GENDER DIMENSION OF DRYLAND FARMING AND ITS IMPLICATIONS ON HOUSEHOLD FOOD SECURITY IN EMBU COUNTY, KENYA

BY

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A THESIS SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF DOCTOR OF PHILOSOPHY IN ENVIRONMENTAL STUDIES (HUMAN ECOLOGY) OF THE UNIVERSITY OF ELDORET, KENYA

OCTOBER, 2019

DECLARATION

DECLARATION BY THE CANDIDATE

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To my treasure, my family members spouse Lydia Ceciliar, lovely children Eric Mwenzwa, Fred Musyoka, Sharon Ndanu and Dan Mumo for being a source of limitless inspiration to carry on with this work even at my lowest moments.

ABSTRACT

Agriculture is the backbone of Kenya's economy, and hence its importance in enhancing foreign trade, food security, poverty alleviation, national development and revitalizing human welfare. Despite the importance of the sector, more than three-quarters (¾) of the country's and area is dryland in the form of Arid and Semi-Arid Lands (ASALs), in which rain-fed agriculture is largely unviable livelihood option.

In the drylands of Kenya therefore, livestock rearing and dryland farming are the most important livelihood options for resident communities given the climatic conditions. The adverse natural weather conditions are compounded by anthropogenic activities that degrade the environment, making local residents high disadvantaged in matters livelihood. As a result, food insecurity remains the greatest challenge in the ASALs of Kenya. While weather patterns are responsible for food insecurity, other factors come in to escalate want in these areas such as gender-based division of labor and cultural dictates that limit food production.

This study investigated the gender dimension of dryland farming practices in the drylands of Embu County and the attendant implications on food production and security at the household level. It used both qualitative and quantitative methods of social investigation, while giving more emphasis on the former as data collection procedures. In addition, the study utilized both qualitative and quantitative data analysis procedures, while putting more emphasis on the former. It henceforth pointed at implications of gender-based division of labor in dryland farming on food production and security at the household level. Such findings have been generalized not only for the dryland areas exhibiting similar socio-economic and climatic conditions, but also on a national scale.

From this study, it was determined that women faced several challenges in their food production efforts and these had more to do with culture than natural weather and and structural problems. In the same vein, they were arguably the hands-on food producers although returns to them were not in line with their efforts. On their part, men had several opportunities in food production, although they were not fully utilized. This has implications for below potential food production and possibility of household food insecurity. As a result, a gender inclined framework of the best practices was the outcome, which is expected to bring a positive difference in food production to assuage household food security. From the findings, policy recommendations were made regarding dryland farming to enhance household food security in semi-arid areas of Embu County and other areas with similar climatic, socio-cultural and economic conditions. It is the implementation of the recommendations which is expected to enhance dryland farming and agricultural productivity in order to alleviate food insecurity and stimulate community welfare as well as national development.

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LIST OF ACRONYMS

AD	Anno Domini/Christian Era
ASALs	Arid and Semi-Arid Lands
CORPs	Community Own Resource Persons
EU	European Union
EWS	Early Warning System
FAEOs	Field Agriculture Extension Officers
FAO	Food and Agriculture Organization (of the UN)
FFSs	Farmers' Field Schools
FGDs	Focus Group Discussion
FYM	Farm Yard Manure
FSIN	Food Security Information Network
GDP	Gross Domestic Product
GoK	Government of Kenya
HEP	Hydro-Electric Power
HIV/AIDS	Human Immune Virus/Acquired Immune Deficiency Syndrome
IDS	Institute for Development Studies
IEBC	Independent Electoral and Boundaries Commission (of Kenya)
IFAD	International Fund for Agricultural Development
IFPRI	International Food Policy Research Institute
IFRA	Institut Francais de Recherché en Afrique/French Institute for Research in Africa
KARLO	Kenya Agriculture and Livestock Research Organization
KCB	Kenya Commercial Bank
KES	Kenya Shillings
KIIs	Key Informant Interviews
KIPPRA	Kenya Institute for Public Policy Research and Analysis
KMD	Kenya Meteorological Department
KNBS	Kenya National Bureau of Statistics
KPHC	Kenya Population and Housing Census
KWFT	Kenya Women Finance Trust

MFIs	Micro Finance Institutions
MoA	Ministry of Agriculture
MSEs	Micro and Small Enterprises
NACOSTI	National Council for Science, Technology and Innovation
NCPB	National Cereals and Produce Board
NGO	Non-Governmental Organization
NWEDF	National Women Enterprise Development Fund
SACCO	Savings and Credit Cooperative Society
SAPs	Structural Adjustment Programmes
SID	Society for International Development
SPSS	Statistical Package for Social Sciences
SSA	Sub-Saharan Africa
UN	United Nations
UNCCD	United Nations Convention to Combat Desertification
UNDP	United Nations Development Programme
UNESCO	United National Educational, Scientific and Cultural Organization
UNICEF	United Nations International Children Emergency Fund
UNSDG	United Nations Sustainable Development Goals
WB/IMF	World Bank/International Monetary Fund
WFP	World Food Programme
WHO	World Health Organization

ACKNOWLEDGEMENT

I wish to register my appreciation to my academic supervisors Prof. Grace Cheserek and Dr. Mark Kiptui and their colleagues at the School of Environmental Studies, University of Eldoret for their invaluable expert advice and unqualified resolve to guide me during my sojourn at the University of Eldoret. Their contribution and valuable guidance in the writing of this thesis cannot be gainsaid-they had both personal and professional interest in guiding me.

More gratitude goes to the *Institut Francais de Recherché en Afrique*/French Institute for Research in Africa (IFRA) and Moi University for partially facilitating my PhD studies at the University of Eldoret through their financial contribution. While IFRA facilitated the data collection component of this work, Moi University paid part of the fees and hence the two enabled me to successfully complete the work.

I would also like to give credit to the contributions of my dear classmates: Kombo, Musonye, Tulel, Beru, Mayaya and Kurui for their fruitful insights and encouragement during our sojourn at the University of Eldoret. The six remained my pillars of encouragement and support as demonstrated through their uncharacteristic boldness in telling me go to on when I felt discouraged.

Last but not least, I must give credit and humbly appreciate the many respondents in the Mbeere drylands of Embu County who painstakingly took time off their busy schedules to give me very useful information that is the backbone of this work.

CHAPTER ONE

INTRODUCTION

1.1. Background to the Study

The drylands of the world including deserts, semi-arid lands, grasslands and rangelands comprise about 41% of the total land area and supports approximately 35% of the global population (Widtose, 2010). The corresponding figure for Kenya is roughly 80% of the total land area, home to about one-third (⅓) of the total population of the country, mostly nomadic and agropastoralists (Republic of Kenya, 2002; 2007; 2008; 2009a; 2009e). In Kenya, the drylands are divided into largely Arid and Semi-Arid Lands (ASALs) depending on the prevailing climatic conditions in each of the areas. They contribute about 5% of Gross Domestic Product (GDP), mainly through livestock production (Republic of Kenya, 2007; 2008).

