ROLE OF WOMEN FARMERS IN HOUSEHOLD FOOD SECURITY IN MPEKETONI LOCATION, LAMU COUNTY, KENYA

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NOVEMBER, 2018

DECLARATION

This thesis is my original work and has not been presented for a Degree in any other University.

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DEDICATION

This thesis is dedicated to my family: my husband Wilfred and children - Dennis, Prudence and Samuel.

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I thank God for giving me wisdom through this academic journey and for the capacity to undertake this research.

I drew heavily on the experience and ideas of my supervisors Dr. Lucy Ngige and Dr. Eunice Njogu, their tireless guidance has enabled me to refine my research skills. They gave me the chance to see my best side. I thank the staff of the Community Resource Management and Extension department as well as my colleague students for their support through the academic journey.

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I owe special appreciation to the respondents at Mpeketoni Location whose time and input into the research made the study a reality. The research couldn't have been completed successfully without the dedication of two research assistants: James Kimemia and Petronilla Kanini.

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LIST OF ACRONYMS AND ABBREVIATIONS

ASAL	Arid and Semi-arid Lands
COMESA	Common Market for Eastern and Southern Africa
ECA	Economic Commission of Africa
FAO	Food and Agricultural Organization
GDP	Gross Domestic Product
GNP	Gross National Product
GOK	Government of Kenya
HDI	Human Development Index
HHFS	House Hold Food Security
KARI	Kenya Agricultural Research Institute
KIHBS	Kenya Integrated Household Budget Survey
LDDP	Lamu District Development Plan
LDSP	Lamu District Strategic Plan
LRA	Lamu Long Rains assessment
MOA	Ministry of Agriculture
SCN	Standing Committee on Nutrition
SDG	Sustainable Development Goals
NGOs	Non-Governmental Organizations
SSA	Sub Saharan Africa
SPSS	Statistical Package of Social Sciences
UN	United Nations
UNDP	United Nations Development Programme
UNEP	United Nations Environmental Programme
USDA	United States Development Agency
WFP	World Food Programme

OPERATIONAL DEFINITION OF TERMS

Farm inputs: These included the farm size; fertilizers; seeds and pesticides used by the farming households.

Farming practices: These were the farm management activities such as conservation of soil fertility, crop rotation, mixed farming and terracing.

Household: referred to all persons who occupy a housing unit and share food from the same pot.

Household food security: referred to a situation whereby members of a household have access to adequate amount of food all year round; This study classified household food security into three categories; a) food secure b) food insecure c) vulnerable to food insecurity.

Post-harvest technology: Referred to handling of farm produce after harvesting, for example through drying or use of chemicals.

Women farmers: Referred to the female member in a household who is involved in food production, cooking and storage.

ABSTRACT

Women play a vital role in food production, however, little has been documented about their role in food security for their households despite their efforts in food production. The purpose of the study was to assess the role of women in household food security in Mpeketoni Location, Lamu County, Kenya. The objectives of the study were: to identify the demographic and socioeconomic characteristics of women farmers; to determine farming inputs used by women farmers; to establish the farming practices adopted by women farmers; to establish post-harvest technologies practiced by women farmers and to establish the status of household food security among households in Mpeketoni Location, Lamu County. The study employed cross sectional survey research design based on a sample of 392 households selected using systematic random sampling. Data was collected from the women farmers using direct interview guides. Quantitative data was analyzed using Statistical Package for Social Sciences (SPSS), while qualitative data was analyzed using a thematic approach. The data was then presented using frequencies, percentages and tables. Chi-square statistical test was used for hypothesis testing. The hypotheses Ho_1, Ho_2 and Ho_3 were rejected at 0.05 significance level. About one third of the women farmers were between 31-40 years of age, representing 43.2% of the target population, 77.7% of the women farmers were married, devoted to farming and that 77.3% of them obtained income from farming and sale of crops. Findings on the roles of women farmers included use of diverse farming inputs such as manure, fertilizers, pesticides and seeds. They also adopted various farming practices such as mixed farming, mixed cropping, crop rotation, terracing and weed control which were aimed at diversifying the diet for their households. The study found out that there was vast land ownership but much less land was directed to farming. Moreover, women farmers lacked knowledge on use of farm inputs especially certified seeds and fertilizers which contributed to the inability by the women to sustain food security for their households. Household food security differed by demographic characteristics, size of farm under food crop, farming experience and use of certified (hybrid) seeds were statistically significant; indicating that household food security differed on the basis of these farm inputs. On farming practices, households which practiced mixed cropping, crop rotation and weed control were associated with higher food security and vice versa. Findings indicated that households that were food secure were 42.9%, those which were vulnerable to food insecurity were 36.5% while the food insecure households were 20.6%. The roles played by women farmers in producing food for their households included ensuring dietary diversity and undertaking various farming practices and farm inputs. These roles were however hindered by low acreage put under farming and inadequate farm inputs such as fertilizers and hybrid seeds. The study recommends that the government puts in place policy recommendations aimed at ensuring household food security and reviews policies to ensure problems that constrain women roles in food security are addressed. Agricultural extension policies should be reviewed to increase access by women farmers so as to enhance household food security. The government should as well provide subsidized farm inputs and technologies as well as involving other stakeholders in provision of extension services with the aim of enhancing household food security.

CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

Food insecurity in the developing world and especially in Sub-Saharan Africa has dominated public debate and is an issue of global concern (Economic Commission on Africa, 2005). Africa remains largely food insecure despite the fact that the action needed to reverse the situation has been discussed in a number of conferences and publications (Sustainable Development Goals report, 2015). These include the Harare Declaration of African Ministers of Agriculture, Food and Agricultural Organization, World Food Programme, the Africa's Priority Programme for Economic Recovery and development. The other one is the African Alternative Framework to Structural Adjustment Programmes for socio-economic recovery and transformation. The recent one is the international conference on population and development and the common African agricultural programme (SDG report, 2015).

The major challenge to food security in Africa is its underdeveloped agricultural sector that is characterized by the following: over-reliance on primary agriculture, low fertility soils, minimal use of external farm inputs, environmental degradation, significant food crop loss both during and after harvest, inadequate food storage and preservation techniques that result in significant commodity price fluctuation (Boon, 2009). Ninety five percent of the food in Sub-Saharan Africa is grown under rain fed agriculture making food production vulnerable to adverse weather conditions (Boon, 2009). There is an overall decline in investment on farm input including fertilizers, seeds and technology adoption. Access to fertilizer use is constrained by market liberalization and trade policies that increase fertilizer prices relative to commodity

prices. There is also poverty and cash constraints that limit farmer's ability to purchase fertilizer and other inputs (Ngalu, 2011).

Kenya's current food security situation is an issue of concern (Icheria, 2012). Food insecurity is a major challenge that is caused by a number of factors in the national and local levels. Several efforts have been put in place to alleviate food insecurity at all levels. Some of the efforts are geared towards supporting women especially among women farmers. Despite these efforts, food insecurity continues to prevail. It is therefore important that food insecurity is addressed appropriately (Icheria, 2012).

The agricultural sector is the backbone of Kenyan economy, making enormous contributions to the Gross Domestic Production (GDP). Approximately 90% of Kenya's population depends on farming. It also provides for more than 18% of formal employment (SDG Report, 2015). The low agricultural productivity at household level leads to food insecurity for families and the country at large. The key to alleviating extreme hunger lies in improving agricultural production (World Watch Institute Report, 2011).

Lamu County is an administrative area in the coastal region of the Country. It is classified among the areas facing food insecurity with majority households having inadequate food. In 2016, food availability was significantly reduced in the county with some crops such as maize experiencing total failure and the expected harvest for other crops reducing significantly. The factors contributing to food insecurity in the county include poor performance of the short rains, insecurity and water scarcity (LDDP, 2016)

1.2 Problem Statement

Agricultural production is linked to food security (GOK, 2010). Lamu County experiences acute food shortage due to underdevelopment of crop production (Lamu District Strategic Plan, 2010). In Mpeketoni division, farm productivity is low due to poor farming practices such as land degradation; as well as poor use of farm inputs such as pesticides, and inadequate high yielding seeds (Lamu District Development Plan, 2012). The number of people facing food shortage in the County by the year 2012 was 28,802 which is an equivalent of 28.9% (LDDP, 2012). According to a study by Icheria (2012), women play a vital role in food security as food producers and providers for their households. However, their role has little documentation despite their efforts in food production. Therefore there was a need to conduct a research on the role of women farmers in household food security in Mpeketoni division, Lamu County.

1.3 Purpose of the Study

The purpose of the study was to assess the role of women farmers in enhancing household food security in Mpeketoni Division, Lamu County, Kenya.

1.4 Research Objectives

1. To identify the demographic and socio-economic characteristics of women farmers.
2. To establish the socio-economic characteristics of women farmers.
3. To determine farming inputs used by women farmers.
4. To determine the farm practices adopted by women farmers.

1.5 Assumptions of the study

The study was guided by the assumptions that; each household was involved in farming and that all farming households had a woman farmer.

1.6 Hypotheses of the study

The null hypotheses of this research were:

1. There is no relationship between women demographic characteristics and household food security.
2. There is no relationship between socio-economic characteristics and household food security.
3. There is no relationship between farm inputs used by the women farmers and household food security.
4. There is no relationship between farming practices adopted by women farmers and household food security.

1.7 Significance of the study

The findings of this study may benefit households in Mpeketoni division since the information will help women farmers to improve on food security for their households. The research findings may also benefit the Ministry of Agriculture, livestock and fisheries and other stakeholders in the formulation of policies on farming practices aimed at ensuring food security in Lamu County. It is anticipated that the results obtained would add to the wealth of information currently available on food security in the County. The findings of this study are also expected to contribute to the advancement of knowledge about household food security in Kenya.

1.8 Scope of the Study

This study was limited to Mpeketoni Location, because Lamu County faces acute food shortage (LDSP, 2010). The study focused on households practicing farming and the respondents comprised of women farmers.

1.9 Limitations of the Study

The study was limited to one location in Lamu County and therefore generalizations can only be done with caution. The study was cross sectional hence may not be a representation of long term food security status. The study focused on women farmers; therefore the role of men in household food security was not studied. Further, the research was conducted among women farmers in Mpeketoni Location and cannot therefore be generalized to other regions of the country.

1.10 Theoretical framework

The study was based on the Family Resource Management theory developed by Deacon and Firebaugh (1988). The theory is composed of three major components: inputs, throughputs and outputs. The inputs were the factors influencing household food security namely demographic factors such as age, occupation and others: and farming inputs; such as fertilizers; seeds and pesticides used by the farming households. The throughputs were the farming practices and postharvest technologies. Farming practices were the farm management activities such as conservation of soil fertility, crop rotation, mixed farming and terracing. The output was household food security. Household food security referred to a situation whereby all members of a household had access to the amount of food their members need all year round. This study classified household food security into three levels; (a) the food secure b) the food insecure c) the vulnerable to food insecurity. Food insecurity exists when people

lack adequate physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life.

1.11 Conceptual framework

This study was guided by the conceptual framework shown in Figure 1.1:

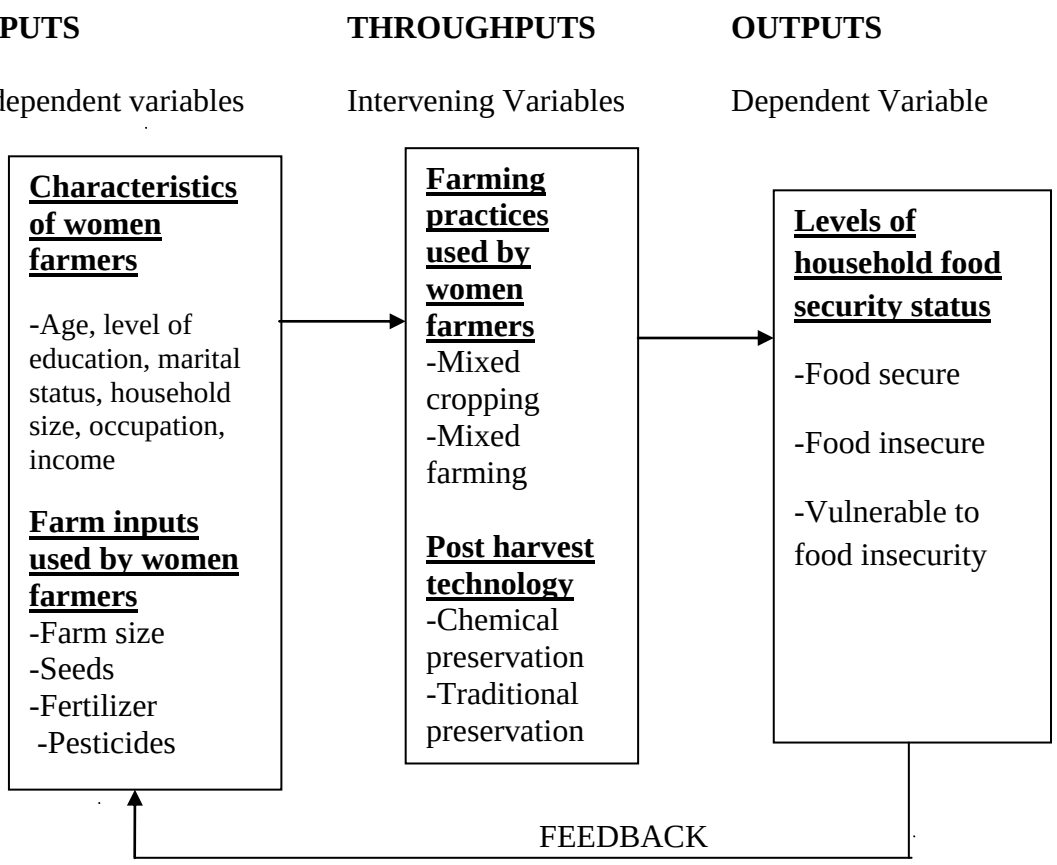

Figure 1.1 Conceptual framework showing relationships among variables. Source: Adapted from Deacon and Firebaugh (1988)

The major areas of this study were; demographic and socio-economic characteristics, farm inputs, farming practices and post-harvest technologies used by women farmers. The framework helped in understanding the meaning of household food security and how it relates to the farm inputs and farming practices. This study focused on the relationship between the independent variables namely demographic factors and farm

inputs, the intervening variables namely farming practices and post-harvest technology and the key dependent variable was, household food security.

