Intervention model for sustainable household food security in the dry lands of Kenya: Case study of Makueni district. PhD thesis, Ghent University.

Lewin P.A. (2011). Three Essays on Food Security, Food Assistance, and Migration. PhD thesis, Oregon State University.

Lune, S., Parke, C.S., & Stone, C.A. (1998). A framework for evaluating the consequences of assessment Programs. *Education Measurement*, 17 (2), p.24-28.

Maede, B. & Rosen, N. (2013) *International Food Security Assessment*, 2013-2023.

Magingxa, L.L., Alemu, Z.G. and Van Schalkwyk, H.D. (2009) Factors influencing access to produce markets for smallholder irrigators in South Africa. *Development Southern Africa*, 26(1): 47-58.

Makueni County Government. (2013). Makueni County Integrated Development Plan (CIDP). Makueni County Government.

Mallick, D., and Rafi, M. (2010). Are female-headed households more food insecure? Evidence from Bangladesh. *World development* 38 (4): 593-605.

Maslow, A. (1954). *Motivation and personality.* New York, NY: Harper.

McLanahan, S. (1985) Family structure and the reproduction of poverty. *American Journal of Sociology,* 990(4), 873–901.

Mdluli, F., Thamaga-Chitja, J. and Schmidt, **S.** (2013) Appraisal of hygiene indicators and farming practices in the production of leafy vegetables by organic small-scale farmers in Umbumbulu (Rural KwaZulu-Natal, South Africa). *International Journal of Environmental Research and Public Health,* 10: 4323-4338.

Meinzen-Dick, R., Quisumbing, A., Behrman, J., Biermayr-Jenzano, P., Wilde, V., Noordeloos, M., Ragasa, C., and Beintema, N. (2010). Engendering Agricultural Research. IFPRI Discussion Paper 973. Washington, DC: International Food Policy Research Institute. www.ifpri.org/publication/engendering-agricultural-research.Misselhorn A.A. 2005 . "What drives food insecurity in southern Africa? a meta-analysis of household economy studies". *Global Environmental Change*, 15: 33–43.

Ministry of finance and planning. Nairobi: Government Printer.

Miraux, M., Cox, D.N., Cotton, N. and Evans, G. (2007) An adaptation of repertory grid methodology to evaluate Australian consumers' perceptions of food products produced by novel technologies. *Food Quality and Preference,* 18: 834–848.

Mpuga, P. (2004) *Demand for Credit in Rural Uganda*. Growth, Poverty Reduction and Human Development in Africa Centre for the Study of African Economies, March 21-22, 2004.

Mugenda, O.M & Mugenda, A.G (1999). *Research Methods. Quantitative and Qualitative Approaches*. Nairobi, Acts Press.

Mulwa, F. (2004). Demystifying Participatory Development In its Global Context Rooted in Participatory Strategic Planning. Zapf and Olivex Publishers, Nairobi.

Muyanga, M. (2004). Insights to rural household food insecurity in Kenya. National Agricultural Research Organization. *Uganda Journal of Agricultural Sciences,* 2004:791-796.

Mwendwa, P. and Giliba, R., (2012). Climate Change Impacts and Adaptation Strategies in Kenya. *Chinese Journal of Population Resources and Environment,* 10(4), pp. 22-29.

Nachmias, F. And Nachmias, D. (2007), Research methods in the social sciences, Worth Publishers

Naidoo, K.D. (2009) *The practice, constraints and perceptions of improving soil quality through manure application: a case study of three smallholder farmer groups.* Unpublished Master of Agriculture Thesis. University of KwaZulu-Natal.

Narayan, D. & Nyamwaya, D. (1995). *A Participatory Poverty Assessment Study Kenya.* February – April 1994. A World Bank & UNICEF Report.

National Council for Population and Development. Ministry of State for Planning, National Development and Vision 2030. (2012.) "Sessional Paper No. 3 of 2012 on Population Policy for National Development."

Neuman, W.L (2000) Social Research Methods, Qualitative and Quantitative Approaches. 4th Edition, Allyn & Bacon, Needham Heights.