A defining attribute of these areas is aridity and accompanying hardships that are largely a function of environmental vagrancy manifested in low, erratic and unreliable rainfall, high thermal stress and low biological productivity. The combination of these factors lead to acute material want manifested in form of low literacy rates, poor health care infrastructure, water scarcity and food insecurity, all which combine and lead to below average human development indicators. Jodha (2008) asserts that arid regions present a bio-physical nature of fragile and a vast diversity of landscapes that remain challenged in terms of food production. In deed as literature attests, food security is the single most significant development challenge in the ASALs of Kenya, where about 5% of the country's population is resident (Republic of Kenya, 2002; 2007; 2008, 2013a).

Although much of Kenya is Arid and Semi-Arid ecological zone (80%), agriculture still plays and will continue to play a key role in the development of the country. It accounts for 80% of employment, about 24% of Gross Domestic Product, 75% of industrial raw materials and about 60% of export earnings (Republic of Kenya, 2007; 2008; 2009a; 2009e). This underscores the important role the sector plays in development and the alleviation of poverty, the latter which afflicts about 46% of Kenyan's population. Dryland farming is practiced under conditions of high temperatures and shallow and largely infertile soils, which constitute about 30% of the earth surface and receive between 10 and 20 inches of annual rainfall (Widtose, 2010).

Much of the farming in dryland ecological zones that are spread across the country is done by women with strong support from their children while the work of men is largely supervisory (Mwenzwa, 2011). While the bulk of farm work in the drylands is done by women, it is probable that they get fewer returns in relation to their labour investment as opposed to their male counterparts (Palacio & Melita, 2011). Indeed, it has been documented that when crops become commercialised, they automatically change possession into men's hands (Palacio & Melita, 2011; BRIDGE, 2014)

In the semi-arid areas of Embu County (Mbeere drylands), dryland farming has many challenges including inadequate rainfall, poor soil and water conservation methods, poor farming practices and skewed gender-based division of labour. Part of this latter development is explained by the patriarchal nature of Kenyan communities including the Mbeere ethnic community among other resident communities in the area. The foregoing

division of labour has various implications on food production and consequently security at the household, community and national levels.

As such, women take the bulk of the farm work to feed their families. This seemingly feminization of dryland agricultural activities means that gender imbalances exist regarding farming activities and therefore food production (Republic of Kenya, 2009f). Such gender imbalances are likely to be manifested in the form of reduced acreage under cultivation, poor adoption of farming technology, poor soil conservation measures and low crop yields, thereby adversely affecting household and community food production and security. When the foregoing combines with local adverse natural weather conditions, the situation becomes dire.

The foregoing is partly explained by the fact that the competition between women productive and reproductive roles renders them time-deficient for food production activities. This adversely affects individual and household welfare as the ability to meet social service needs including food, shelter, education and health among others is compromised to a large extent. It needs to be emphasised that these are some of the proximate indicators of development and when they are compromised, development is adversely affected.

In such state of affairs, it will be a long shot to think of achieving the Kenya Vision 2030 ideals and UN Sustainable Development Goals (UNSDGs) (Republic of Kenya, 2007; 2008; UN, 2015). The essence of this study was the gender-based division of labour

regarding farming activities and how it impacts on food production and security at the household level. As findings have consistently demonstrated gender division of labour has a negative impact on food production and as such household food security. Such are expected to be translated into both community and national levels to adversely affect general development of the country.

1.2. Statement of the Problem

The environment, which includes both biotic and abiotic factors, forms the basis for livelihood activities including food production. Therefore, the environment has a significant contribution to human livelihood and development (Republic of Kenya, 2005). It is acknowledged that food security is basic to the survival of the individual, household and the nation at large (Republic of Kenya, 1994a; 2009f). Indeed, no meaningful development in economic, political, social and cultural spheres is possible without food security.

The Mbeere dryland of Embu County register high levels of poverty, with about 56% of its population living below the poverty line (Republic of Kenya, 2002b; 2009d). Consequently, most residents here are still at the level of basic needs including food, implying that there is much that needs to be done to develop the study area. As a result, Cheru & Modi (2013) suggest that African agriculture in general needs major transformation given the various roles it has played and continue to play in the continent's development.

In addition, climatic patterns are not as conducive for sustainable agricultural production and particularly rain-fed farming, thus necessitating many people to remain largely subsistence agropastoralists (Mwaruvie, 2011; Republic of Kenya, 2002b). With the largely semi-arid ecology, diversification of economic activities is restricted and hence the high poverty indices. The resultant poverty is likely to lead to increased school dropout rates, low income per capita and inability by many families to meet basic household level needs (Republic of Kenya, 2002b).

The Food Security Information Network (FSIN) (2017) list Kenya among some countries that are currently experiencing or exposed to risks that will lead to food insecurity. Other countries include Afghanistan, Burundi, Central Africa Republic, Bangladesh, Uganda and Ethiopia (ibid). Despite the many challenges to agriculture in the Mbeere drylands of Embu County, dryland farming and related activities remains the most important economic activity to moderate household food insecurity. This activity, like other livelihood activities in society is characterised by near rigid gender roles as literature attests (Boserup, 1970; Mwenzwa, 2011; Mwaruvie, 2011).

Generally, roles in society are characterised by the separation of male and female spheres and activities so that men and women responsibilities are clearly defined by the cultural dictates within which people live and are members. In such state of affairs and in many instances, the contribution of women is blurred, implying that they are counted but may not necessarily count for example in development. Indeed, research has shown that rural women have less access to productive resources, services and opportunities associated to agricultural production compared to their men counterparts (FAO, 2017a; b; Palacios &

Melita, 2011; BRIDGE, 2014; Njuguna, Brownhill, Kihoro, Muhammah & Hickey, 2016; Habtezion, 2012; Westerweel & Samwel, 2014)).

The foregoing happens despite women being an integral part of society and therefore important for any economy. It has been pointed out that no meaningful progress is possible when women are taken as unequal partners in development (Sindhuja, 2011). As a result, the relative contribution of men and women in development is difficult to measure and returns to each may not be commensurate with their efforts. This may work against the morale of those disadvantaged as far as food production is concerned, meaning less than optimal food production.

To understand and assess the relative contribution of both men and women in development and the impact of development on both, it is necessary to provide gender-disaggregated information on the prevailing situation at any given time. This could be looked at in terms of who does what, level of access to resources, benefits and deprivations of both men and women as imposed by the society. In addition, it is also important to find out the implications of such roles on both men and women and the society at large. This information is important for planning for gender mainstreaming, equity allocation and balanced development that benefits both men and women. It is through such information that gender gaps are identified and strategies formulated to correct existing imbalances, while enhancing the complementary roles of men and women.

Generally, food production especially through dryland farming is largely manual and involves several activities including forest clearing, land tillage, seed sowing, weeding, crop tending, harvesting, threshing of grains where applicable and subsequently post-harvest storage and marketing. While these activities are important, the aim of ensuring food security for the household, community and the nation at large may be hampered by other factors that are largely outside effective human manipulation including weather conditions. Such may include moisture deficiency, thermal stress, soil salinity and infertility as well as erosion and subsequent land degradation.