CHAPTER TWO: LITERATURE REVIEW

2.1 The status of food security in the world

Worldwide around 925 million people are chronically hungry due to extreme poverty, while up to 2 billion people are food insecure intermittently due to varying degrees of poverty (FAO, 2013). Six million children die of hunger every year – 17,000 every day. As of late 2007, export restrictions and panic buying, US Dollar Depreciation, increased farming for use in biofuels, world oil prices at more than $100 a barrel, global population growth, climate change, loss of agricultural land to residential and industrial development, and growing consumer demand in China and India are claimed to have pushed up the cost of grain (World Bank, 2014). Nonetheless, food riots have recently taken place in many countries across the world. The causes have been: Export restrictions and panic buying, world oil prices, population growth, climate changes, loss of agricultural land to residential and industrial developments (Brain et al, 2011).

The UN Development Goals were one of the initiatives aimed at achieving food security in the world. In its list of goals, the first Millennium Development Goal is “to eradicate extreme hunger and poverty”, and that “agricultural productivity was likely to play a key role in this if it is to be reached on time”. Of the eight Millennium Development Goals, eradicating extreme hunger depends on agriculture the most (MDG 1 calls for halving hunger and poverty by 2015). Currently the Sustainable Development Goal (SDG) 2 emphasizes on ending hunger, achieving food security and promoting sustainable agriculture (Standing Committee on Nutrition, 2014).

2.2 The status of food security in Africa

Food insecurity and hunger are widespread in Sub-Saharan Africa (ECA, 2005). The root cause of food insecurity in SSA is the inability of people to gain access to food due to poverty. The issues of food security in the developing world and especially in sub-Saharan Africa have dominated public debate and are an issue of global concern. Over 70% of food insecure population in Africa lives in the rural areas. It is estimated that world population will reach the 8 billion mark in the year 2025; most of the increase is expected in the developing world.

Agriculture plays a very important role in the social and economic development of most African countries and is the main contributor to economic growth and stability. The sector not only contributes to the national Gross Domestic Product (GDP) and employment creation, but is also a source of foreign exchange earnings. In Africa agriculture contributes to poverty alleviation and food security and thus serves as the engine for economic growth and improved livelihoods. Farming and the harvesting of natural resources provide livelihoods for over 70% of the African population. However, most farming households are resource-poor and face many challenges. It has been pointed out that emerging trend will lead to very poor community that cannot feed itself (Boon, 2009).

For Africa, where the rural population is close to 70 percent in most countries and where consequently the main economic and social activity is farming, these facts are an issue of great concern. The challenge for developing countries is to ensure that their citizenry enjoys food security. Chronic food insecurity in Sub Saharan Africa (SSA) is largely due to the fact that 85-90 per cent of agriculture is rain-fed and

accounts for 35 percent of the gross national product (GNP), 40 percent of exports and 70 percent of employment in SSA (World Bank, 2000). Domestic food production accounts for about 80 percent of the region's consumption (UNEP, 2002).

In order to fight hunger and the consequent malnutrition in East Africa, there is need for farmers to handle the challenges that face them. According to the UN (FAO, 2009) statistics, nearly 20 million people in Eastern Africa community are food insecure, and are depending on food relief. This shortage has been attributed to various factors such as heavy reliance on rain fed agriculture, land degradation, poverty, poor and erratic weather patterns – resulting in massive food shortages (World Vision, 2010). There are various policies to build food security in Africa. Building a food-secure future for all Africans will only be achieved if efforts span the entire development agenda. The UNDP report argues that food security can be achieved through immediate action in critical areas. First, increasing agricultural productivity: With population projected to exceed two billion sometime after 2050, Sub-Saharan Africa will need to produce substantially more food, while mitigating the stresses which agricultural production places on the environment. Second, ending decades of bias against agriculture and women, countries must put into place policies which provide farmers with the inputs, infrastructure, and incentives which will enable them to lift productivity (UNDP report, 2012). With two-thirds of working Africans making a living off the land, policies promoting agricultural productivity would stimulate economic growth, pulling people out of poverty through job and income creation, and increasing their capacity to save and invest in the future. This will also enable a more sustainable use of land and water resources.

2.3 Food Security in Kenya

Kenya's current food security situation and outlook is a cause for concern. Fifteen million (approx. 50%) of Kenyans are food insecure with 3 million in constant need of food relief. Despite the increasing global concern of improving food security, the nature and extent of food insecurity in the rural areas of Kenya is not well documented. Over the years, the Government of Kenya has strived to achieve national, household and individual food security throughout the country. The success in this effort has been mixed. The economic review of agriculture 2007 indicates that 51% of the Kenyan population lack access to adequate food (National Economic Survey, 2008).

However, in spite of the importance of the agricultural sector, farming in Kenya has for many years been predominantly small scale, rain fed and poorly mechanized (Konya, Benin and Okecho, 2009). Farming remains the largest employment opportunity in Kenya and is central to the empowerment of women, who form the bulk of the workforce – estimated at 82% (World Bank, 2012). Farm productivity in Kenya is low due to dwindling water supply on account of land degradation, low rate of adoption of technologies, low soil fertility, crop pests and diseases. In Kenya, food security status in 2009/2010 was gloomy with about 9.9 million people being food insecure. Production of maize and other food crops had dropped by as much as 40% (Ingosi, 2010). About 51% of the rural population and 38% of urban populations in Kenya are food insecure. The insecurity has been attributed to many factors including; decline in agricultural productivity, land fragmentation, periodic droughts over the years, institutional failure and poor land policies which cause crop production to decline, exploitative cereal marketing channels, limited alternative sources of income,

unavailability of drought resistant crop varieties, inaccessibility to agricultural services, poor storage facilities and lack of credit services.

Kenya has the largest food deficit among the Eastern Africa community (EAC) countries, according to food security symposium in February 2010. Using the maize stocks as the yard stick for food security situation, the forecasted maize grain situation in relation to expected consumption requirements was a deficit of 714,000 metric tons for Kenya. According to KARI, the challenges in achievement of food security included poverty; dependency on rain fed agriculture; vagaries of climate change; inadequate access to knowledge, information & technologies; poor infrastructure; population growth; high transport costs and minimal diversification. The strategies to ensuring food security lies in modernizing farming and boosting agricultural productivity (World Bank, 2012).

2.4 Food Security in Mpeketoni, Lamu County

According to Kenya Integrated Household Budget Survey (KIHBS), the number of food insecure people in Lamu County by 2012 was 28,802, an equivalent of 28.9%. Current factors affecting food security include; high cost of farm inputs and increase in price of food commodities (LRA, 2013). Most households consumed two to three meals per day in 2012. In Mpeketoni division, farm productivity is low due to dwindling water supply as a result of land degradation, crop pests and diseases (LDDP, 2012).

Challenges facing households in achievement of food security in Mpeketoni division include: low acreage under crops, as well as reliance on hand tools. Low productivity at household level is due to unreliable rainfall patterns, lack of capital, low soil

fertility, destruction of crops by wild life as well as post-harvest losses and low acreage of land under irrigation; which is currently 3.6% of land under cultivation. This is due to lack of information on irrigation potential, lack of access to irrigation infrastructure by farmers and poor irrigation that is not attractive to farmers due to low productivity from irrigated farming (LDDP, 2012).

2.5 The roles of women farmers in household food security

Women farmers play an essential role in the pillars related to food security (SDG, 2015). In the world, women produce half of the food in their households (FAO 2010). In Sub Saharan Africa, studies have shown that women play a role in many aspects of food production. They participate in land preparation, harvesting and post- harvest work. They also play a role in household animal production where they are responsible for taking care of domestic animals (Gittinger, 2010).

According to World Bank (2013), women farmers use few farm inputs which affect the level of food security for their households. Research shows that if women farmers in Kenya had total access to farm inputs, their yields for food would increase and the number of food hungry reduce (FAO, 2011). They also undertake farming practices and participate in producing various food crops and cash crops for their households so as to ensure dietary diversity (Asian development Bank, 2013).

2.6 Summary of gaps to be filled

The study aimed at contributing to the existing knowledge on food security. Literature reviewed showed little documentation on the role of women farmers in household food security in Lamu County. This study aimed at filling this gap by providing information on the role of the women farmers in food security. Some households had not fully adopted use of hybrid seeds and fertilizers. There was need

to find out whether the households had adopted the farm inputs. There is little documentation on use of modern post-harvest technologies among smallholder women farmers. There is scarce information on the benefits of farming practices among small holder women farmers.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Research Design

The study employed cross sectional analytical research design. In this research design data is collected from a population at a single point in time (Mugenda and Mugenda, 2003). The design was chosen because it was not costly and does not require a lot of time to collect data from the population and hence the researcher would complete the process within the available time.

3.2 Measurement of variables

Household food security was the dependent variable. It referred to a situation whereby members of a household have access to adequate amount of food all year round. Three levels of household food security status were considered, food secure, food insecure and those vulnerable to food insecurity. Household food security levels measured included those households which were food secure, those which were food insecure and those which were vulnerable to food insecurity. The following indicators were used to measure the levels: number of meals consumed by the household in a day and months of adequate food provisioning. The independent variables were the socio economic and demographic factors such as age, level of education and marital status while farm inputs such as tools, seeds, fertilizers. Farming practices such as mixed farming and terracing; post-harvest technologies such as use of chemicals and indigenous preservation methods were the intervening variables.

3.3 Study area

The research was carried out in Mpeketoni Location of Lamu County. Mpeketoni is an administrative division in the mainland part of Lamu County, Kenya. The division covers an area of 1,360.7 km². Mpeketoni location is made up of 8 sub locations and

10 villages. It is a predominantly agricultural area and the land has been transformed to arable land for farming. The main food crops grown include maize, cassava, cowpeas and green grams. Crops grown for commercial purposes include: cashew nuts, mangoes, bananas and simsim among others. The study area was chosen because of the following reasons: it has characteristics of ASAL areas, since drought resistant crops are grown and also in ASAL areas food security is an issue of concern. In Lamu County, 28.9% of the households were described as food poor (LRA, 2013).

3.4 Target Population

According to Cooper and Schindler (2000), a population is the total collection of elements about which a researcher wishes to make inferences. The target population was 3,920 farming households (Ministry Of Agriculture, Mpeketoni) in the Location.

3.4.1 Inclusion criteria

The study included households with women involved in farming. This is because women are more involved in subsistence food production and in ensuring household food security.

3.4.2 Exclusion criteria

The study excluded households where the women farmer did not consent.

3.5 Sampling design

Mpeketoni Location was identified through purposive sampling from a list of seven administrative divisions of Lamu County because it has characteristics of Arid and Semi-Arid Lands (ASAL) regions and food security is an issue of concern. The Location had 3,920 households as of 2013 and is located in Lamu West Sub County. Cluster sampling was used to get one sub-location for the study from the eight sub-locations, whereby the names of the eight sub locations were written on pieces of

paper and picked at random. Baharini was identified from Kiongwe, Baharini, Mkunumbi, Bomani, Uziwa, Mapenya, Kibaoni and Lakeside. Systematic random sampling was then used to obtain the households so as to ensure non biased sampling from the population of farming households in Mpeketoni Location. The list of households was prepared and then assigned numbers 1 to 3,920. The total population was then divided by the sample size 392 to get the sampling interval (K) 10. Starting point was determined by blindly picking any number between 1 and 10. Every 10^{th} number of household was picked to get the sample.

3.6 Sample size

Mugenda & Mugenda, (2003) defined a sample as a smaller group obtained from the target population and which a researcher can use to make inferences about population characteristics from which it is drawn. From the following sample size determination formula, a sample size of 392 respondents was calculated from the target population.

$$n = \frac{Z^2.\rho.q.D}{d^2} = \frac{(1.96)^2 x(0.5)x(0.5).2}{0.07^2} = 392$$

Whereby:

n =Sample Size

Z = Standard score at 95 percent level of confidence (1.96 for 95% confidence level)

ρ = the proportion of occurrence of the variable of focus (which is 0.5 where the figure is not known to provide maximum variability hence largest sample size)

q = The proportion of non-occurrence of the variable of focus (which is 1-p =0.5)

D = Design effect was set at 2 since the population was nearly homogenous[1]

[1] The design effect is set at 2, whereas the level of precision is to 5%. Design effect is the ratio of estimation errors under cluster sampling to that of errors of estimating a simple random sample (Alecxih, Corea and Marker, 1998). Theory and practice has shown that the sample size required for a cluster survey is almost always larger than that required for surveys using simple random sampling because of the design effect (DEFF)

d = A margin of error within ± 0.07 or 6% was set

The women farmers in the household were the respondents of the study.