Ngechu, M. (2004). Understanding the Research Process and Methods. *An Introduction to Research Methods*. Acts Press, Nairobi.

Nuncio, J. (2013) Hungry Neighbours? Indonesia's Food Strategy and Water Security. Future Directions International Pty Ltd. Dalkeith, Australia.

Nyangito, H. O., Nzuma, J., Ommeh, H. and Mbithi, M. (2004). *Impact of Agricultural Trade and Related Policy Reforms on Food Security in Kenya*. The Kenya Institute For Public Research and Analysis (KIPPRA), Nairobi KIPPRA Discussion Paper No. 3.

Nyangweso P.M., M.O Odhiambo, P. Odunga, M.K. Korir, M.J. Kipsat and A.K. Serem. (2007). Household food security in Vihiga district, Kenya: determinants of dietary and diversity. African Crop Science conference proceedings vol 8 pp 1383-1389.

Nyariki, D.M., Wiggins, S. L., Imungi, J. K., (2002). Levels and Causes of Household Food and Nutrition Insecurity in Dryland Kenya. *Ecology of Food and Nutrition*, 41: 155-176.

Orodho J.A (2005). Elements of Education and Social Science Research Methods, Nairobi, Masola Publishers.

Orodho, A. (2006). "Country Pasture/Forage Resource Profile." Food and Agriculture Organization.Retrievedfromhttp://www.fao.org/ag/AGP/AGPC/doc/counprof/PDF%20files/Kenya.pdf. (Accessed September 5, 2017).

Ortmann, G.F. and King, R.P. (2010) Research on agri-food supply chains in Southern Africa involving small-scale farmers: Current status and future possibilities. *Agrekon,* 49(4): 397-417.

Patel, P. N., Mbagaya, G. M. and Imo, B. E., (2012). Impact of Climate Change on Food and Nutrition Security in Kenya. *International Journal of Current Research,* 4(1), pp. 242-248.

Pinstrup-Andersen, P. (2009) Food security: definition and measurement. *Food security*, 1. 5-7.

Quisumbing, A. R., Lynn, R. B., Hilary, S. F., Lawrence, H., and Christin, P. (1995).*Women: The Key to Food Security.* Food Policy Statement 21.Washington, DC: International Food Policy Research Institute.

Ramin, B. M. & McMichael, A. J., 2009. Climate Change and Health in Sub-Saharan Africa: A Case-Based Perspective. *EcoHealth,* 1(6), pp. 52-57.

Republic of Kenya (1992), *Makueni District Development Plans from 1992-2008* .Nairobi: Government Printer.

Republic of Kenya (2000): 2nd Report on poverty in Kenya Vol 3 Welfare indicators atlas.

Republic of Kenya, (2001) *Poverty Eradication Strategy Papers for the period 2001-2004 VOL 1.* Nairobi: Government Printer.

Republic of Kenya, Ministry of Agriculture. "Post-Harvest Challenges to Food Security in Kenya."Retrievedfromhttp://www.kilimo.go.ke/kilimo_docs/food_security_reports/march2013_Report.pdf. (Accessed September 27, 2016).

Republic of Kenya: Annual District Agricultural reports for Makueni District 1992 – 2002. Ministry of Agriculture and livestock development. Nairobi: Government Printer.

Ruel, Marie T., et al. 2010. "The Food, Fuel, and Financial Crises Affect the Urban and rural Poor Disproportionately: A Review of the Evidence." *The Journal of Nutrition*. 140: 170S – 176S.

Shiundu, A. (2011). *Government Urged to Buy Excess Maize to Stem Hun*ger. 12 January 2011. Daily Nation: Nairobi, Kenya.

Sisay, Y. (2008) . *Determinants of Smallholder Farmers" Access to Formal Credit:* The Case of MetemaWoreda, Ethiopia. Department of Rural Development and Agricultural Extension, Haramaya University-Ethiopia.