Nevertheless, there are also factors that are within the armpit of human manipulation such as acreage under cultivation, type of crops grown, timing of cropping, amount of labour invested, which would eventually determine the amount of food produced if weather conditions are held constant. Nonetheless, in the ASALs, weather conditions remains the most dynamic element and hence impossible to hold constant. In this endeavour, the relative contribution of men and women in the production of food and subsequently household food security is a concern that this study sought to investigate. This was intended to gain an understanding of their contribution and hence devise strategies for ensuring sustainable gender equity regarding dryland farming and production of food to alleviate food insecurity, poverty and improve human welfare.

Kimenyi (2002) asserts that the largest growth in poverty reduction in developing countries results from agricultural activities. Hence agriculture is pro-poor and indeed improving farm production helps spur non-farm activities in rural areas where majority of

Kenyans live such as the Mbeere drylands of Embu County. It is widely acknowledged that poverty reduction must begin with the fulfilment of basic needs including ensuring food security. Hence, to achieve food security calls for a strategic focus on agriculture and food production as a precursor to overall development. In addition, it has been established as literature attests that Kenya's potential for industrialization is in agro-based industries (Republic of Kenya, 2007; 2008).

The foregoing therefore necessitated research in the sector and as such this study was justified based on the importance of agriculture in poverty reduction and national development. In addition, given that issues related to gender equity in development in low income countries like Kenya are yet to gain maximum recognition and priority, it was deemed logical to undertake this study so that the knowledge produced can be cascaded upwards from the grassroots to the national level. This was looked at from the reasoning that such data is important for proper planning and gender mainstreaming in agriculture in order to move towards sustainable food production and security and generally a food secure country. It is on the basis of such background information that this study was conceived and justified.

High incidences of poverty in low potential areas such as the Mbeere drylands of Embu County have partly seen the largely economically active, especially men moving to urban areas in search of jobs to diversify livelihood (Republic of Kenya, 2002; 2007; 2008). This has robbed the rural areas of significant manpower that would have been used in development including contribution to livestock husbandry, dryland farming and food

production. Women may be left to fend for their families against relatively lower levels of education, poor access to technology and farm inputs compounded by adverse weather conditions. The result is likely to be below potential food production and thus rendering many families food-poor. Against this background, this study aimed at determining the contribution of men and women in dryland farming and subsequently food production and security at the household level.

As a result of population pressure, like elsewhere in the country, land subdivision has seen the gradual decrease in farm sizes in the study area in the midst of aridity, hence compounding food production and security for many families. In such a case, women, children, disabled and the aged among other vulnerable categories of people are likely to get a major beating as a result of heightened poverty (BRIDGE, 2014; FAO, 2014; Republic of Kenya, 2007). This has necessitated the over-exploitation of natural resources such as sand, ballast and forests among others.

The research concern here was to determine the contribution of men and women in dryland farming, food production and household food security. More important was the gender dimension of food production and its implication on household food security. In other words, the farming activities undertaken by men and women in dryland farming and how they affect and impact on food production and security at the household level were the concerns of this study.

In addition, the United Nations has a great interest in poverty alleviation, food and nutrition security and generally sustainable development. As a result, in 2015, the UNDP came up with seventeen (17) Sustainable Development Goals (SDGs) also known as the Agenda 2030. Sustainable Goal 2 is about ending hunger, achieving food security and improved nutrition and promoting sustainable development (UNDP, 2015). Such ambitious proposal cannot be achieved without the acquisition of appropriate information through scientific research. It is on the basis of the foregoing knowledge that the study was conceptualized and hence justified. The data adduced by this study and the attendant recommendations if adopted are expected to play a key role in the achievement of food security and sustainable alleviation of hunger by and beyond 2030 as envisaged in the Kenya Vision 2030 (Republic of Kenya, 2007).

In summary, while there are several challenges that stand in the way of effective dryland farming as explained in the proceeding paragraphs, gender was deemed as a factor that has not specifically been adequately analysed as it concerns dryland farming. Such knowledge was deemed necessary for devising strategies to ensure gender equity regarding food production and subsequently ensure household food security. The information collected was seen as important in determining how much effort to invest to have either men or women get more involved in order to bring the two at par in dryland farming and related activities. It is on the basis of the foregoing that this study was conceived with the aim of bridging such knowledge gap.

1.3. Research Objectives

1.3.1. General Objective

The overall objective of the study was to investigate the gender dimension of dryland farming practices and their implications on household food production and security in the Mbeere drylands of Embu County.

1.3.2. Specific Objectives

In order to achieve the general objective, the study was guided by the following specific objectives:

1. To explore the nature of gender-based division of labour in dryland farming in the Mbeere drylands of Embu County.
2. To examine the gender-based constraints to enhanced dryland farming in the study area.
3. To investigate the gender-based opportunities for enhanced food production through dryland farming in the study area.
4. To find out the implications of gender-based division of labour in dryland farming on household food security in the study area.

1.4. Research Questions

The study endeavoured to answer the following research questions:

1. What is the nature of household division of labour regarding dryland farming activities in the Mbeere drylands of Embu County?
2. What are gender-based constraints and opportunities for enhanced food production through dryland farming in the study area?

3. What are the implications of gender-based division of labour in dryland farming on food production in the study area?
4. What are the implications of gender-based division of labour in dryland farming on household food security in the study area?

1.5. Significance of the Study

The Kenya Vision 2030 is the newest development blueprint put in place in 2007 to guide the socio-economic and political transformation of the country to the year 2030 and beyond. This blueprint is anchored on three pillars, the economic, political and the social, all of which complement one another towards the attainment of a middle income nation by 2030 (Mwenzwa & Misati, 2014; Republic of Kenya, 2007a; 2008). In each pillar are proposed flagship projects for propelling the envisaged progress. In particular, the blueprint recognises the role to be played by the physical environment in the country's envisaged transformation and hence a key sector in achieving the vision goals. The foregoing resonates well with the UN Sustainable Development Goals, particularly Goal 2 that has to do with alleviation of food insecurity at the global level (UNDP, 2015)

In the economic pillar of the Kenya Vision 2030, agriculture is seen as a key sector that will drive the vision towards the achievement of its ideals. Indeed, it is the major employer of rural people, with an estimated 3.8 million Kenyans directly employed in the sector-related activities such as farming and livestock rearing (Republic of Kenya, 2007a; 2008). The Government of Kenya (GoK) has also acknowledged that ensuring food security and eliminating hunger remain significant challenges as more than 40% of the population lack access to adequate food (Republic of Kenya, 2007a; 2008). Hence, due to

increased population there is need for improved food production to forestall hunger, starvation and malnutrition and hence the improvement of welfare of the population in line with the vision ideals.

Moreover, arid and semi-arid areas such as the Mbeere drylands of Embu County are likely to experience major transformations as necessitated by climate change, population explosion and urbanization. For example, with increased population there is going to be heightened demand for farmland and hence the possibility of depleting forests, which may have adverse consequences on food production and security. Given the foregoing it was important and logical to undertake this study to identify gender-based participation gaps with a view to narrowing or eliminating them altogether. The foregoing if accomplished is aimed at increasing food production and enhancing food security at the household level, which is expected to contribute to national development in the long-run.