3.7 Research instruments

The instruments used to collect data for the study were questionnaires for women farmers, Key Informant Interview (KII) guide for the agricultural officers, Focus Group Discussion Guide (FGD) and observation check lists. Direct interviews using the structured questionnaire helped to gather quantitative data. The interviews were preferred because they would give accurate information and would keep the respondent focused till the questionnaire is completely filled. Key informant interviews and focus group discussions were preferred for collection of qualitative data, to acquire an in-depth understanding of the information from the direct interviews. Information obtained through observation helped validate the information from the respondents.

3.8 Pre-testing of Research instruments

A pretest was conducted on 10 women farmers, selected randomly from Lakeside, a location which was not included in the actual study. The pre testing was carried out to help the researcher to identify items in the research instruments that were ambiguous for eliciting relevant information. The information obtained from this was used to improve the clarity and relevance of items.

3.9 Validity and reliability of the instruments

3.9.1 Validity

A valid instrument should accurately measure what it is supposed to measure (Mugenda & Mugenda, 2003). The research instruments were pretested on 10 women farmers not included in the actual study obtained from a different location within the

division. The selected households had similar characteristics to the sampled population. The feedback was used to validate the instruments in readiness for the study. Expert opinion from specialists was also sought. After administering the instruments to the selected respondents, the data obtained was considered a true reflection of the variables under study.

3.9.2 Reliability

Reliability is the degree of consistence that the instrument demonstrates (Orodho, 2004). Reliability focuses on the degree to which empirical indicators are consistent across two or more attempts to measure a theoretical concept. In order to establish the reliability of the questionnaire, it was pre tested with selected participants from selected household heads. Their feedback was used to calculate the test- retest reliability coefficient.

In determining reliability of the instrument, the researcher carried out a pretest by administering 10 questionnaires to women farmers and the data obtained was entered into the Statistical Package for Social Science (SPSS) version 21 to determine the reliability of the tool. Cronbanch's Alpha Coefficient was used to assess the internal consistency, where a score of 0.7 was attained.

3.10 Data collection Procedures

3.10.1 Questionnaires

Data from the women farmers in the households was collected using researcher-administered questionnaires (Appendix B). The researcher read each question and recorded the responses verbatim. Each questionnaire was taking between thirty to fourty five minutes. The instruments were made up of six sections; covering

demographic and socio-economic information; the role of women in household food security; farming inputs; farming practices, post-harvest technology and lastly on status of household food security.

3.10.2 Training of Research Assistants

Two Research assistants, male and female were trained to assist in data collection. They had minimum qualification of KCSE and were trained on research etiquette such as to introduce themselves to the respondents and clarifying to the respondents the purpose of the study. They were also trained on how to ask questions and probe, as well as familiarizing them with the research objectives. Training of research assistants is important to ensure data collection is standardized and to minimize variations (Mugenda & Mugenda, 2003).

3.11 Data Analysis Methods

This study used quantitative and qualitative methods of data analysis. Quantitative data were analyzed using the Statistical Package for Social Sciences (SPSS) program while qualitative data were analyzed using a thematic approach. Analytical techniques included descriptive statistics and inferential statistics whereby Chi-square statistic was used for hypothesis testing. The household food security status was categorized into food secure, vulnerable to food insecurity and food insecure. Data presentation was done using frequencies, percentages and tables to give a graphical report of the research findings. This was enhanced by offering a narrative interpretation of results.

3.12 Logistical and Ethical considerations

Before carrying out the research, clearance was sought from Kenyatta University Ethics Review Committee and the graduate school. A research permit (Appendix C) to collect data was obtained from National Commission for Science Technology and

Innovation (NACOSTI). Respondents participated voluntarily and before administering the questionnaire, the researcher would seek informed consent (Appendix A). Anonymity and confidentiality was maintained throughout the research process.

CHAPTER FOUR: RESEARCH FINDINGS

4.1 Introduction

This chapter presents the research findings of the study that assessed the role of women farmers in enhancing household food security in Mpeketoni Location, Lamu County, Kenya.

4.2 Questionnaire return rate

From three hundred and ninety two (392) questionnaires administered, a total of three hundred and thirty six (336) were fully filled out. The response rate was 89.37 percent, an indication that the sample is adequately represented in the findings of the study.

4.3 Demographic and socio-economic characteristics of women farmers

This section presents the findings on the demographic information and characteristics of the respondents. The characteristics considered in the study were: range of ages of the respondents, education level, religion, marital status, occupation, level of monthly income, type of house, cooking facility and size of the household. The findings are summarized in Table 4.1.

Table 4.1: Demographic and socio-economic characteristics of respondents

n = 336

Variable	Category	Frequency	Percentage
Age bracket	Below 21 years	6	1.8
	21-30 years	58	17.3
	31-40 years	145	43.2
	41-50 years	99	29.5
	Over 50 years	28	8.3
Highest level of education	Primary	94	28.0
	Secondary	112	33.3
	Post-secondary certificate	42	12.5
	Diploma	77	22.9
	Undergraduate degree	11	3.3
Religion	Christian	229	68.2
	Muslim	107	31.8
Marital status	Single	39	11.6
	Married	261	77.7
	Separated	18	5.4
	Divorced	10	3.0
	Widowed	8	2.4
Occupation	Paid employment	18	5.4
	Food crop farming	156	46.4
	Cash crop farming	25	7.4
	Fishing	23	6.8
	Livestock	56	16.7
	Small business	58	17.3
Monthly income (Ksh)	Below 2,999	33	9.8
	3,000-5,999	75	22.3
	6,000-9,999	116	34.5
	Above 10,000	112	33.3

Age was categorized into five cohorts, namely (1) below 21 years, (2) 21 years to 30 years, (3) 31 years to 40 years, (4) 41 years to 50 years and (5) over 50 years. Table 4.1 reveals that the age bracket of 31-40 years had the highest number of respondents at 43.2%. Women farmers aged 41-50 comprised of 29.5 % and over 50 years were only 8.3%. The distribution of age revealed that women farmers were middle aged in the category of 31 to 40 years.

Results on the level of education indicated that women farmers had diverse levels of educational attainment with 33.3% having secondary level of certification, 28% of them having reached primary level while 22.9% had diploma level. Another 12.5% of respondents had post-secondary education certification and only 3.3% having under graduate degree level of education. The results imply that majority of the respondents had at least a secondary level of education.

Religion was categorized into two; Christianity and Muslims. Majority of the respondents were Christians with 68.2% while Muslims accounted for 31.8%. This can be explained by the fact that majority of the Kenya population are Christians (Kenya National Bureau of Statistics - KNBS - and ICF Macro, 2010). Majority of the women farmers were married at 77.7% while those that were widowed were the least at 2%.

The study sought to establish the source of income for the women farmers' households. Majority of the women relied on food crop as their source of income at 46.4%. Livestock rearing accounted for the second source of income for the respondents at 16.7% whereas small business trade activities were the next biggest source of income (for 17.3% of women farmers). This finding indicates that crop farming in Mpeketoni is a paramount important source of livelihood and that

households have diversified sources of income to supplement when food stocks depleted.

The study also enquired about the approximate monthly income whereby the highest proportion of women farmers (34.6%, or 116 out of 336 respondents) earned a monthly income of between 6,000 and 9,999 Kenya Shillings (KSh). Another 112 of women farmers (33.3% of sample) reported having a monthly income above Ksh 10,000. This was followed by those whose monthly income was between Ksh 3,000 - 5,999 representing 22.3% of the sample. Less than a tenth of women farmers (33 or 9.8%) had a monthly income of below 2,999 Kenya Shillings.

4.3.1 Respondents' type of house

The study sought to find out the type of house occupied by the women farmers in the study area. The findings were as shown in Table 4.2.

Table 4.2: Type of house occupied by the respondent

Type of house	Frequency	Percentage
Timber wall and iron sheet roof	4	1.2
Bricks and makuti thatched	51	15.2
Traditional and makuti thatched	119	35.4
Bricks and iron sheet roof	162	48.2
Total	**336**	**100.0**

The houses were mostly built of bricks and roofed with iron sheets at 48.2%. This can be explained by the fact that the community has been shifting from makuti thatched roofs and traditional house to at least some semi modern houses. The respondents said

their house walls were made of bricks because it was naturally available and less expensive compared to timber. This was followed by 35.4% of respondents living in traditional and makuti thatched houses. Those who were living in stones/bricks and iron sheet roof and timber wall and iron sheet roof represented 15.2% and 1.2% respectively.

4.3.2 Type of cooking facility commonly used by respondent

The study sought to find out from the women farmers, the type of cooking facilities they used quite often in their households. The findings are presented in Table 4.3 below.

Table 4.3: Type of cooking facility used by respondent

Cooking facility	Frequency	Percentage
Paraffin stove	8	2.4
Gas cooker	84	25.0
Charcoal stove	101	30.1
Open firewood	143	42.6
Total	336	100.0

Firewood was the most common source of cooking energy (42.6%) because it was readily available in the study area. During dry seasons trees and shrubs dry up offering firewood to the households. Charcoal was also used at 30.1% as it was prepared from the dry woods. The statistics of the finding is higher than the country's statistic and lower than the country's rural statistic of KDHS 2008-09 Report which stipulates that the most common cooking fuel in Kenya is wood, used by 63% of the country's households and by 83% of its rural households (GOK, 2010). Following the

findings of the study, the small scale farmers did not have a lot of problems in cooking food since firewood and charcoal offered affordable sources of cooking energy.

4.3.3 Household size

Household size was measured in terms of the number of people who shared a meal in the household and findings are as shown in Figure 4.1.

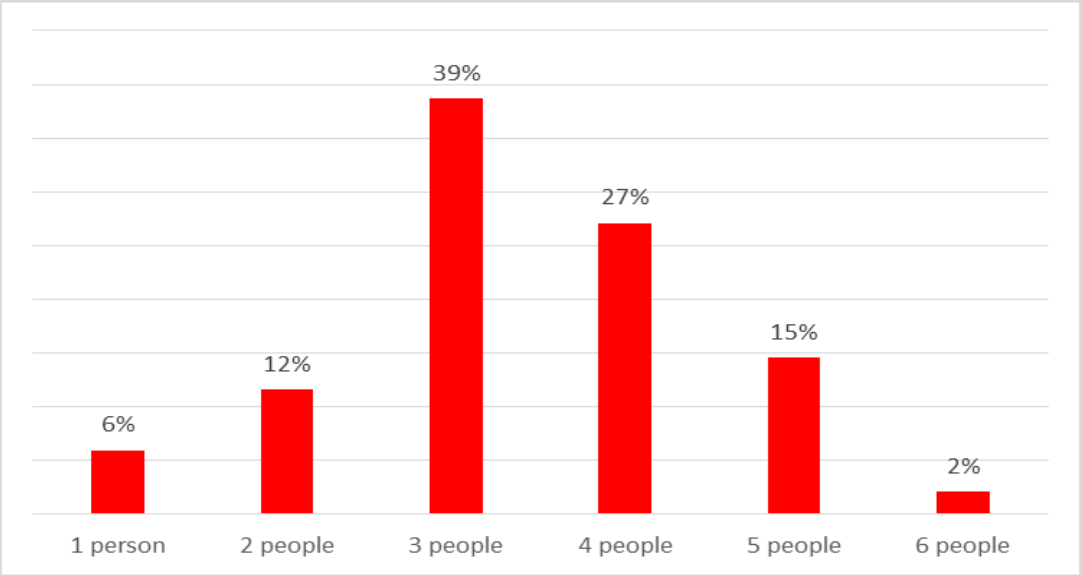

Figure 4.1 Number of members in the household

Household size had a mean of 4 which means that the typical household in the survey had 4 members. However the mode was 3 implying that the highest percentage (38.7%) of women farmers came from households with 3 members.

When asked who was the person responsible for performing subsistence farming related activities in their household, results showed that women were at least three times more likely to be planting, cultivating and harvesting than men (19% versus 6% for planting, 20% versus 6% for cultivation and 26% versus 6% for harvesting respectively. Post-harvest food preservation, food preparation and feeding household

members was virtually an exclusive responsibility of women farmers (60% versus 1.2%).

4.4 Farm inputs used by women farmers in Mpeketoni Location, Lamu County.

4.4.1 Size of farm owned by household

The findings for the size of the farm that the women farmers cultivated in relation to food production are presented in Table 4.4.

Table 4.4: Size of farm owned by the household

Farm size in hectares	Frequency	Percentage
Below 2 hectares	128	38.1
3 to 6 hectares	154	45.8
7 to 10 hectares	47	14.0
Over 10 hectares	7	2.1
Total	**336**	**100.0**

Table 4.4 shows that 128 of the women farmers (38.1% of sample) cultivated below 2 hectares. However this number was exceeded by those who practiced farming on a land size of between three to six hectares at 45.8%. Only 7 women farmers (2.1% of respondents) had farm size of above 10 hectares for farming activities.

4.4.2 Farm size under food crops

The study sought to find out the size of the farm out of the whole land owned by the women farmers allocated to food crops. The findings are as shown in Table 4.5.

Table 4.5: Farm size under food crops

Farm size	Frequency	Percentage
Less than 1 hectare	195	58
1-5 hectares	97	29
6-10 hectares	30	9
Over 10 hectares	13	4
Total	**336**	**100**

Majority of the respondents (195 out of 336 equivalent to 58%) allocated less than 1 hectares of their land for farming food crops. This was followed by 29% of the respondents having between 1 and 5 hectares of land with food crops. Although there were large potential cultivation lands, it was found that the respondents did not want to cultivate vast farmlands which they were not capable of controlling weed invasion and weed prevalence.