Songwe, V. (2012).*Strategies to Improve Food Security in Africa. Foresight Africa*, 4th Edition. Boston: McGraw-Hill. USA.

Symons, K., 2014. Anti-politics, Apocalypse and Adaptation in Kenya's National Climate Change Response Strategy. *Scottish Geographical Journal.*

The Kenya Food Security Steering Group (KFSSG). (July 2008.) "The Impact of Rising Food Prices on Disparate Livelihood Groups in Kenya."

Tiwari T. P. , G. Ortiz-Ferrara ,D. B. Gurung , R. Dhakal, R. B. Katuwal ,B.B. Hamal , N.Gadal and D. S. Virk. (2010). Rapid gains in food security from new maize varieties.

Uaiene, R. N. (2011). Determinants of Agricultural Technology Adoption in Mozambique . Paper presented at the International Conference on Increasing agricultural productivity & enhancing food security in Africa: New challenges and opportunities. Addis Ababa, Ethiopia. Interantional Food Policy Research Institute. 1-3 November 2011

Waithaka, M., Nelson, G., Thomas, T. and Kyotalimye, M., (2013). Kenya. In: *East African Agriculture and Climate Change.* Washington, D.C.: International Food Policy Research Institute.

Wambua, B. N. (2013). The status and effects of food Insecurity on the Livelihood Opportunities and Options in Semi-Arid Parts of Makueni District, Kenya. *Asian Journal of Agriculture and Food Sciences*, 1(4), 172-179.

World Bank, (2007b). "From Agriculture to Nutrition: Pathways, Synergies, and Options." Report 40196 GLB, World Bank, Washington, DC.

World Bank. (2007a). *Gender and Economic Growth in Kenya.* Washington, DC: World Bank.

Zeller, M. (2000). *Determinants of Credit Rationing: A Study of Informal Lenders and Formal Credit Groups in Madagascar. World Development*, 22(12):1895-1907.

APPENDICES

APPENDIX I: INTRODUCTION LETTER

SALOME SYEKETHE MUTIE

P. O BOX …….

DATE……

Dear Respondent,

RE: <u>Participation in Research</u>

I am a postgraduate student pursuing a Master of Arts degree in Sociology (Rural Sociology and Community Development) in the University of Nairobi. In order to enable me to complete this program, I am conducting a study on: **household characteristics, farm use practices and effect on food security in Kathonzweni sub-county, Makueni County.** I would therefore kindly ask you to participate in this study by helping me fill this questionnaire. Please answer all questions freely and in honesty. Your actual name will not be revealed to anyone and the data you provide will only be used for the purpose of this academic study. Your participation is important for the success of this project and I would highly appreciate your contribution.

Thanking you most sincerely in advance.

Yours Faithfully,

Sign……

SALOME SYEKETHE MUTIE

APPENDIX II: QUESTIONNAIRE FOR HOUSEHOLDS HEADS

Dear Respondent,

This research is meant for academic purpose only. The responses you give will be treated with utmost confidentiality. You are requested to provide your honest answers in this questionnaire.

Please circle where appropriate or fill in the required information on the spaces provided

SECTION A: SOCIAL AND DEMOGRAPHIC CHARACTERISTICS OF HOUSEHOLDS

Location……..

No.	Questions	Response	
1.	Gender	Male	1
		Female	2
2.	Age	(a) 18-25 ( ) (b) 26-35 ( ) (c) 36-45 ( ) (d) 46-55 ( ) (e) 56-& above ( )	
3	Marital Status	(a) Single ( ) (b) Married ( ) (c) Separated ( ) (d) Divorced ( ) (e) Widowed ( )	
4	Highest Level of Education	(a) Primary ( ) (b) High School ( ) (c) Tertiary ( ) (d) University ( ) (e) Other...specify ( )	

5	Religion	(a) Christianity ( ) (b) Islam ( ) (c) Traditional ( ) (d) None ( ) (e) Other...specify ( )	
6	Size of the Household	(a) 1-3 Members ( ) (b) 4-6 Members ( ) (c) 7-9 Members ( ) (d) 10 & above ( )	
7	Do you keep animals?	Yes	1
		No	2
8	If yes, what kind of animals do you keep?		
9	Occupation	(a) Farmers ( ) (b) Businessperson ( ) (c) professional ( ) (d) casual laborers ( ) (e) Other...specify ( )	