Agriculture is indisputably the backbone of Kenya's economy, which contributes about 24% of the country's Gross Domestic Product (GDP), 75% of agricultural raw materials and 60% of export earnings, while directly supporting approximately 80% of the total population who live in rural areas (see Republic of Kenya, 2007a; 2008). Moreover, the sector has one of the highest potentials for poverty reduction (Kimenyi, 2002). As a result, the agricultural sector is regarded as pro-poor since it does not only ensure food security, but also an important engine for spurring non-farm activities in both rural and urban areas. Such importance therefore makes the sector a focal point for continued research and subsequent improvement. This is yet another reason why this study was seen

as important and hence significant not only to the country's development goals, but also the UN Sustainable Development Goals (Agenda 2030) (UNDP, 2015).

Further, the adverse effects of climate change that are already felt in the country are likely to be more severe in future. These are also expected to compound the exploitation of environmental resources with devastating impact on agriculture and related sectors. All these changes are expected to impact negatively on the environment and therefore the need for strategic intervention measures. On the basis of the foregoing exposition, this study was seen as important in enhancing the achievement of the Kenya Vision 2030 flagship development projects and sustaining the envisaged progress up to and beyond the vision period.

It was therefore important that this study was conceived and carried out to provide information that can be useful in the sustainable use of agricultural land in drylands of Kenya to achieve the country's development targets. Moreover, the study was done from a gender perspective since it points at gender-based equity gaps whose bridging can play a pivotal role in enhancing food selfsufficiency and by extension overall development of the country. This observation is based on the reasoning that no meaningful development is achievable in the midst of inequalities and discrimination including those based on gender (BRIDGE, 2014; Njuki, Parkins & Kaler, 2016; Habtezion, 2012; 2016).

In addition, the National Food Policy (Republic of Kenya, 1981; 1994a) despite its noble intentions of ensuring a broad-based food sufficiency in main foodstuffs has failed to

ensure food security more than three decades since inception. Part of the problem is that the policy emphasizes increase in food production without giving adequate attention to quality and access. Again, while it has proposed various programmes for increasing food production, equity regarding access to agricultural land and related resources is unfortunately not in the picture.

Most important, the policy does not give any attention to gender-based food production and appropriation gaps. It is such a weakness in this policy document that has propelled this study in order to identify the gender-based constraints and opportunities for enhanced dryland farming in the Mbeere drylands of Embu Country, with the aim of enhancing food production and household food security. Without a doubt, it can be averred that the omission of gender issues by the policy makers is partly to blame for the incessant food insecurity more than half a century into political self-rule in Kenya.

Notably, the policy has not taken cognizance of the importance of gender concerns regarding agriculture and specifically dryland farming. Indeed, while it has been overemphasised that women should be more involved in off-farm activities, studies have largely ignored their relative contribution in farming activities against their male counterparts and the benefits each derive there from. The foregoing may perhaps explain the lingering food insecurity in the country more than five decades into political independence. It is on the basis of this knowledge gap that this study was conceived and carried out. The motivation here was to unearth the gaps in the policy, government

documents and data in order to draw appropriate conclusions and attendant recommendations as it were, to improve household as well as national food security.

The current Embu County Development Profile and the Embu County Integrated Development Plan (Republic of Kenya, 2013a & b) have identified several problems facing the agricultural sector in the drylands. These include poor agronomic practices, poorly developed farm produce bazaar, poor value-addition practices, over dependence on natural weather and post-harvest losses. Others include high cost of farm inputs, aridity, poor soil conservation practices and inappropriate farming technologies. Although the two documents (ibid) acknowledge that women face several challenges in the semi-arid areas including participation in decision-making and asset ownership, they do not however point out the gender issues regarding agriculture in general and dryland farming in particular. This leaves a knowledge lacuna and hence justifies this study as an attempt at bridging the gap.

Women are about 50% of the population and maximizing their participation and contribution in development including in food production is essential. Certainly, with the new constitution inaugurated in 2010, active citizen participation in matters of public concern is no longer an option. Indeed, in most developing countries like Kenya, there are more women than men who are involved in farming activities especially subsistence farming, which is important to assuage household food security (Sindhuja, 2011).

As a result, it is acknowledged that ignoring the contribution of any segment of the population implies delaying or foregoing development in the same proportion (Kibwana,

1992; Mwenzwa, 2011a). Despite this, the contributions of both men and women are blurred by the age-old cultural practices that assign duties including farm-related ones on gender basis. Such assignment of duties as this study found out is part of the problem bedeviling food insecurity in the drylands of Kenya.

However, in farming generally and dryland farming in particular, available texts (Kimenyi, 2002; Republic of Kenya, 2009; Haines, 1982; Clayton, 1964) shy away from looking at gender issues at play. On the other hand, texts that give this issue attention (Boserup, 1970; 2011; Poats, 1991; FAO, 2003; 2017a; World Bank, 2009) are general and hence fail the specificity test. Such specificity was the impetus for undertaking this study although its findings are applicable in other areas of the country that have similar socio-cultural, economic and climatic conditions. As such, the application of the findings of this study is not limited to the Mbeere drylands of Embu County, but also other areas.

In addition, the Government of Kenya has developed a guide to mainstream gender in the agricultural sector (Republic of Kenya, 2010c). However, the document lacks gender disaggregated data on farming generally and dryland farming in particular, leaving a knowledge gap that needs to be investigated. Gender disaggregated data regarding dryland farming cannot be ignored given that a large population of Kenya derive their livelihoods from this activity. For this reason, identifying constraints that men and women face and opportunities for enhanced dryland farming requires data of the kind provided by this work. This was yet another reason why this study was deemed necessary, conceived and therefore undertaken.

1.6. Scope and Limitations of the Study

While the topic of the study is gender dimension of dryland farming and food security, the study was limited to looking at farming activities and men and women participation in them. In addition, the study attempted to determine how gender division of labor with regard to dryland farming activities impacted on food production and subsequently, household food security in the Mbeere drylands of Embu County. The emphasis was placed on looking at the issue of dryland farming from a gender perspective in terms of the roles of men and women.

As far as the county scope was concerned, the study was limited to two administrative divisions (Gachoka and Kiritiri) that posted high incidences of poverty. This was provided by the Kenya Central Bureau of Statistics (KNBS) through the Embu County Development Profile, the Embu County Integrated Development Plan, 2013-2017 (Republic of Kenya, 2013a & b) and local Kenya National Bureau of Statistics (KNBS) office. Embu drylands that are in Mbeere North and Mbeere South sub-counties are known for seasonal variability in precipitation resulting from high rainfall to extremely low amounts (see Republic of Kenya, 2002b; 2009d; 2013a & b; Mwaruvie, 2011). As a result, there could be bumper harvest in one season and extremely low or no yields in another. As such, if the study was carried out during bumper harvest, many people may not have readily captured the state of affairs during a food scarce season. On the other hand, if it was done at a time when people were busy in their farms such as during planting or harvesting, reaching respondents may be problematic.