Table 4.6: Farming Duration

Farming duration	Frequency	Percentage
less than 3 years	8	2.4
3-5 years	66	19.6
6-10 years	74	22.0
more than 10 years	188	56.0
Total	**336**	**100.0**

Majority of the respondents were truly long term residents of Mpeketoni as they had cultivated on their parcels of land for a period of more than 10 years. The study

revealed that 56% had cultivated the land under investigation of this study for over a decade.

4.4.3 Use of farm inputs by the respondent

The study sought to find the farm inputs employed in Mpeketoni area by the women farmers. The results from the findings are shown in Table 4.7.

Table 4.7: Use of farm inputs among the respondents

Farm inputs	Yes		No	
	F	%	F	%
Manure	275	81.8	51	15.2
Fertilizers	254	75.6	82	24.4
Pesticides	233	69.3	103	30.7
Local seeds	260	77.4	76	22.6
Hybrid seeds	91	27.1	245	72.9

Findings in Table 4.7 shows that 81.8% of the respondents used manure in their farms, 75.6% used fertilizers, 77.4% used local seeds while 27.1% used hybrid seeds. Moreover from the findings, it's clear that women farmers used various farm inputs in their farms and that over three quarter (77.1%) of them used local seeds rather than hybrid seeds.

4.4.4 Agricultural extension services offered

The respondents were asked whether they had ever received agricultural services in the last twelve months preceding this study. Findings revealed that, only 282 out of 336 women farmers or 83.9% of respondents in the study had actually received various forms of extension services. Agricultural extension services are important to

the farmers to improve their yields and it emerged that a significant proportion of farmers in Mpeketoni actually do receive extension services hence enquiry was done on the type of services received. The results as shown in Table 4.9 indicate that the extension services comprised farming techniques for 48.8% of respondents, veterinary services for 36% of farmers and provision of fertilizer for 15.2% of them.

Table 4.8: Agricultural extension services offered in the last 12 months

Agricultural extension service	**Frequency**	**Percentage**
Farming techniques	164	48.8
Veterinary services	121	36.0
Fertilizers	51	15.2
Total	**336**	**100.0**

4.4.5 The extension services that assisted to improve household food security

From those who received the agricultural extension services in the area, the researcher sought to establish which among the received services helped the farmers to improve food security.

Table 4.9: Extension services that improved food security

Agricultural service	**Frequency**	**Percentage**
Farming techniques	214	63.8
Fertilizers provision	111	33.0
Veterinary	11	3.2
Total	**336**	**100**

According to women farmers of Mpeketoni, the most useful extension services that helped to improve household food security as in Table 4.9 were farming techniques and provision of fertilizers as rated by a combination of 96.8% of the respondents.

4.5 Farming practices

4.5.1 Farming practices adopted by respondents in the farm

The study sought to establish the kind of farming practices used by the women farmers in the study area. The findings are shown in Table 4.10.

Table 4.10: Farming practices adopted by respondents in the farms

Farming practise	Frequency	Percentage
Mixed farming	48	14.3
Mixed cropping	181	53.9
Crop rotation	74	22.0
Terracing	33	9.8
Total	**336**	**100.0**

The study revealed that 53.9% of the respondents practiced mixed cropping and 14.3% practiced mixed farming (both crops and livestock). This is an indication that women in this county valued different varieties of food crops. Also 22% practiced crop rotation to maximize on the yield and also to retain the soil fertility. The respondents also indicated on the interview schedule that they practice crop rotation since some crops only did well during specific periods.

4.5.2 Food crops grown by the respondents during the last planting season

Following the establishment of different farming practices employed by the women farmers in the region, the study sought to find out which type of food crops the farmers grew for the past one year. The findings are presented in Figure 4.2

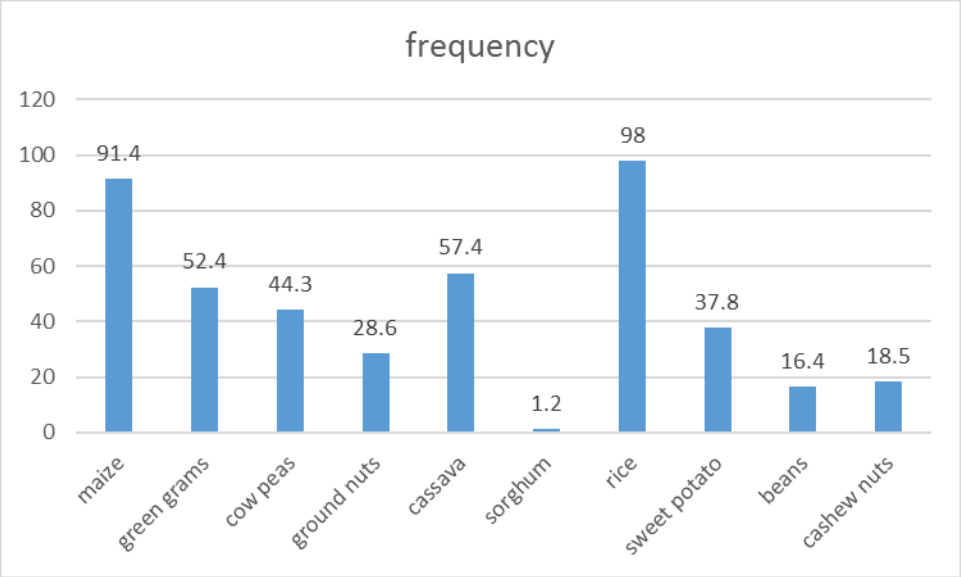

Figure 4.2 Food crops grown by farmers (% of farmers growing crop)

From the findings, many types of crops were grown by the women farmers in Mpeketoni. Maize and rice were the most popular food crops grown by 91.4% and 98% of women respectively. Other major crops grown by the farmers (57.4% and 52.4% of respondents respectively) were cassava and green grams. Sorghum was the least grown food crop with only 1.2% of women farmers cultivating it. Feedback on storage indicated that, maize and rice were not affected by pests and also could be stored for longer time than other food produce, hence the choice of crop cultivated was a coping strategy to avert incidences of hunger.

4.5.3 Cash crops grown by the women farmers in the last agricultural season

Following the varied crops grown by the women farmers in the area, the study sought to establish the types of cash crops that the farmers grew in the past one season. The findings are presented in Figure 4.3.

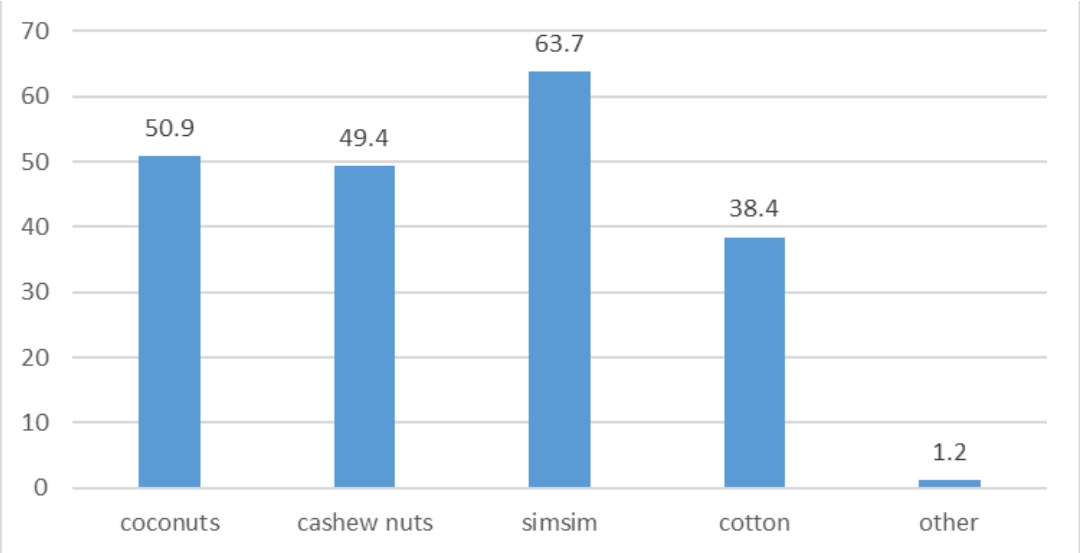

Figure 4.3 Cash crops grown by female farmers in the last agricultural season

The major cash crop grown was simsim at 63.7% followed by coconuts at 50.9%, cashew nuts at 49.4% and cotton by 38.4% of respondents. According to study findings, food crops accounted for the major share of cultivation activity in Mpeketoni. Cereals provided staple food while the surplus such as of cashew nuts could be consumed as well as for commercial purposes to cater for other basic needs such as education and clothing.

4.5.4 Livestock kept by the respondents

The research findings on the kinds of livestock kept are represented in Figure 4.4. In general households kept included chicken, goats, cattle, sheep/goats and donkeys. This finding was in harmony with that of Ministry of Agriculture, Livestock and Fisheries (MoALF) and National Drought Management Authority (Kenya, 2013).

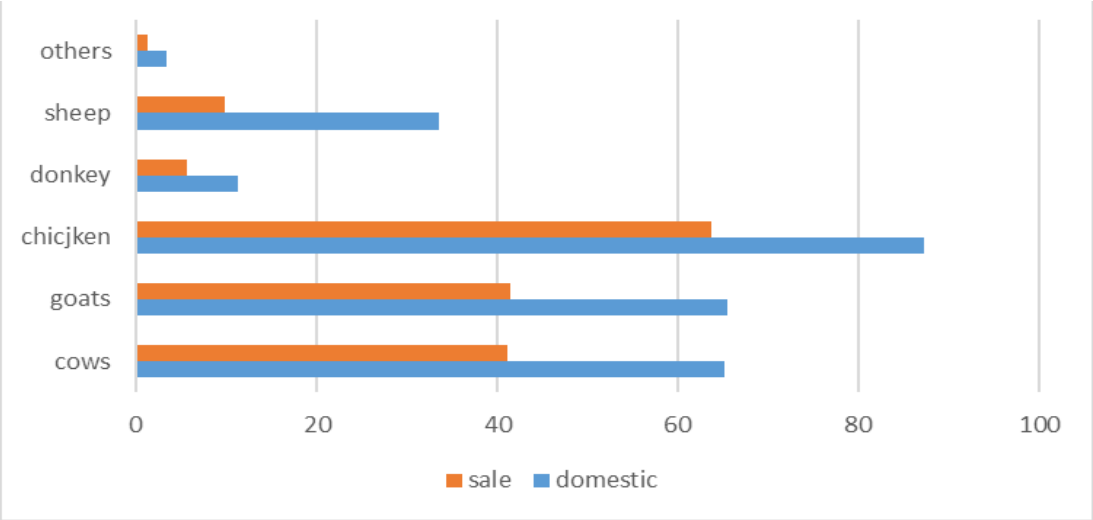

Figure 4.4 Livestock kept by the respondents

Majority of the women farmers reared chicken of which 87% of households reared chicken meant for domestic consumption as they were easier to rear compared to the other animals.

4.6 Post harvest food technologies among the women farmers

4.6.1 Food storage after harvest.

The study established how the food was stored after harvest. Results reveal that women farmers in the region have employed various ways of storing their crops after harvest.

Table 4.11: Methods of food storage after harvest

Description	Frequency	Percentage
Silo	126	37.5
Granary	94	28.0
Barn	89	26.5
Storeroom	27	8.0
Total	**336**	**100.0**

Findings show that, there were a number of ways the farmers stored their food after harvest. Silos were the most popular storage of food for 37.5% of the respondents followed by granary (28%) and barns (26.5%). Only 8% of women farmers said that they stored harvest in store rooms.

4.6.2 Pests and diseases attack on food

The study established whether the stored food was attacked by pests and diseases. Majority of the respondents said their harvested food was attacked by pests. Findings indicated that 68.2% of the female farmers reported that they had their food attacked during storage.

4.6.3 Food protection from attack by pests after harvesting

The other aspect that was established was how the farmers protected food from pest attack.

Table 4.12: Crop loss mitigation methods from pests attack after harvesting

Crop loss mitigation methods	Frequency	Percentage
Apply pesticide	249	74.1
Store in sacks	38	11.3
Smoking	26	7.7
Store in containers	23	6.8
Total	**336**	**100**

Findings in Table 4.12 show that women farmers in Mpeketoni applied various pest control techniques to protect their foods from pest's infestation post-harvest. The majority of the farmers (74.1%) sprayed or applied pesticides, 7.7% smoked the food produce, 6.8% stored the food in containers while 11.3% stored it in sacks to prevent

attacks. Largely, the food produce was infested by pests such as termites and stock borers.

4.6.4 Duration that the food would take before it spoils

The study sought to find out the duration the stored food took before getting spoiled. The research results were as shown in Table 4.13.

Table 4.13 Duration stored food would take before it is spoilt

Duration in months	Frequency	Percentage
Below 6 months	111	33
7-12 months	140	41.8
13-24 months	44	13.1
Over 24 months	41	12.1
Total	**336**	**100**

Findings show that majority of the stored food took between 7 – 12 months before it got spoilt as indicated by 41.8% of the respondents.