SECTION B: CHALLENGES FACED BY HOUSEHOLDS IN FARM PRODUCTIVITY

10. Do you feel that you are food secure? **Yes ( ) No ( )**

11. What is your main food source?

    (i) Farm
    (ii) Purchases
    (iii) Food aid

12. How much do you produce?

    (i) Enough for my family ( )
    (ii) Enough for my family and surplus ( )
    (iii) Too little for my family ( )

13. How many months did your most recent harvest last for household consumptions? ----------

14. What types of food crops do you grow as your preference?

    (i) Maize ( )
    (ii) Sorghum ( )
    (iii) Millet ( )
    (iv) Finger millet ( )
    (v) Potatoes ( )
    (vi) Legumes ( )
    (vii) Fruits ( )
    (viii) Vegetables ( )
    (ix) Other (specify)… ( )

15. Do you grow your common food crop out of choice or you are forced by circumstances?

    (i) Out of choice ( )
    (ii) Forced by circumstances ( )

16. Do you face any specific challenges in your farm productivity? **Yes** ( ) **No** ( )

17. If yes, which ones?

    ……
    ……
    ……

SECTION C: HOUSEHOLD DYNAMICS IN LAND USE PRACTICES

18. Do you have your own land for farming, or do you hire? ***Own ( ) hire ( ) given for free ( )***

19. On a scale of 1-5 where ***1= Not Fertile, 2= Fertile, 3= moderately fertile, 4=Very fertile, 5=don't know***, how fertile is the land you usually farm? ( )

20. If you own the land, have you ever observed fertility decline on your farm? **Yes** ( ) **No** ( )

21. What do you usually do to enhance or restore fertility on your farm?

(i) Apply fertilizer ( )

(ii) Apply manure ( )

(iii) Consult extension officer for advice ( )

(iv) Other (specify)…… ( )

22. How do you mostly prepare your land/farm for cultivation? (*Tick one response**). Hoe & cutlass ( ) Bullock/Donkey ( ) Tractor ( ) other (specify)…. ( )***

SECTION D: FARM PRACTICES ON FOOD PRODUCTION

23. Do you practice more than one farming methods in your farm? **Yes** ( ) **No** ( )

24. What is your common farming method?

(i) Mono cropping? ( )

(ii) Mixed cropping? ( )

(iii) Mixed farming? ( )

25. Do you have easy access to farm inputs like seeds, fertilizers, pesticides etc.? **Yes** ( ) **No** ( )

26. On a scale of 1-5 where ***1= Least Frequent, 2= Less Frequent, 3=Not at all, 4=Frequent, 5=Very Frequent***: *(Please tick one response):*

(i) How frequent do you buy farm inputs? ( )

(ii) How frequent do you get free farm inputs? ( )

(iii) How frequent do you afford farm input? ( )

(iv) Other means (specify)…… ( )

27. Do you have easy access to labour for your farm production? **Yes** ( ) **No** ( )

28. If yes, on a scale of 1-5 where ***1= Least Frequent, 2= Less Frequent, 3=Not at all, 4=Frequent, 5=Very Frequent***: *(Please tick one response),*

(i) How frequent do you access family labour? ( )

(ii) How frequent do you access hired labour? ( )

(iii) How frequent do you afford labour for your farm production? ( )

(iv) Others (specify)…… ( )

SECTION E: POST-HARVEST PRACTICES AND THEIR EFFECTS ON FOOD SECURITY

29. Do you usually get satisfied with your harvest every season? **Yes** ( ) **No** ( )

30. On a scale of 1-5 where ***1= Least Frequent, 2= Less Frequent, 3=Not at all, 4=Frequent, 5=Very Frequent***, how frequent do you have surplus? ( )