It is noted that when people are busy in their farms, this may be the best time to carry out direct observation regarding men and women involvement in dryland farming activities. These include farming practices, use of technology, soil conservation and moisture preservation practices among other relevant issues. Consequently, effort was made to collect data during the two seasons in order to capture as much data as possible. Hence, the study was undertaken between January 2015 and September 2017, which coincides with both dry and wet seasons in the Mbeere drylands of Embu County (Republic of Kenya, 2002b; 2009d; 2013a & b; Mwaruvie, 2011). The study was specifically carried out in Kiritiri and Gachoka divisions of Mbeere South SubCounty, Embu County. This was because, Mbeere South unlike Mbeere North is drier and exhibits more characteristics of ASALs.

Regarding non-response, some of the sampled households there were no people with the required competency to give the required information to answer the study questions and achieve the study objectives. Whenever this happened, then the selected household was discarded or a recall appointment made. Where the latter turned out to be time consuming, the household was replaced by the next one where competent respondents were present. In this particular case, respondents' competency implies their ability to give appropriate information from a point of knowledge as opposed to ignorance or guesswork.

Given the aridity of the study area, this is likely to necessitate rural-urban migration of men to diversify livelihood opportunities. Flowing from the foregoing, it became apparent that many of the selected households where men were targeted for interview;

women turned out to be the ones available. However, this was not significant and hence had little impact on the need for balancing interviewees by gender. Hence, this did not compromise data collected because there was a near balance in gender representation. Effort was however made to ensure a gender balance with regard to the study respondents. To achieve a gender balance regarding interviewees and hence forestall overrepresentation of one gender in the study, once a man was interviewed in one household, a woman was targeted in the next and vice versa.

It also happened that some of the people sampled deliberately or for other reasons declined to participate in the study. This is highly anticipated in any study since some people may be expecting to be induced, others may be busy and even more could be suspicious of the study intentions. In this case, these were replaced with other respondents or a recall interview arranged in case the particular respondent was busy during the first contact. Whenever the sampled individual was not able to take part in the study, these were persuaded and if it was not possible to have them take part in the study, they were replaced.

Regarding language barrier, effort was made to recruit and train guides and research enumerators from the local community and this forestalled the possibility of communication breakdown. This worked to endear the respondents to participate in the study given that they were interviewed by people they knew and could trust. This reasoning is based on the homophily principle (Chitere, 1994), which states that people

tend to trust those who are more like themselves as opposed to those different from the them-in this case same language, community and co-residence.

The household questionnaire produced some quantitative data, while the rest of the tools including focus group discussion and key informant interview guides, observation checklists, photography and desk research produced largely qualitative data. To offset the weaknesses of some of the qualitative instruments of data collection, adequate cross-checking of information using the different tools of data collection was done in order to guard against the production of data that was not a reflection of reality. In data analysis, the study put more emphasis on the qualitative techniques of data analysis.

CHAPTER TWO

LITERATURE REVIEW AND THEORETICAL FRAMEWORK

2.1. Introduction

This chapter is a review of the literature related to gender and agriculture with more emphasis on dryland farming in Kenya. In particular, the chapter involved looking at the key issues as they relate to agriculture, food security and poverty alleviation including an overview of the agricultural sector in Kenya. It also includes a review of the challenges facing the agricultural sector in general and dryland farming in particular. Emphasis was put on the relationship between gender and dryland farming and the socio-cultural and economic profile of the Mbeere drylands of Embu County and other arid and semi-arid areas. The section also looked at the various theories that explain the study topic and finally came up with a conceptual framework which showed the envisaged relationship between the various study variables.

2.2. Literature Review

2.2.1. An Overview of Kenya's Agricultural Sector

Agriculture is undoubtedly the mainstay of the country and especially when defined to mean and include crop husbandry, livestock rearing, fishing and related activities. It contributes about 24% of Gross Domestic Product (GDP), produces 75% of industrial raw materials and constitutes 60% of export earnings, while at the same time generating close to 18% of the total formal employment (Republic of Kenya, 2007a; 2008). In addition, it employs about 3.8 million people in farm, livestock production and fishing while an estimated 4.5 million other people are employed in agriculture-related off-farm

activities (Republic of Kenya, 2007; 2008). This implies that the sector supports virtually the bulk of economic activities in the country and hence a negative event on the sector affects development in general in a very substantial way.

The foregoing underscores the importance of the sector and its contribution to development and human welfare in the country. However, the contribution notwithstanding, about 70% of the agriculturally potential land is owned by about 5% of individuals and 90% of the farms exceeding 3 hectares have absentee landlords in Kenya (Bayart, 1989; Platteau, 1992), leaving about 40% of Kenyans food-poor. As such, many acres of agriculturally viable land remain fallow across the country. This is partly responsible for poverty, food insecurity and poor rural livelihoods (Odhiambo & Nyangito, 2003). Such has far reaching implications on national development considering that the latter is likely to breed poverty, negative civic engagement and therefore negatively affecting development indicators. It is important to emphasize that for meaningful development to be realized, basic needs including food must be met first.

The agricultural sector is an important entry point for stimulating industrialization, food production and security and the achievement of the development targets envisioned in the Kenya Vision 2030 (Kimenyi, 2002; Republic of Kenya, 2007a; 2008). Its growth is expected to provide the necessary food and social security, raw materials for agro-based industries, spur employment opportunities and as a result reduce social evils (Republic of Kenya, 2002a; 2007a; 2008). Consequently, the sector has a significant and direct impact in reducing poverty indices estimated at about 46% in the country, however with rural-

urban, regional and gender variations (Amuyunzu-Nyamongo et al, 2007; Republic of Kenya, 1999; 2002a). As the backbone of the country's economy, the agricultural sector also supplies raw materials to agro-based industries and hence playing a leading role in generating economic growth and direct as well as indirect employment opportunities.

While many attempts have been made to ensure food security in the country, they have largely been unsuccessful owing to several governance, economic and policy bottlenecks including political ill-will regarding their implementation. For example, the National Food Policy despite its noble intentions of ensuring a broad-based food sufficiency in main foodstuffs (see Republic of Kenya, 1981; 1994) has failed to ensure food security almost four (4) decades since inception. Indeed, successive political regimes since inception of the policy have largely engaged in rhetoric and paperwork that is yet to bear meaningful fruits in terms of food production and sustainable development.

The policy has emphasized on increasing food production without giving adequate attention to quality, equity and access. In addition, while it has proposed various programmes for increasing food production, equity regarding access to agricultural land is unfortunately left out. The foregoing partly explains the lingering food insecurity in the country five decades into self-rule in the midst of agriculturally viable, yet fallow land in much of the high potential agro-ecological zones of the country. In addition, there seems to be little political commitment to implement the National Food Policy and related blueprints that would see enhanced food production, better targeted distribution and streamlining of the food produce bazaar.

To alleviate such food insecurity, ensure sustained national development and prosperity, the government has come up with several measures and strategic policies including a revision of the National Food Policy. Others include increasing land acreage under irrigation, enhancing extension services, concerted crop disease surveillance and prevention and the development of a National Land Use Policy (Republic of Kenya, 1981; 1994; 2009). While the National Land Policy (Republic of Kenya, 2009) has been put in the place, the implementation of its ideals has been dragging (Mwenzwa & Bunei, 2012). Indeed, what has been witnessed is incessant supremacy infighting between the National Land Commission on one hand and the parent ministry on the other. The foregoing has not only postponed the implementation of the policy, but also the time when the country will sustainable arrest food insecurity. It would seem that the authorities in Kenya have not regard food security as a basic human right.