4.7 Status of household food security among the farming households

The study sought to find out the level of food security status among households in Mpeketoni. The indicators used were: the sources of food for the household, amounts of food available for the households, the Months of Adequate Food Provisioning and the number of meals taken by the household in a day.

4.7.1 Sources of food for the household in the last agricultural season

The study determined where the women farmers obtained food for their households for the last agricultural season. The results from the findings are presented in the Table 4.14.

Table 4.14: Sources of food in the household in the last agricultural season

Source of food in the household	Frequency	Percentage
Buying from the market	143	42.5
Own farm produce	118	35.1
Barter trade	34	10.0
Relief food from Government/NGO	25	7.4
Borrowing from relatives/friends/neighbours	17	5.0
Total	**336**	**100**

Findings show that 42.5% of the respondents bought their foods from the market while 35.1% got it from their own farms. About 10% got their foods from barter trade with other foodstuffs while 7.4% got relief food from the government and NGOs. The least, 5% borrowed from friends and family

4.7.2 Amount of food that was harvested last season

Findings established that some farmers got food from their own farms last season, the study sought to find out how much was harvested. This question was necessary since food consumption and food sources are likely to vary by proximity of the harvest seasons (Aiga & Dhur, 2006). Results are shown in Table 4.15.

Table 4.15 Amount of food (in percentages) harvested last season

Amount	Maize	Green-grams	Cowpeas	Groundnuts	Beans
Below 3 bags	9	40	31	28	25
Between 4 - 6 bags	23	30	43	40	30
Between 7 - 9 bags	25	10	8	13	18
Between 10 -12 bags	45	10	10	8	8
Over 12 bags	13	10	8	8	10
Total	**100**	**100**	**100**	**100**	**100**

Findings show that from the various crops that were planted during last agricultural season, farmers harvested several 90kg bags of different crops from their farms. Majority (45%) harvested maize between 10 – 12 bags of 90kgs. For green grams, majority (40%) harvested below 3 bags of 90kgs. Those who planted beans harvested between 4 – 6 bags of 90kgs.

4.7.3 Duration the harvested food sustained the household

From the foods harvested by the farmers, the study sought to find out how long the food lasted the household.

Table 4.16 Duration the harvested food sustained the household

Duration in months	Frequency	Percentage
1-4	118	35.1
5-8	151	45.0
9-12	67	19.9
Total	**336**	**100**

Findings show that majority of the respondents (45%) harvested food that was enough to last the household for 5-8 months. For 35.1% of respondents, the food was enough to last 1-4 months. For the rest 19.9% of respondents, the food was enough to last the household for 9-12 months.

4.7.4 Amount of food left in the granary/store from last season harvest to the new season

As the study established that majority of the households had enough food to last up to the next season, the results showing how much food was left over to the next season are presented in the Table 4.17.

Table 4.17: The amount of food left from last season to the new season

Duration in months	Percentage	Frequency
Below 3 bags	22.8	76
4-6 bags	35.0	118
7-9 bags	25.2	85
10-12 bags	12.0	40
Above 12 bags	5.0	17
Total	**100**	**336**

Findings in Table 4.17 show that 35% of the households had between 4 – 6 bags of food left over in the granary/store from last harvest to the new season. Another 25.2% had between 7 – 9 bags of food in the store left. Only 5% had over 12 bags of food in the store.

4.7.5 The number of meals consumed by the households

The study sought to find out the number of meals consumed in the household for the past 24 hours. The results are presented in Table 4.18.

Table 4.18: The number of meals consumed by the household in a day

Description	Frequency	Percentage
One meal	123	36.9
Two Meals	145	43.3
Three meals	68	19.8
Total	**336**	**100**

Findings in Table 4.18 show that majority of the respondents of 43.3% had two meals in a day. Respondents who had one meal were 36.9% while 19.8% had three meals.

4.7.6: Number of months that the household had adequate food in the last 12 months

The study sought to find out the months that the households had adequate food in their households. The results are presented in Table 4.19.

Table 4.19: Months that the household had adequate food in the last 12 months

Number of months	Frequency	Percentage
1– 3	58	17.4
4 – 6	110	32.6
7 – 9	67	20
10 – 12	101	30
Total	**336**	**100**

Findings in Table 4.19 show that majority of the households 32.6% had adequate food in their households for four to six months. This was followed by a 30% response from the respondents who had adequate food in their households for ten to twelve months. Twenty percent (20%) had adequate food in their households for seven to nine months. Only 17.4% of respondents had adequate food for one to three months.

4.7.7 Food shortage experience in the last 12 months

The study sought to find out from the women farmers whether in the past twelve months they had shortage in food supply in their households. The results showed that most of the households had not experienced food shortage.

4.7.8 Type of food that had shortage in the household in the last 12 months

Following the finding that there was a portion of women farmers who suffered food shortage in the household, the study sought to find out the types of foods that they experienced shortage in the twelve months. The results are presented in Figure 4.5.

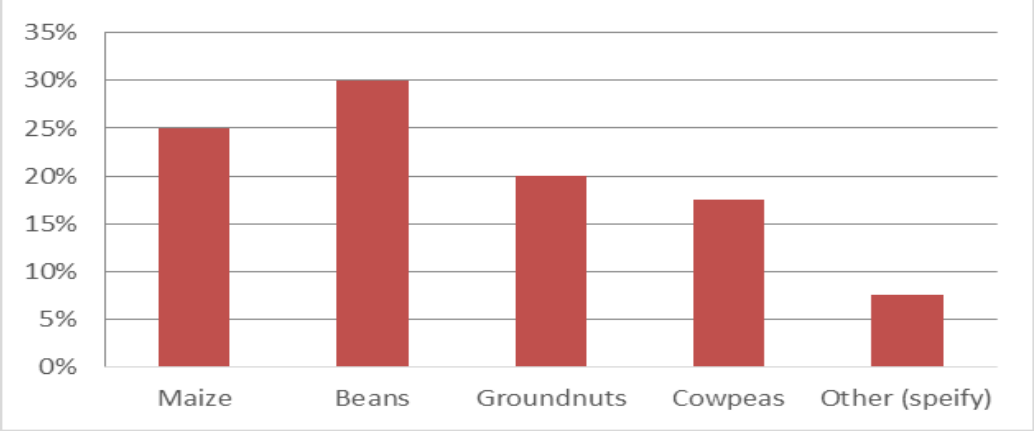

Figure 4.5 Household food shortages

Findings in Figure 4.5 show that the food that had major shortage was beans, recording a 30% response from farmers. This was followed by those who had

shortage of maize at 25%. Those who had a shortage of groundnuts represented a 20% rate from the respondents. Only 8% of the respondents said they lacked other foods apart from the major ones mentioned by the majority of the respondents.

4.7.9: The level of food security in the households for the last twelve months

The study sought to find out the level of food security among the women farmers in Mpeketoni Location and the findings were as below;

Table 4.20: Adequacy of food in the household

Description	**Strongly agree**		**Agree**		**Disagree**		**Strongly disagree**	
	N	**%**	**N**	**%**	**N**	**%**	N	**%**
Had adequate food for 12 months	141	42.9	123	36.5	44	12.8	28	7.8
Had food shortage for 1-5 months	123	36.5	137	40.8	43	12.8	33	9.9
Had food shortage for 6-12 months	77	23.0	67	19.9	98	29.1	94	28
Depended on relief/food support for 1-5 months	60	17	77	23.0	94	28	105	32

Table 4.20 illustrates various levels of food adequacy in the households. Findings established that those who had adequate food for 12 months were the food secure and were represented by 42.9%. Those who didn't have adequate food for 12 months were vulnerable to food insecurity and the level was 36.5% while those who had inadequate food for over 6 months and depended on relief food for 1-5 months were food insecure and the level was 20.6%.

Table 4.21: Levels of household food security

Level	N	%
Food secure	144	42.9
Vulnerable	123	36.5
Food insecure	69	20.6
Total	**336**	**100**

4.8 HYPOTHESIS TESTING

H_{01} :There is no relationship between women demographic characteristics and household food security in Mpeketoni Location, Lamu County

Table 4.22: Food security and demographic characteristics

Demographic characteristics		Consumed breakfast		Consumed lunch		Consumed supper		Chi-square statistic
		No	Yes	No	Yes	No	Yes	
Age bracket	Below 21 years	0	6	6	0	0	6	10.648** (b), 34.503*** (l), 5.617 (s)
	21-30 years	7	51	14	44	0	58	
	31-40 years	28	117	34	111	4	128	
	41-50 years	10	89	14	85	0	91	
	Over 50 years	0	28	0	28	0	28	
Highest level of education	Primary	20	74	20	74	0	80	19.726***(b), 9.535(l), 8.103(s)
	Secondary	18	94	31	81	4	101	
	Post-secondary certificate	7	35	7	35	0	42	

	Diploma	0	77	10	67	0	77	
	Undergraduate degree	0	11	0	11	0	11	
Religion	Christian	29	200	45	184	4	217	0.330 (b), 0.154 (l), 1.723 (s)
	Muslim	16	91	23	84	0	94	
Marital status	Single	10	29	23	16	0	39	9.554**(b), 110.257***(l), 1.266(s)
	Married	31	230	24	237	4	236	
	Separated	4	14	14	4	0	18	
	Divorced	0	10	7	3	0	10	
	Widowed	0	8	0	8	0	8	
Income source	Salary and wages	4	14	4	14	0	18	14.937***(b), 53.709***(l), 17.952***(s)
	Farming	23	81	23	81	0	104	
	Cash crop	0	25	0	25	0	25	
	Fishing	7	68	7	68	0	54	
	Livestock sale	4	52	4	52	0	56	
	Small business	7	51	30	28	4	54	

Notes: *the notations "b", "l" and "s" represent breakfast, lunch and supper respectively; "**" and "***" represent significance of statistic at 0.05and 0.01level of testing respectively.*

Table 4.22 indicates presence of relationship in food security status on the basis of demographic profiles of women farmers (age, education, marital status and sources of income). However, there appears to be no relationship in food security status of women farmers on the basis of religion.

The first hypothesis posited the lack of a relationship between demographic characteristics of women farmers and household food security.

Procedure

Socioeconomic and demographic characteristics of women farmers were cross tabulated against food security indicators and a chi-square statistic computed (a non-parametric test since the variables were discreet and of nominal measurement scale).

Criteria

If the computed-statistic is greater than the critical – statistic (or if the calculated statistic is statistically significant) reject the hypothesis.

Finding and Conclusion*:*

Results indicated that, calculated statistics for age, education, marital status and source of income were statistically significant indicating that household food security differed by demographic characteristics. Thus hypothesis one of "a relationship between demographic characteristics of women farmers and household food security was rejected. This means that a relationship existed between socio-demographic characteristics of women farmers and household food security.

Table 4.23: Food security and socio-economic characteristics

$H_{02:}$ There is no relationship between women socio-economic characteristics and household food security.

Socio-economic characteristics		Consumed breakfast		Consumed lunch		Consumed supper		Chi-square statistic
		No	Yes	No	Yes	No	Yes	
Monthly income	Below 2999	6	27	6	27	0	33	78.798***(b), 54.149***(l), 6.950(s)
	3000-5999	32	43	32	43	0	71	
	6000-9999	7	109	30	86	4	112	
	Above 10000	0	112	0	112	0	95	
Type of house occupied	Traditional and makuti thatched	41	78	38	81	4	111	70.678***(b), 42.330****(l), 7.046(s)
	Bricks and makuti thatched	0	51	20	31	0	51	
	Bricks and iron sheet roof	4	158	10	152	0	145	
	Timber wall and iron sheet roof	0	4	0	4	0	4	
Cooking facility used	Open fire wood	41	102	44	99	4	135	51.029***(b), 24.330***(l), 5.130(s)
	Charcoal stove	0	101	20	81	0	84	
	Paraffin stove	0	8	0	8	0	8	
	Gas cooker	4	80	4	80	0	84	
House hold size	1	7	13	20	0	0	20	35.135***(b), 145.185***(l), 7.242(s)
	2	4	35	17	22	0	39	
	3	7	123	11	119	4	109	
	4	20	71	13	78	0	91	
	5	3	46	0	49	0	49	
	6	4	3	7	0	0	3	

Notes: *the notations "b", "l" and "s" represent breakfast, lunch and supper respectively; "**" and "***" represent significance of statistic at 0.05 and 0.01 level of testing respectively.*

Similarly, Table 4.22 presents socio-economic attributes on the basis of which differences in food security status among women farmers manifest. These attributes include income level, type of house and cooking facility as well as household size.

The second hypothesis posited the lack of a relationship between socio-economic characteristics of women farmers and household food security in Mpeketoni Location, Lamu County.

Procedure

Socioeconomic characteristics of women farmers were cross tabulated against food security indicators and a chi-square statistic computed (a non-parametric test since the variables were discreet and of nominal measurement scale).

Criteria

If the computed-statistic is greater than the critical – statistic (or if the calculated statistic is statistically significant) reject the hypothesis.

Finding and Conclusion*:*

Results indicated that, calculated statistics for amount of income, type of house, cooking facility as well as household size were statistically significant indicating that household food security differed by socio economic characteristics. Thus hypothesis two of "a relationship between socio-economic characteristics of women farmers and

household food security in Mpeketoni Location, Lamu County" was rejected. This means that a relationship existed between socio-economic characteristics of women farmers and household food security.