31. Do you save/store your surplus for family future use? **Yes** ( ) **No** ( )

32. How much is consumed and sold?

    (i) We consume all that I harvest ( )

    (ii) We sell all I harvest ( )

    (iii) We consume part of what I harvest and sell the rest ( )

33. Do you sometimes completely fail to harvest anything during harvesting season? **Yes** ( ) **No** ( )

34. If yes, how do you get the surplus for your family?

    (i) Buy ( )

    (ii) Ask from neighbours, friends, or well-wishers ( )

    (iii) Depend on the county government and other donors ( )

SECTION F: HOUSEHOLD FACTORS IN FARM PRODUCTION AND FOOD SECURITY

35. Have you ever faced any gender-based difficulties in your farm productivity? **Yes** ( ) **No** ( )

36. If **yes**, what sort of challenge did you face?

    (i) Missing a credit facility because of my gender?

    (ii) Failing in outsourcing labour because of my gender?

    (iii) Others (specify).....

37. What do think you need to enhance food security for your household?

(i) Technical expertise ( )

(ii) Materials only (e.g. quality seeds, fertilizer etc ( )

(iii) Skills and materials ( )

(iv) Training ( )

(v) irrigation facilities ( )

38. In your opinion, what are the household factors that need to be addressed in order to enhance food security in your sub-county?

……

……

……

Thank you very much for your time.

APPENDIX III: KEY INFORMANTS (KIs) INTERVIEW GUIDE FOR COMMUNITY DEVELOPMENT OFFICERS, AGRICULTURAL EXTENSION OFFICERS, NGOs' HEADS, & LOCAL CHIEFS

SECTION A: SOCIAL AND DEMOGRAPHIC CHARACTERISTICS OF HOUSEHOLDS

1. Introduce yourself and describe your designation.

SECTION B: CHALLENGES FACED BY HOUSEHOLDS IN FARM PRODUCTIVITY

2. Do you think Kathonzweni sub county is food secure?
   (i) Do you think what they produce is enough for family consumption, or they also have surplus?
   (ii) In your opinion, is what they produce too little for family consumption; and if so, how do they get the surplus?
3. Do the Kathonzweni residents face any specific challenges in food production; and what are these challenges?

SECTION C: HOUSEHOLD DYNAMICS IN LAND USE PRACTICES

4. Do the most of the people here own land they farm?
5. How fertile would you say most of the land is, and how do they enhance/restore land fertility?
6. What is the common mode of preparing land for cultivation and do you think that is the best to maximize food production?

SECTION D: FARM PRACTICES ON FOOD PRODUCTION

7. What are their common farming methods, and would you say that method is the best?
8. How easily do the Kathonzweni residents access farm inputs like seeds, fertilizers, pesticides etc.? How do they access farm inputs?
9. How cheap is farm labour, and how easily accessible is it?

SECTION E: POST-HARVEST PRACTICES AND THEIR EFFECTS ON FOOD SECURITY

10. Do most people in Kathonzweni harvest enough for their households?

11. How do they store their surplus?
12. How much is consumed and sold; for example, do most household consume or sell all they harvest?
13. Do the residents sometimes completely fail to harvest anything during harvesting season? And how do they get the surplus for your family?

SECTION F: HOUSEHOLD FACTORS IN FARM PRODUCTION AND FOOD SECURITY

14. In your opinion, what are the household factors in farm production that most residents are faced with?

……

……

……

……

Thank you very much for your time.

APPENDIX IV: BUDGET

ITEM	**AMOUNT IN KSHS.**
Transport	5,000.00
Field Work	30,000.00
Stationery	4,000.00
Typesetting and Printing	2,500.00
Binding	1,500.00
Miscellaneous	5,000.00
TOTAL	**48,000.00**

APPENDIX V: WORK PLAN

Activity	**The year 2017 (Months)**							
	March	**April**	**May**	**June**	**July**	**Aug**	**Sept**	**Oct**
Proposal Writing								
Proposal Approval								
Data Collection								
Data analysis								
Compiling chapters								
Presenting the research project								