Evidence has shown that rural development, which is largely agricultural in developing countries including Kenya, has important implications on poverty reduction and overall development of any country (Kimenyi, 2002). As such, agricultural development is not only pro-poor, but also has *trickle up* effects on the national development and improvement in human welfare. Agriculture is therefore one of the sectors that governments in many parts of the world have invested and continues to invest heavily given its ability to spur development through employment and wealth creation, provision of basic needs and poverty alleviation.

With women providing approximately 75% of labour force in small-scale agriculture in Kenya, it would seem that farm work is highly feminized. In addition, research elsewhere in the developing world points to the fact that more women than men depend on land-based livelihood activities (Sindhuja, 2011; Boserup, 2011). However, returns to women labour are not commensurate with their efforts (Kimenyi, 2002). This is compounded by the unequal access to resources by men and women such as land, credit, education, health, information and technology among others. It needs to be stressed that the foregoing resources are important in facilitation decision making as well as the scaling up of investment in food production activities.

As a result, women are more socially and economically deprived, which increases their vulnerability to poverty as opposed to their male counterparts (BRIDGE, 2014; Njuguna, Brownhill, Kihoro, Muhammah & Hickey, 2016; Habtezion, 2012). More specifically in dryland farming, they are likely to be more marginalized given that most rural communities especially pastoralists and agro-pastoralist are still at the *seedbed* stage of social evolution. Based on this background knowledge, this study aimed to uncover men and women contribution in food production and food security at the household level through dryland farming in the Mbeere drylands of Embu County.

2.2.2. Challenges of Agricultural Development in Kenya

While the agricultural sector is one of the most important drivers of development in Kenya, its potential has not yet been exploited and utilized (Republic of Kenya, 2007a; Mwenzwa, 2011b). The sector holds the key to the country's development goals and

poverty alleviation efforts (Kimenyi, 2002). Its full potential has been challenged by several factors including but not limited to diminishing farm sizes occasioned by the increasing population. This has made the land become increasingly uneconomical for meaningful agricultural production.

As a result, farmers are unable to take advantage of available opportunities and utilise economies of scale for more food production. Other challenges include inappropriate farming technology, which is largely traditional in nature, and thus compounding the picture further. It is also challenged by unpredictable and hence unreliable weather patterns, unfavourable macro-economic conditions including inflation, poorly developed food produce bazaar, inappropriate land tenure systems and Human Immune Virus/Acquired Immune Deficiency Syndrome (HIV/AIDS).

In particular, HIV and AIDS is responsible for decimating the economically productive (15-64 years) segment of the population, making labor force scarce and hence affecting food production negatively. In addition, peripheral private sector participation and lack of viable disaster Early Warning Systems (EWSs) are also responsible for below capacity food production and subsequently food insecurity in the country (Republic of Kenya, 2007b). The crosspollination of the foregoing factors makes it largely impossible to alleviate food insecurity.

More important, over-reliance on rain-fed agriculture, poorly developed produce bazaar, high cost of farm inputs such as fertilizers and pesticides and poor implementation of

land use policy challenge the sector greatly (see Republic of Kenya, 2002b; 2007a; 2007b; 2008). Moreover, other challenges include weak farmer institutions and mismanagement of farmer cooperative societies, which continue to adversely affect the morale of farmers thereby discouraging them from maximum food production. In the midst of all the foregoing, farmers are largely unable to exploit value-addition opportunities for their produce and hence the sale of largely primary agricultural raw materials to middlemen who are likely to exploit them (Republic of Kenya, 2007a & b; 2008).

These factors and the impacts of the 2007/2008 post-election violence especially in the country's bread baskets of Uasin Gishu and Transnzoia counties are partly responsible for below capacity food production and therefore food insecurity. It is acknowledged that food security is a prerequisite for sustainable development (BRIDGE, 2014). On the other hand, food insecurity is a recipe for malnutrition, starvation, hunger and social evils including negative civic engagement and crime. These social evils are responsible for retarding development and hence human welfare. It is these consequences that partly compromise food production, escalate food insecurity and negatively affect nation building in Kenya.

In the Mbeere drylands of Embu County (Republic of Kenya, 2001a; 2002b; 2009d; 2013a & b; Mwaruvie, 2011), the most significant issues negatively affecting local agricultural development in general and food production in particular include aridity as a result of low amounts of precipitation, inadequate and high cost of farm inputs, poor

produce storage and high incidences of disease pests. Other challenges include poorly developed farm produce market, poor infrastructure especially roads, high prices of agricultural seeds, rampant wildlife menace, inadequate access to credit facilities, poor farming and soil conservation methods and lack of title deeds for accessing agricultural credit (Republic of Kenya, 2001a; 2002b).

In particular, the slash and burn agricultural practice is responsible for massive deforestation, soil erosion, soil moisture loss and environmental degradation, all which combine to negatively affect food production in a very significant way. In turn, the foregoing affects food security at both the household and community levels and ultimately, national development. Moreover, inadequate research and extension services compound the foregoing problem to the detriment of household food production, which is key to food security at both local and national levels (Republic of Kenya, 2009d; 2013). The latter has particularly been necessitated by the change in the way agricultural extension services are provided. This was from the supply-driven to the demand driven model as a result of the World Bank/International Monetary Fund (IMF) Structural Adjustment Programmes of the early 1980s.

2.2.3. Concept and Challenges of Dryland Farming

Drylands cover about 41% of the earth's land surface and over two (2) billion people (about 35% of the world population) inhabit them. Their primary productivity is limited by low soil water content resulting from low precipitation and high evaporation rates. They range from hyper-arid and arid deserts to semi-arid rangelands and dry sub-humid

areas. In arid regions, ecosystem utilization is traditionally limited to pastoralism, while semi-arid and dry sub-humid areas can support croplands and rangelands.

Dryland farming is seen as the cultivation of crops in areas where rainfall ranges between 750mm and 1150mm and in which dry spells may occur but crop failure are infrequent (Panda, 2008; Widtose, 2010). In these areas high evapotranspiration and less precipitation is the main reason for soil moisture deficit and hence negative effect on crops and generally vegetation growth and hence fodder and food production. As such, appropriate and effective moisture and soil conservation techniques are key to dryland farming in semi-arid areas such as the Mbeere drylands of Embu County where this study was carried out. Short of this practice, crop production would normally be compromised especially in episodes of inadequate precipitation and high evaporation. When this happens, food production is likely to be negatively affected, leading to household as well as community level food shortfalls.

The agro-ecological zones of Kenya where dryland farming is practiced are largely semi-arid, which means livelihood options are minimal, principally due to unpredictable and hence unreliable weather patterns. In a situation where livelihood options are substantially reduced as in this case, it is expected that poverty is also high. Indeed most dryland areas of Kenya posit poverty rates that are significantly above the national average (Republic of Kenya, 2002a; 2007a; 2008; 2013). This is perhaps a pointer to the urgent need for a transformation of the agricultural sector in the drylands of Kenya with

the aim of sustainably revitalizing food production to hold back the perennial food deficits.