Table 4.24: Relationship between farm inputs and household food security

H_{03}: There is no relationship between farm inputs used by the women farmers and household food security in Mpeketoni Location, Lamu County

Farm inputs		Consumed breakfast		Consumed lunch		Consumed supper		Chi-square statistic
		No	Yes	No	Yes	No	Yes	
Farm size (Ha)	1.00	16	112	29	99	3	103	4.779(b), 31.463**(l), 7.876**(s)
	2.00	26	128	22	132	0	154	
	3.00	3	44	10	37	0	47	
	4.00	0	7	7	0	0	7	
Farm size (Ha) under food crop	<1 acre	33	77	27	83	2	110	44.456***(b), 3.888(l), 21.453***(s)
	1-2 acre	4	159	30	133	0	146	
	3 acre	8	46	11	43	1	46	
	More than 3	0	9	0	9	0	9	
Farming duration	Less than 3 years	4	4	4	4	0	8	56.940***(b), 26.725***(l), 2.884(s)
	3-5 years	3	63	16	50	0	66	
	6-10 years	27	47	27	47	0	57	
	More than 10 years	11	177	21	167	6	180	
Use of manure	Yes	39	236	59	216	7	250	1.811(b),

	No	6	45	9	42	0	51	3.002(l), 0.973(s)
Use of fertilizer	Yes	19	235	54	200	3	208	31.368***(b), 0.673(l), 1.968(s)
	No	26	56	14	68	0	103	
Use of local seeds	Yes	45	215	65	195	4	235	15.188***(b), 16.147***(l), 1.288(s)
	No	0	76	3	73	0	76	
Use of hybrid seeds	Yes	27	218	27	218	8	220	4.390**(b), 47.615***(l), 1.646(s)
	No	18	73	41	50	0	91	

Notes: *the notations "b", "l" and "s" represent breakfast, lunch and supper respectively; "**" and "***" denote a significant statistic at 0.05 and 0.01 level of significance testing respectively.*

One of the general patterns of data distribution in Table 4.22 is that whereas many households stayed without meals for breakfast and lunch, nearly all households did consume supper. Also judging from significance of Chi-square statistics, food security status did not differ by sizes of land owned by women farmers, however it differed by size of farm under food crop so that households with larger portions of land under food crops were more food secure than those with less than 1 acre of land for food crops. In addition, higher farming experience and use of certified (hybrid) seeds was related to better food security.

The third hypothesis posited the lack of a relationship between farm inputs used by the women farmers and household food security in Mpeketoni Location, Lamu County.

Procedure

Farm inputs used by the women farmers in Mpeketoni Location were cross tabulated against food security indicators and a Chi-square statistic computed.

Criteria

If the computed-statistic is greater than the critical – statistic (or if the calculated statistic is statistically significant) reject $\mathbf{H_{03}}$ in favor of the alternative hypothesis

Finding and Conclusion:

From the findings, calculated statistics for size of farm under food crop, farming experience and use of certified (hybrid) seeds were statistically significant indicating that household food security differed on the basis of these farm inputs. Hence Hypothesis two postulating no relationship between farm inputs used by women farmers and household food security in Mpeketoni Location, Lamu County was rejected.

Table 4.25: Relationship between farming practices and household food security

Farming practice		Consumed breakfast		Consumed lunch		Consumed supper		Chi-square statistic
		No	Yes	No	Yes	No	Yes	
Practice mixed farming	Yes	45	284	65	264	4	304	0.633 (b), 0.982 (l), 0.53 (s)
	No	0	4	0	4	0	6	
Practice mixed cropping	Yes	14	164	30	148	8	174	6.975***(b), 2.686(l), 3.118(s)
	No	31	127	38	120	0	137	

Practice crop rotation	Yes	11	132	17	126	7	135	9.972***(b), 10.753***(l), 5.130**(s)
	No	34	159	51	142	0	176	
Practice weed control	Yes	0	119	23	96	0	119	28.494***(b), 0.095(l), 4.460(s)
	No	45	172	45	172	4	192	
Practice others	Yes	0	7	3	4	0	7	21.171(b), 1.997(l), 0.097(s)
	No	45	268	65	248	5	288	

Notes: *the notations "b", "l" and "s" represent breakfast, lunch and supper respectively; "**" and "***" denote a significant statistic at 0.05 and 0.01level of significance testing respectively.*

From Table 4.23, households practicing mixed cropping, crop rotation and weed control were observed to have greater food security than those that do not. There was no statistical differences in food security between households which practiced mixed farming (crop and livestock) and those which did not.

Hypothesis Testing – Farming Practices and Food Security

H_{O4}: There is no relationship between farming practices used by the women farmers and household food security in Mpeketoni Location, Lamu County

The third hypothesis posited the lack of a relationship between farming practices used by the women farmers and household food security in Mpeketoni Location, Lamu County.

Procedure

Variables of farming practices used by the women farmers in Mpeketoni Division were cross-tabulated against food security indicators and a chi-square statistic computed.

Criteria

The computed-statistic was compared with the critical statistic so that if the former was greater than the critical – statistic (or if the calculated statistic is statistically significant) $\mathbf{H_{04}}$ is rejected. Otherwise it should not be rejected.

Finding and Conclusion:

Analysis findings computed significant statistics for mixed cropping, crop rotation and weed control indicating differences in food security on the basis of those farming practices. Hence hypothesis three postulating no relationship between farm inputs used by women farmers and household food security in Mpeketoni Location, Lamu County was rejected.

CHAPTER FIVE: DISCUSSION OF RESEARCH FINDINGS

5.1 Introduction

This chapter discusses the main research findings that were guided by the study objectives which were:

1. To identify the demographic and socio-economic characteristics of women farmers.
2. To establish the socio-economic characteristics of women farmers.
3. To determine the farming inputs used by women farmers.
4. To determine the farm practices adopted by women farmers.

5.2 Summary of key findings

5.2.1 Demographic and socio economic characteristics of women farmers

Demographic and socio economic characteristics helped to understand the target population. Findings established that majority of the female farmers in Mpeketoni were aged between 31-40 years as indicated by 43.2% of the respondents. This meant that they were young and energetic to do farming. Most of them were educated up to secondary school level as indicated by 33.3% and they could therefore understand basic knowledge on farm inputs, practices and post-harvest technology. The number of years spent in formal education is an important determinant of increased household food production and food security intentions. Education further enhances awareness on food farming techniques and food storage (World Bank, 2014 and Mutisya et al, 2016).

Typical households in the study area had less than four members. According to Alem and Shumiye (2007), a shift to smaller family size decreases the probability of food insecurity. Following this assertion, majority of households would be deemed to be less food insecure because majority had 3 or less than the mean members. The finding on household size is comparable (although slightly lower) with that of Kenya Demographic and Health Survey (KNBS and ICF Macro, 2010) which reports that the mean size of a Kenyan household is 4.2 persons.

Findings indicated that a significant number of households practiced mixed farming of which the livestock included chicken, goats, cattle, sheep/goats and donkeys. This finding was in harmony with that of Ministry of Agriculture, Livestock and Fisheries (MoALF) and National Drought Management Authority (Kenya, 2013) who regularly conduct food security and drought monitoring in Lamu County.

Most of the women farmers were married as indicated by 55% of the respondents. Findings also established that majority of the households for the female farmers obtained income from farming and sale of crops as indicated by 32% and 22% of the respondents respectively. The approximate monthly income was between 6,000 and 9,000 as indicated by 40% of the respondents. This finding concurs with (MDG Report, 2009) report that approximately 90% of Kenya's population depends on farming which also provides for more than 18% of formal employment.

Core farming related activities such as planting, tilling, harvesting food preservation and preparation were predominantly the responsibility of women farmers in the study area. Women farmers are more loaded than men with household duties, on farm and off-farm related responsibilities especially planting food crops, cultivation and

harvesting, post-harvest food preservation, food preparation and even feeding household members. When asked who was the person responsible for performing subsistence farming related activities in their household, results showed that women were at least three times more likely to be planting, cultivating and harvesting than men. Post-harvest food preservation, food preparation and feeding household members was virtually an exclusive responsibility of women farmers.

5.2.2 Farming inputs used by women farmers

Knowledge on use of farm inputs is important to farmers so that they can enhance food production for households. The second objective of the study was to determine the farming inputs employed by women farmers in Mpeketoni Location to enhance household food security. The findings established that most women farmers cultivated less than 2 hectares of land as indicated by 40% of the respondents and that less than 1 hectare was allocated for food crops as indicated by 38% of the respondents. Although there were large potential cultivation lands, it was found that the respondents did not cultivate vast farmlands for economic reasons. According to Alem and Shumiye (2007), the smaller the size of the farm with crops the higher the household will be vulnerable to household food insecurity because the small farmland size is associated to lower volume of yield output.

Also, the women farmers used various farm inputs which included fertilizers as indicated by 40%, manure as indicated by 60%, pesticides as indicated by 35%, local seeds as indicated by 70% and hybrid seeds as indicated by 30% of the respondents. This finding is similar to that of Boon, (2009) that there is a general decline in investment on farm inputs by farmers. Poor use of inputs in terms of fertilizers and

pesticides as well as local seeds has contributed to the inability by the women to sustain food security for their households. It is clear that women farmers used various farm inputs in their farms and that over three quarter (77.1%) of them used local seeds rather than hybrid seeds. This is a finding of concern vis-a-vis food security because other studies have found use of certified seeds to increase farm output (Alem and Shumiye, 2007, Kirimi, 2012 and Kariuki, 2015).

This finding agrees with LDDP 2008-2012 that poor use of farm inputs has contributed to households being vulnerable to food insecurity. This finding is in agreement with FAO (2009) that, although women contribute to the day to day household subsistence for food, they have difficulties in gaining access to resources such as land and farming inputs that help to enhance farm produce. There is need for farmers to invest more on farm inputs for higher food production which will enhance food security for their households.

5.2.3 Farming Practices adopted by women farmers.

Farming practices have a vital role to play towards food security for a household (Mativo, 2002). The third objective of the study was to determine the farming practices adopted by women farmers in Mpeketoni Location to enhance household food security. Findings established that women farmers adopted farming practices which included; mixed farming as indicated by 40% of the respondents, mixed cropping as indicated by 30%, crop rotation as indicated by 15% and terracing as indicated by 15% of the respondents. Food crops such as maize, greengrams, beans, ground nuts and cowpeas were grown to ensure food diversity. Cash crops such as coconuts, cashewnuts, cotton and simsim were also grown to improve the economic status of the households, which contributed towards enhancing household food

security. However, this was in low quantities which were attributed to poor farming mechanisms. This is in agreement with (Konya, Benin and Okecho, 2009) that farming in Kenya has for many years been predominantly small scale, rain fed and poorly mechanized. The women farmers adopted various farming practices to enhance food consumption diversity and therefore improving food security for their households.

Findings established that the main food crops grown in the study area were maize, cassava, cowpeas and green grams while the main cash crops were cashew nuts, mangoes, bananas and simsim. Kenya (2013) reported a similar list of crops grown in Mpeketoni area and attributed the selection to market demand. Apart from cashew nuts and simsim which are largely taken as snacks, few other crops growth in Mpeketoni were staple foods and this could have implications on food security. According to Asian Development Bank (2013), staple food crop production contributes to food availability of a household; because food availability of foodstuff in a household would increase the chance of food security for the household.

5.2.4 Post harvest technologies practiced by women farmers in Mpeketoni

One challenge facing households in achieving food security is post-harvest losses (LDDP 2012). The fourth objective of the study was to establish the post-harvest technologies that the women farmers practiced in Mpeketoni to enhance household food security. The findings revealed that women farmers in Mpeketoni stored their food using different methods which included granaries as indicated by 27.6%, barns as indicated by 40%, silos as indicated by 15% and store rooms as indicated by 18%

of the respondents. The results also indicated that foods were affected by pests and diseases during storage as indicated by 55% of the respondents and that the women applied pesticides to protect the food from pest attack as indicated by 57.8% of the respondents.

These findings were in agreement with findings from FAO (2010) that women play a crucial role in post-harvest work. They are also in agreement with findings in LDDP (2008-2012) that farm productivity in Mpeketoni location is low due to crop pests and diseases. Further findings indicated that the stored food took a period of between 7-12 months before getting spoilt as indicated by 41.8% of the respondents. Food security for households can be enhanced by adoption of modern technologies after harvest. This concurs with (Mativo, 2002) that practices applied on food after harvest have an important role to play in enhancing household food security. If women farmers adopted modern ways of preserving food after harvest then food security for the households would be enhanced to a great extent and food losses could also be reduced.

5.2.5 Status of household food security in Mpeketoni

Household food security refers to a situation whereby all members of a household have access to the amount of food their members need all year round. The fifth objective of the study was to establish the status of household food security among households in Mpeketoni. The findings established that majority of households, represented by 79.4% were food secure. Households which were vulnerable to food insecurity were 42.9% while households which were food insecure were 40.7%. Findings also established that food harvested could only sustain the household for

between 5-8 months as indicated by 45% and they coped by reducing the number of meals per day to two as indicated by 43% of the respondents. This is in agreement with UN (World Vision, 2010) report that nearly 20 million people in Eastern Africa community are food insecure, and are depending on food relief.

A significant proportion of households bought their foods from the market while about a third got food from their own farms. Only a paltry 5% borrowed from friends and family while 7.4% got relief food from the government and NGOS. This findings are consistent with Baiphethi and Jacobs (2009) that small scale farmers contribute majorly contribute to household food security through own food production. According to Ariga, J., Jayne, T., and Njukia, S. (2010) and FEWSNET (2013) most of the households in Kenya consume food stuff obtained from their own farms and very little is consumed from markets. However these findings tend to differ with (Scribd, 2011) whose study in Makueni County showed the main source of food for 64.5% of households was market.