Agricultural production inputs that work to increase crop yield such as fertilizers, herbicides and mechanized farming are largely beyond the reach of many local farmers and many times regarded as unnecessary luxuries that can be ill-afforded (Mwenzwa, 2011b). This makes dryland farming one of the least rewarding livelihood options and hence discouraging farmers from investing in it. This may partly explain below optimum agricultural production and hence food insecurity in the drylands of Kenya. The foregoing will certainly trickle up to the national level to affect development indicators adversely.

Notably, the relatively warm climatic conditions in the dryland areas that are conducive for the thriving and multiplication of crop pests and disease vectors. Without the ability to afford pesticides, herbicides and related inputs courtesy of material dispossession among many dryland farmers, the crosspollination of crop pests, diseases, unfavourable natural weather conditions and other anthropogenic factors greatly compromise local crop production and hence household as well as community food security, which cascade up to the national level. In such a situation, it is unexpected that people can engage in significant investment that can spur food production and enhance national development.

Related to the foregoing is the late onset and early cessation of rainfall, which make farmers unable to develop rain water Early Warning Systems (EWSs) and take advantage

of the largely inadequate moisture (Kamath, 1961; Panda, 2008; Witdose, 2010). As a result, less food as compared to consumption needs is produced leading to food insecurity, whose consequences are starvation, malnutrition and household level hunger. The foregoing may partly explain the recurrent food insecurity, hunger and reliance on government and Non-Governmental Organizations (NGO) relief supplies in much of the drylands of the country. When such is the case, it is unexpected that meaningful development can be realized when the ability to meet basic needs is compromised.

Many communities in Kenya and particularly those inhabiting arid and semi arid areas (drylands) are conspicuously conservative and more so regarding division of labour at the household level (Mwaruvie, 2011; Mwenzwa, 2011a). Indeed, every other activity including access to social services, assignment of duties and engagement in economic activities has a gender dimension. In particular, the assignment of duties and responsibilities is more or less the preserve of men, to the disadvantage of women. As a result, many times women may have to take the bulk of farm work with strong support from their children, while the work of men may just be reduced to supervision and other supposedly *heavy* duties (Boserup, 1970; Mbilinyi, 1994; Tamale, 1999; Ong'ayo, Njoroge & Critchley, 2001; Waswa, Muthengi & Kutsch, 2003; Mwenzwa, 2011a; Palacios & Melita, 2011; BRIDGE, 2014).

The foregoing therefore leaves men manpower grossly underutilized as women and their children are overworked. Consequently, it is expected that the underutilization of such manpower means less food production, not only for the household but also the

community at large, with various implications on overall development of the country. It should however be pointed out that the foregoing is not universal as literature attests (Mwaruvie, 2011). As such, while men may not necessarily be involved directly, their indirect contribution to food production as this study found out cannot be ignored.

In the dryland areas and in the whole country, land ownership and tenure security is tilted in favour of men and hence to the great disadvantage of women. As a result, women hardly own land if ownership were defined to include the ability to use and dispose of it at will. When land tenure security is shaky, it is not expected that women would invest substantially on it given that they do not own. Worse still, where title deeds are not available such as in much of the Coast of Kenya (Republic of Kenya, 2009b), heavy investment on land even for men is unexpected. This is because in a way, such state of affairs negatively affects their motivation to invest in the land to enhance food production. It therefore results into decreased food production and subsequently food insecurity in drylands of Kenya.

Drylands are generally characterised by low precipitation and high rates of evapotranspiration and resultant problems. In some of the dryland such as deserts, evaporation exceeds precipitation and as a result such ecological zones experience perennial moisture deficiency. The resultant aridity is not only responsible for soil salinity, but also infertility, which in essence compromises food crop husbandry and growth of vegetation. The onset of flash floods ensures the erosion of soil nutrients as the land is largely vegetation-bare, which as well compromises it ability to hold water for

vegetation and crop growth. In the circumstances, livelihood options are quite minimal and the sustainability of the few available remains wanting.

Drylands the world over are areas that largely remain afflicted by poverty and hence minimal opportunities for livelihood diversification. This compromises people's access to social services including education, health, technology and information. In particular, farmers in dryland areas largely utilize traditional technologies that not only restrict quality and quantity of produce (Mwaruvie, 2011), but also forbid farmers from enjoying economies of scale from farming. This can also be explained by poverty and illiteracy, which stand in the way of farmers to access modern farming technology, know-how and appropriate information. These are important factors that affect the ability of the dryland farmer irrespective of gender, to produce food and subsequently enhance food security both at the household and community levels. However, when this is combined with discriminatory gender practices, the resultant gender inequalities are known to disadvantage women the most (Mbilinyi, 1994; BRIDGE, 2014)

Many of the inhabitants of drylands of Kenya are peasant farmers and agro-pastoralists who largely use not only traditional methods of farming, but also practice poor soil husbandry, leading to soil erosion, loss of soil nutrients and degradation. When soil is degraded it loses its fertility and as a consequence, productivity. This is for largely compounded by unreliable weather conditions. This implies low crop yields, food insecurity and subsequent hunger and associated social problems including the possibility

of nutrition-related diseases (Mwenzwa, 2011b; FAO, IFAD, UNICEF, WFP & WHO, 2017; Stoeper, Sisomphone & Han, 2013; FAO, 2014).

In addition, due to the limitation in livelihood options, many people resort to the exploitation of the natural environment through charcoal burning, commercial firewood harvesting, casual logging, slash and burn cultivation, quarrying, sand harvesting, wetland and forest excision and other environmentally-detrimental livelihood activities. These activities are known to degrade the environment further, making soils less productive and subsequently putting many households at the risk of food insecurity, starvation, malnutrition and hunger. The strategic planning and reversal of such activities is important to restore soil fertility and hence land productivity to increase food production and alleviate possible food scarcity.

The limited livelihood options in many drylands that are largely rural have seen the economically active segments of the population moving into towns in search of white collar and other employment opportunities. This rural-urban migration has worked to rob the rural dryland areas of manpower that would have been used for local development including dryland farming and pastoralism (Mwenzwa, 2011b). For example, data from the Mbeere drylands of Embu County as elsewhere shows that it is largely men who migrate to urban areas in search of alternative livelihood to supplement dryland farming and agro-pastoralism. This leaves women playing the role of farmer, bread winner and household head among other roles (Republic of Kenya, 2009d). This implies reduced labour investment in farming and hence reduced food production, with the result of household and community food insufficiency. In such circumstances, sustainable

development as captured in the UN Agenda 2030 and the Kenya Vision 2030 (Republic of Kenya, 2007a; UNDP, 2015) may remain largely illusionary.