5.3 Summary of key findings

The study established that majority of women in Mpeketoni were young and energetic to practice farming activities, were educated up to at least form Four and their main source of income was from farming and cash crop sale. Formal education helps farmers to understand the use of farm inputs and how to apply them thus improving food security. It was concluded that farming inputs enhanced household food security in the study area. The women farmers lacked money to buy fertilizer and hybrid seeds and had to rely on manure from livestock and local seeds which led to poor quality harvest which could not sustain the households. The women farmers also lacked the

services of agricultural extension officers for advice on farm inputs to improve food production.

The study also established that farming practices adopted by women farmers enhanced household food security whereby the women planted different food crops which included maize, green grams, cow peas, groundnuts, cassava, sorghum, rice, sweet potatoes, beans and cashew nut. The women also planted various cash crops which included cotton and simsim. Mixed farming and mixed cropping helps to fight pests and insects thus improving food security.

It was also concluded that post-harvest technologies enhance household food security. Women farmers in Mpeketoni employed various ways of storing their crops after harvest but their methods were not effective as the food was attacked by pests and diseases and could not last long therefore the need to embrace modern post-harvest technologies to enhance household food security.

The study established that women farmers faced challenges allocating time between household commitments and domestic chores. These activities are in competition with their role in contributing to food security. Some households in Mpeketoni were not food secure since they did not have enough food to last till the next season. The households had therefore to cope by reducing the number of meals consumed in a day since the food was not adequate.

CHAPTER SIX: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

This chapter presents the summary of research findings, conclusions made from the study and the recommendations for policy and practice as well as recommendations for further research.

6.2 Summary of the findings

6.2.1 Demographic and socio economic characteristics of women farmers

The study established that most women farmers in Mpeketoni were aged between 31-40 years, had attained at least secondary education and were involved in farming activities which generated income for the household. The study found out that there was vast land ownership but much less land was directed to farming activities. In addition women farmers exhibited lack of knowledge on use of farm inputs especially certified seeds. Further, lack of inputs in terms of fertilizers and seedlings has contributed to the inability by the women to sustain food security for their households.

6.2.2 Farming inputs used by women farmers in Mpeketoni Location

The study established that women farmers in Mpeketoni practiced mixed farming which refers to crop production and animal husbandry as well as mixed cropping which involved planting different types of food and cash crops. Crop rotation and weed control were also practiced which contributed to household food security. Household food security differed by demographic characteristics, size of farm under food crop, duration of farming and use of certified (hybrid) seeds were statistically significant indicating that household food security differed on the basis of these farm inputs.

6.2.3 Farming Practices adopted by women farmers in Mpeketoni Location

On farming practices, households which practiced mixed cropping, crop rotation and weed control were associated with higher food security and vice versa. On household duties boosting food security, women farmers are more loaded with household responsibilities especially planting food crops, cultivation and harvesting, post-harvest food preservation, food preparation and even feeding household members. The study also established that lack of knowledge in post-harvest technologies and lack of modern store rooms contributed to lack of food security in Mpeketoni whereby the food got spoilt due to poor storage methods and low food production which could not last the households for one year.

6.3 Conclusion

The following conclusions can be drawn from the findings: that women farmers in Mpeketoni were young, educated and their main source of income was from farming and cash crop sale. The roles of women farmers in enhancing household food security in Mpeketoni Location included: cultivation of various food crops which included cereals, legumes, nuts and root tubers. This helped to enhance dietary diversity for the respondents' households. Women farmers used varied farm inputs which included manure, fertilizers and pesticides as well as farm practices mainly mixed cropping, mixed farming, terracing and crop rotation which helped to ensure food availability for the household. Women farmers grew cash crops such as cotton and kept livestock such as goats, cows, donkeys, chicken and sheep. This practice improved their economic status and consequently enhancing dietary quality for the households. Women farmers ensured that the foods were stored appropriately and that the foods

were protected from pest attack after harvesting. Women farmers also ensured that the household had adequate food supply throughout the year.

The women farming activities enhance household food security. The study established that women farmers used various farm inputs which included fertilizers, manure, pesticides, local and hybrid seeds. The study also established that women farmers in Mpeketoni practiced mixed farming, mixed cropping, crop rotation and terracing. Findings established that women farmers in Mpeketoni used poor post harvesting technology which contributed to food shortage as the food they harvested could not last long.

6.4 Recommendations for policy

The recommendations arising out of this study include: the government should put in to place policy recommendations aimed at ensuring food security. The government should also review policies to ensure that problems that constrain women roles in food security are addressed. A review of agricultural extension policies to increase access by women farmers to enhance household food security.

6.5 Recommendations for practice

The study had the following recommendations:

a. The Ministry of Agriculture should consider providing appropriate subsidized inputs and technologies to households in Mpeketoni so as to improve food security.

b. It is paramount for state and non-state actors in agricultural sector to provide agricultural extension services with the aim of increasing farm productivity and thereby enhancing household food security.

6.6 Suggestions for Further research

A similar study should be done on the roles of women farmers in household food security in other parts of the country. Further research should be carried out on the role of both men and women in household food security in other areas of the country.

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APPENDICES

APPENDIX A: LETTER OF INTRODUCTION

Tabither Nthenya Kilovoo,

Department of Community Resource Management and Extension,

Kenyatta University,

P.O BOX 43844,

NAIROBI.

Dear Respondent,

My name is Tabither Kilovoo. I am a Masters' student at Kenyatta University. I am conducting a study on "***The role of women farmers in household food security in Mpeketoni division, Lamu County, Kenya."***

The purpose of this study is academic. The information will be used by the Ministry of Agriculture, livestock and fisheries and other stakeholders in the formulation of policies aimed at ensuring food security in Lamu County.

Procedures to be followed

Participation in this study will require that I ask you some questions. I will record the information from you on a questionnaire. You have the right to refuse to participate in this study. You may refuse to respond to any questions and may stop the interview at any time. You may ask questions related to the study at any time.

Benefits

If you participate in this study you will help us to learn the role of women farmers in enhancing household food security.

Reward

If you agree to participate in this study, refreshments will be provided.

Confidentiality

The interview will be conducted in a private setting within the homestead. Your name will not be recorded on the questionnaire. The information gathered shall be treated confidentially and shall be used for academic purposes only.

Contact information

If you have any questions you may contact Dr Lucy Ngige on 0734169731 or Dr Eunice Njogu on 0722862052 or the Kenyatta University Ethical Review Committee Secretariat on kuerc@ku.ac.ke

CONSENT TO PARTICIPATE IN THE STUDY

The above information regarding my participation in the study is clear to me. I have been given a chance to ask questions and my questions have been answered to my satisfaction. My participation is entirely voluntary. I understand that the information will be treated confidentially.

Signature or thumbprint: …….....Date: ……

INTERVIEWER'S STATEMENT

I, the undersigned, have explained to the respondent in a language s/he understands, the procedures to be followed in the study and the benefits.

Name of interviewer.....Date.....

Signature.....

APPENDIX B: QUESTIONNAIRE FOR FEMALE FARMERS

Date.....Village.....House hold No.....

SECTION 1: FEMALE DEMOGRAPHIC INFORMATION

1. What is your age bracket?(tick)

   Below 21 years ( )

   21-30 years ( )

   31-40 years ( )

   41-50 years ( )

   Over 50 years ( )

2. What is your highest level of education? (tick where appropriate)

   Primary ( )

   Secondary ( )

   Post-secondary Certificate ( )

   Diploma ( )

   Undergraduate degree ( )

   Postgraduate degree ( )

3. What is your religion? .....

4. What is your marital status?(tick where appropriate)

   a) Single ( )
   b) Married ( )
   c) Separated ( )
   d) Divorced ( )
   e) Widowed ( )

5. What are the source(s) of income for your household?

   a. Salary/wages
   b. Farming, Crop sale
   c. Cash crops (specify)
   d. Fishing
   e. Livestock sale ( ) Milk sale ( ) Egg sale ( )
   f. Small business
   g. Others (specify)

6. What is the approximate household monthly income? (tick)

a. Below 2,999 ( )
b. 3000-5999 ( )
c. 6,000-9999 ( )
d. Above 10,000 ( )

7. The type of house occupied by the wife/mother
   a) Traditional mud wall and makuti/grass thatched roof
   b) Bricks and makuti thatched roof
   c) Stone/Bricks and iron sheet roof
   d) Timber wall and iron sheet roof
   e) Other (specify)

8. The type of cooking facility used by Wife/mother
   a) Open firewood
   b) Charcoal stove
   c) Paraffin stove
   d) Gas cooker
   e) Electric cooker

9. How many people live and share meals on daily basis in this household?

Age	Relationship with head of household	Occupation

SECTION 2: ROLE OF WOMEN IN HOUSEHOLD FOOD SECURITY

10. For a better understanding of the role of women farmers in household food security, explain how much time you allocate for the following family activities in a typical farm working day.

DAILY ACTIVITY	TIME SPENT IN HOURS	TIME SPENT IN MINUTES
Farm work		
Off-Farm work (job)		
Housework (Child care, cooking, cleaning)		
Fetching Water		
Collecting Firewood		

11. Who is the person responsible for performing the following subsistence farming related activities in this household?

ACTIVITY	HUSBAND/FATHER	WIFE/MOTHER	BOTH
Planting food crops			
Cultivating food Crops			
Harvesting food crops			
Post-harvest food preservation			
Food preparation			
Feeding the household members			

SECTION 3: FARMING INPUTS

12. What is the size of your farm in hectares? .....
13. What is the size of farm under food crops?(tick where appropriate)
    a) Less than 1 hectare
    b) 1 to 5 hectares
    c) 5 to 10 hectares
    d) More than 10 hectares

14. How long have you been carrying out farming on this land?

    Less than 3 years ( )

    3-5 years ( )

    6-10 years ( )

    More than 10 years ( )

15. Do you use the following?(tick where appropriate)

    Manure Yes/No

    Fertilizers Yes/No

    Pesticides Yes/No

    Local seeds Yes/No

    Hybrid seeds Yes/No

16. How do the following farm inputs influence your farm produce?

    a. Local seeds: ……..

    b. Hybrid seeds: .....

    c. Manure: .....

    d. Fertilizer: .....

    e. Pesticides: ……..

17. Have you received any agricultural extension services in the last twelve months?

    a. Yes

    b. No

18. If yes, list the types of agricultural extension services you have received in the last twelve months.

    a. .....

    b. .....

    c. .....

    d. .....

19. Which extension services have assisted you to improve food security?

a. .....
b. .....
c. .....
d. .....

SECTION 4: FARMING PRACTICES

20. Select the type of farming practices that you use on your farm and explain how you use it.
    a. Mixed farming
    b. Mixed cropping
    c. Crop rotation
    d. Terracing
    e. Weed control
    f. Other (specify)

21. Which food crops did you grow during the last planting season? (tick)

Maize	
Green grams	
Cow peas	
Ground nuts	
Cassava	
Sorghum	
Rice	
Sweet potatoes	
Beans	
Cashew nuts	
Ground nuts	
Other (specify)	

22. What cash crops did you grow last season?
    - ❖ Coconuts
    - ❖ Cashew nuts
    - ❖ Sim sim
    - ❖ Cotton

- ❖ Others (specify)

23. What livestock do you keep?

Type	For domestic use	For sale
Cows		
Goats		
Chicken		
Donkey		
Sheep		
Others (specify)		

SECTION 5: POST HARVEST FOOD TECHNOLOGIES

24. Give ways you used to store your food after harvesting?

25. Are your foods attacked by pests and diseases in the stores?(Yes/No)

26. Give ways you use to protect the food from pest attack after harvesting?

27. How long do the foods take before they spoil?

SECTION 6: LEVEL OF HOUSE HOLD FOOD SECURITY

28. Give the sources of food for your household in the last agricultural season (tick options that apply)

a) Own farm produce
b) Buying from the market
c) Relief food from Government/NGOs
d) Barter/exchange trade
e) Borrowing from relatives/friends/neighbours

29. How much food in 90kg bags did you harvest last season?

Type	Amount Harvested	Amount consumed	Food preserved and stored	Duration food lasted after harvest
Maize				
Green grams				
Cowpeas				
Groundnuts				
Beans				
Other(specify)				

30. Explain whether the food you harvested from your farm was enough to last your household until the next season.
31. About how much food was left over in your granary/store from the last harvest season to the new season?
32. About how much food in kilogram bags did you give away to needy people in your community in the last season?
33. How would you describe your household food security level in the last harvest season?
    a) Enough food to last until the next season
    b) Not enough food to last until the next season
34. How many meals/snacks did your house hold consume yesterday from the time you woke up until bed time?

Breakfast	Lunch	Supper	Snacks between meals

35. In which months did your household have adequate food in the last 12 months? (tick where appropriate)

a. January
b. February

c. March
d. April
e. May
f. June
g. July
h. August
i. September
j. October
k. November
l. December

36. Did your household suffer from food shortage in the last 12 months?(Yes/No)
37. If yes, in what type of food shortage did your household experience in the last 12 months?
    .....
38. Did your household receive relief food in the last 12 months?(Yes/ No)
39. If yes, for how long did the relief food sustain your household in days/weeks/months?
    .....

40. Apart from farming, what are the other sources of food for your household?
    a. .....
    b. .....
    c.....
    d:.....
41. Which of the following statements reflect the level of your household food security in the last 12 months? tick where appropriate)

Level of food security for my household	Agree	Strongly agree	Disagree	Strongly disagree
We had adequate food for 12 months				
We had food shortage for 1-5 months				
We had food shortage for 6-11 months				
We depended on relief/food support for 1-5 months				
We depended on relief/food support for 6-12 months				

Thank you for your time and cooperation in this study

APPENDIX C: CLEARANCE PERMIT - NACOSTI

THIS IS TO CERTIFY THAT:
MS. TABITHER NTHENYA KILOVOO
of KENYATTA UNIVERSITY, 179-90200 kitui,has been permitted to conduct research in *Lamu County*

on the topic: *THE ROLE OF WOMEN FARMERS IN ENHANCING HOUSE HOLD FOOD SECURITY IN MPEKETONI DIVISION , LAMU COUNTY KENYA*

for the period ending:
1st August,2015

.....
Applicant's Signature

Permit No : NACOSTI/P/15/9619/5771
Date Of Issue : 6th May,2015
Fee Recieved :Ksh 1,000

.....
for *Director General*
National Commission for Science, Technology & Innovation

CONDITIONS

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

REPUBLIC OF KENYA

NACOSTI

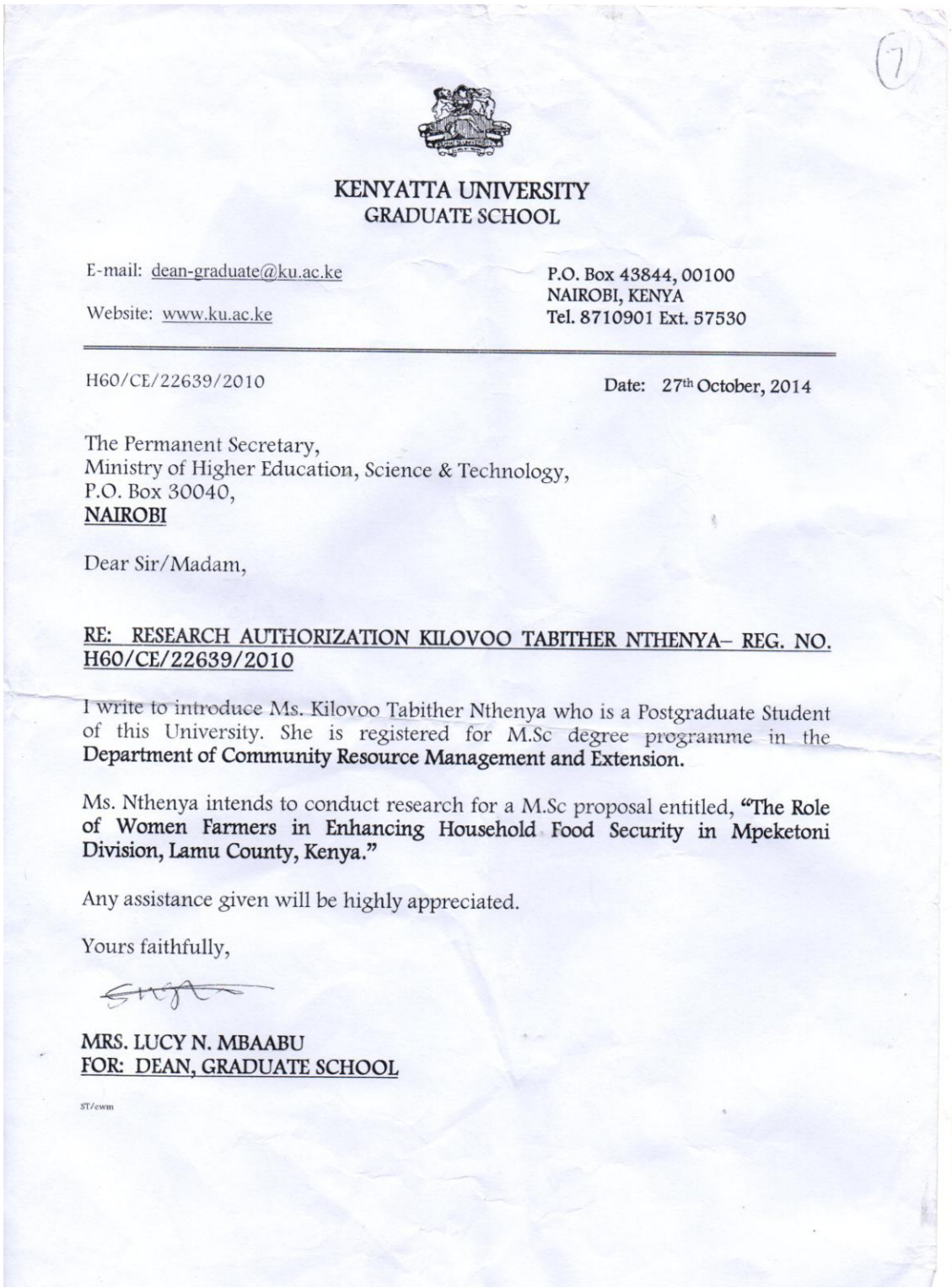
National Commission for Science, Technology and Innovation

RESEARCH CLEARANCE PERMIT

Serial No. A 5058

CONDITIONS: see back page

APPENDIX D: RESEARCH AUTHORIZATION – KENYATTA UNIVERSITY



KENYATTA UNIVERSITY
GRADUATE SCHOOL

E-mail: dean-graduate@ku.ac.ke
Website: www.ku.ac.ke

P.O. Box 43844, 00100
NAIROBI, KENYA
Tel. 8710901 Ext. 57530

H60/CE/22639/2010

Date: 27th October, 2014

The Permanent Secretary,
Ministry of Higher Education, Science & Technology,
P.O. Box 30040,
NAIROBI

Dear Sir/Madam,

RE: RESEARCH AUTHORIZATION KILOVOO TABITHER NTHENYA– REG. NO. H60/CE/22639/2010

I write to introduce Ms. Kilovoo Tabither Nthenya who is a Postgraduate Student of this University. She is registered for M.Sc degree programme in the **Department of Community Resource Management and Extension.**

Ms. Nthenya intends to conduct research for a M.Sc proposal entitled, **"The Role of Women Farmers in Enhancing Household Food Security in Mpeketoni Division, Lamu County, Kenya."**

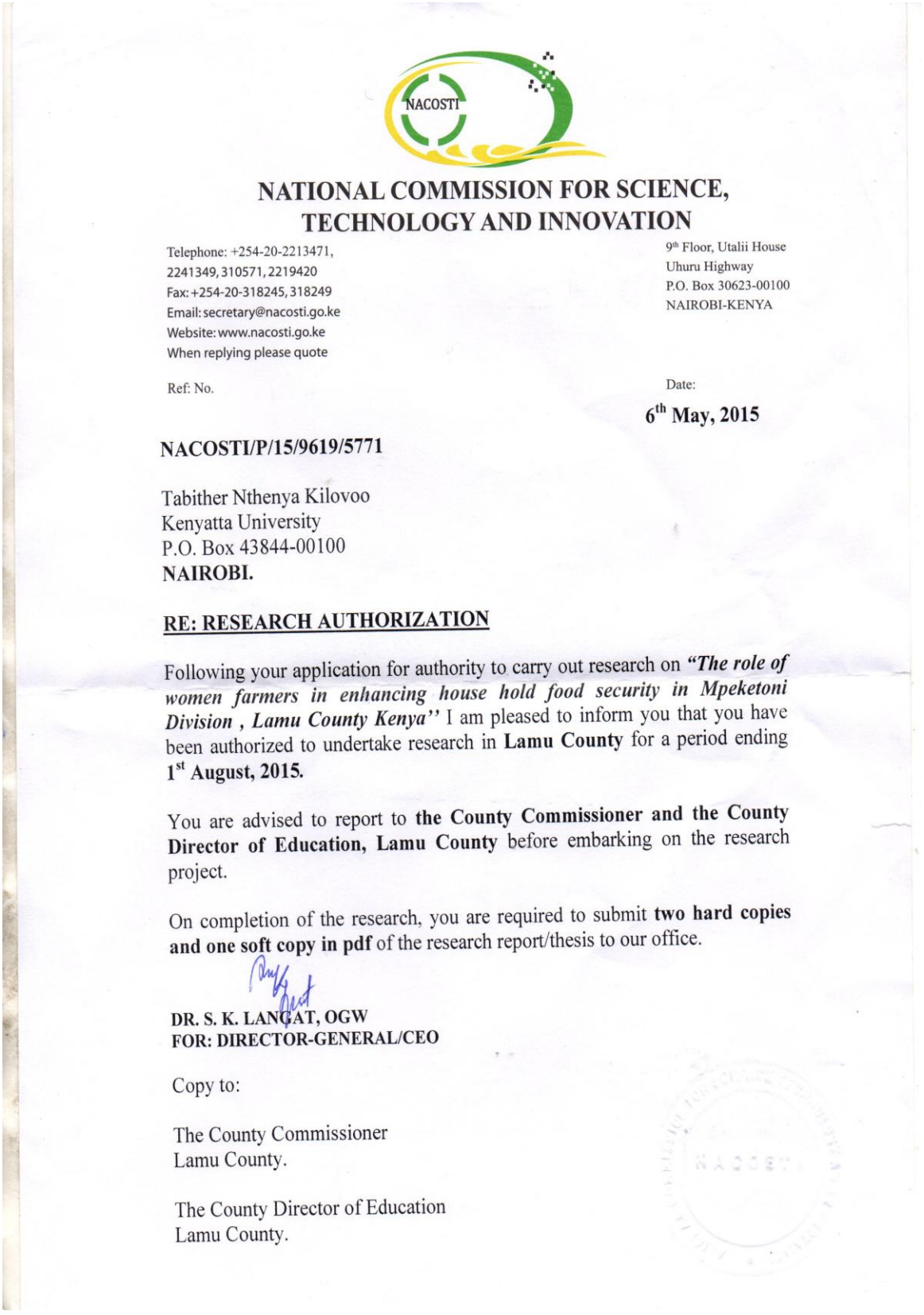
Any assistance given will be highly appreciated.

Yours faithfully,

MRS. LUCY N. MBAABU
FOR: DEAN, GRADUATE SCHOOL

ST/ewm

APPENDIX E: RESEARCH AUTHORIZATION - NACOSTI



NACOSTI

NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY AND INNOVATION

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9th Floor, Utalii House
Uhuru Highway
P.O. Box 30623-00100
NAIROBI-KENYA

Ref: No.

Date:

6th May, 2015

NACOSTI/P/15/9619/5771

Tabither Nthenya Kilovoo
Kenyatta University
P.O. Box 43844-00100
NAIROBI.

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on ***"The role of women farmers in enhancing house hold food security in Mpeketoni Division , Lamu County Kenya''*** I am pleased to inform you that you have been authorized to undertake research in **Lamu County** for a period ending **1st August, 2015.**

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

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

DR. S. K. LANGAT, OGW
FOR: DIRECTOR-GENERAL/CEO

Copy to:

The County Commissioner
Lamu County.

The County Director of Education
Lamu County.

APPENDIX F: RESEARCH AUTHORIZATION KENYATTA UNIVERSITY ETHICS REVIEW COMMISSION

KENYATTA UNIVERSITY
ETHICS REVIEW COMMITTEE

Email: chairman.kuerc@ku.ac.ke
secretary.kuerc@ku.ac.ke
ercku2008@gmail.com
Website: www.ku.ac.ke

P. O. Box 43844 - 00100 Nairobi
Tel: 8710901/12
Fax: 8711242/8711575

Our Ref: KU/R/COMM/51/398

Date: 9th February, 2015

Kilovoo Tabither Nthenya
Kenyatta University,
P.O Box 43844,
Nairobi

Dear Tabither,

RE APPLICATION NUMBER PKU/290/1266– "THE ROLE OF WOMEN FARMERS IN ENHANCING HOUSEHOLD FOOD SECURITY IN MPEKETONI DIVISION, LAMU COUNTY, KENYA"

1. IDENTIFICATION OF PROTOCOL

The application before the committee is with a research topic **"The role of women farmers in enhancing household food security in Mpeketoni Division, Lamu County, Kenya"** received on 28th November, 2014.

2. APPLICANT
Kilovoo Tabither Nthenya, Department of Community Resource Management & Extension

3. STUDY SITE
Mpeketoni Division, Lamu County, Kenya

4. DECISION
The committee has considered the research protocol in accordance with the Kenyatta University Research Policy (section 7.2.1.3) and the Kenyatta University Ethics Review Committee Guidelines **AND APPROVED that the research may proceed for a period of ONE year from 9th February, 2015.**

5. ADVICE/CONDITIONS
i. Progress reports are submitted to the KU-ERC every six months and a full report is submitted at the end of the study.
ii. Serious and unexpected adverse events related to the conduct of the study are reported to this board immediately they occur.
iii. Notify the Kenyatta University Ethics Committee of any amendments to the protocol.
iv. Submit an electronic copy of the protocol to KUERC.

When replying, kindly quote the application number above.
If you accept the decision reached and advice and conditions given please sign in the space provided below and return to KU-ERC a copy of the letter.

09 FEB 2015

PROF. NICHOLAS K. GIKONYO
CHAIRMAN ETHICS REVIEW COMMITTEE

I Kilovoo Tabither Nthenya accept the advice given and will fulfill the conditions therein.

Signature..... Dated this day of 9/2/2015 2015.

cc. Vice-Chancellor