Scarcity of water courtesy of low precipitation, high evapotranspiration, poor governance, inappropriate soil water conservation methods and both forest and wetland destruction compounded by climate change compels dryland farmers to over-rely on rain-fed agriculture, which is for the most part unreliable (Mwaruvie, 2011; Mwenzwa, 2011b; Republic of Kenya, 2009d). Consequently, irrigation farming even among farmer along major rivers such as the Tana and the Athi is not optimal. As a result, considerable volumes of water drain into the Indian Ocean even as the major rivers snake through largely food insecure dryland areas including the Nyika and the Yatta plateaus (Mwenzwa, 2013b). Classic examples in this regard include the largely arid and semi-arid and food insecure Kitui, Garissa and Tana River counties through which River Tana snakes its way towards and into the Indian Ocean.

2.2.4. Gender and Agriculture

Agriculture is the lifeblood of the Kenya, which is not only responsible for farm-based employment opportunities, but also non-farm enterprises. Its role in poverty alleviation and national development cannot therefore be gainsaid. It is acknowledged that agricultural livelihoods can be enhanced by governance reforms specific to the sector. Such include and not limited to strategies to improve policy making and reforms of service provision (see World Bank, 2009). Such reforms are in turn expected to address the socio-cultural concerns in agriculture including gender equity in the sector and hence

enhance food production. This would be achieved partly through providing the necessary agricultural resources, while taking into account gender needs.

The World Bank (2009) has summarised the relevant governance reforms that have a gender dimension in the agricultural sector as those which are sensitive to gender differences, gender specific and empowering to women. Others include attitude and social norms transformation to make them non-discriminatory with regard to gender and other socio-cultural parameters. Over half of all labourers worldwide, rely on the agricultural sector while in Sub-Saharan Africa and South Asia, 70% or more of the labour force works in agriculture (ibid, 2009).

In many regions more women than men are employed in agriculture. For example, World Bank (2009) records that in the Middle East, the ratio of men to women working in the agricultural sector is about 1:2 and in South Asia about one-third more women are working in the sector than men. This underlines the high representation of women in agriculture and related activities and their importance of their labor in the sector. As such, women literally feed the world given their overrepresentation and involvement in direct farming activities.

In addition, the World Bank (2008) has pointed out several trends in the agricultural sector: that there is declining agricultural labour as countries industrialize and that more women than men work in the sector. Moreover, the number of women wage earners in the sector is rapidly increasing even as representation of women in traditional labour

institutions is weakening. As seen in the foregoing discussion, there is an apparent feminization of agricultural labour although returns for their labour are generally minimal. Table 2.1 show the gender dimension of agricultural labour in the world, European Union (EU) and Sub-Saharan Africa (SSA).

Table 2.1: Global gender dimension of agricultural labour, 2007

	Region		
Gender	World	European Union	Sub-Saharan Africa
Men	34.0%	4.6%	62.4%
Women	36.1%	3.2%	67.9%

Source: World Bank, 2009

It is evident from Table 2.1 that worldwide, women are the primary workers in the agricultural sector. This is in addition to other reproductive roles of maintaining households, raising children, preparing food and taking care of sick family members. Indeed, in rural areas of Sub-Saharan Africa such as Kenya where such activities are more pronounced, women are more constrained by these activities and hence almost cut off from participation in off-farm activities such as entrepreneurship (Palacios & Melita, 2011; Mwaruvie, 2011; Mwenzwa, 2011a; Westerweel & Samwel, 2014; Njuguna, Brownhill, Kihoro, Muhammah & Hickey, 2016).

As such, child care and other domestic chores generally are structural barriers to women's offfarm participation and may therefore partly explain the apparent feminization of agricultural activities as shown in Table 2.1 (World Bank, 2009). This study was expected to provide such information regarding the Mbeere drylands of Embu County

and more specifically as far as dryland farming, food production and contribution to household food security were concerned.

2.2.5. Challenges of Food Security in Kenya

Kenya is divided into seven ecological zones: Tropical Alpine, Upper Highland, Lower Highland, Upper Midland, Lower Midland, Lowland and Coastal Lowland (see Republic of Kenya, 2010d). However, if we use rainfall patterns, the country can be divided into three main production zones: first, the high-rainfall zone, which receives more than 1000mm of rainfall annually and occupies less than 20% of the productive agricultural land. This is where about half of the country's population live largely depending on agriculture for their livelihood. It is also the source of food for most of the population and hence may include the food baskets of Uasin Gishu and Trans Nzoia counties in the Rift Valley region.

Second, the medium-rainfall zone, which receives between 750mm and 1000mm of rainfall annually and occupies between 30-35% of the country's land area, home to about 30% of the country's population. Farmers here keep cattle and grow drought-tolerant crops and hence this is the region where dryland farming is predominant. Third, low-rainfall areas, which receive 200– 750mm of annual rainfall, are home to about 20% of the population. This zone is home to 80% of the country's livestock and 65% of the wildlife (see Republic of Kenya, 2010d). If any, insignificant crop husbandry takes place here, which would highly supplement nomadic pastoralism, the predominant livelihood activity.

Kenya has two types of agriculture namely, rain-fed and irrigation agriculture, with the former being predominant. In addition, small-scale farming is the most widely practiced mainly in the high potential areas of the country owing to scarcity of land (Republic of Kenya, 2007a; 2008; 2010d). Such farming is largely subsistence in nature and therefore meaning saving out of farming is almost non-existent. Food crops grown include cereals (maize, wheat, sorghum, rice, millet); pulses (beans, pigeon pea, cowpea, chickpea, green grams); and, roots and tubers (sweet potato, Irish potato, cassava, arrow root and yam). The main food crops are maize, rice, wheat, sorghum, potato, cassava, vegetables and beans (Republic of Kenya, 2007; 2010d). Generally, farming in the country is challenged by the combination of many factors (Republic of Kenya, 2002a; 2007a; 2008; 2010d):

These factors include inappropriate policy and legal framework that is not fully supportive of private sector-led agricultural development in a liberalized economic environment. This discourages private sector investment in the sector, which in turn has implications on food production and security and by extension national development. Insufficient and poorly maintained transport and market infrastructure for handling farm produce results in high levels of waste, significantly disillusioning farmers (Republic of Kenya, 2007a; 2008).

As a result, farmers are discouraged from market-oriented production while at the same time they are highly exploited by middlemen in the absence of well-developed farm produce bazaar. In addition, low farm output and productivity resulting from low adoption of appropriate technologies such as high-yielding crop varieties, inadequate

application of fertilizer and manure, inefficient tillage and cultivation methods all compound food production (Republic of Kenya, 2002a; 2007a; 2008; 2010d). Moreover, high cost of inputs and productive resources such as credit and irrigation infrastructure also come in to pose a significant hindrance in the sector especially when their cross-breeding is put into perspective.

Poor performance of research and extension systems due to inadequate public funding, restrictions on staff recruitment and weak research-extension linkages, which are compounded by inappropriate land-use practices work to escalate the problem. For example, some of the practices such as land fragmentation, urban sprawl into agricultural land, absentee landholding, cultivation of river bank and wetlands and deforestation are responsible for below optimum food production. In the country, there is weak institutional framework, which has led to poor coordination of the various actors following liberalization of agricultural extension service delivery. This in turn has worked to discourage sustainable food production to assuage food insecurity.

In addition to the foregoing factors, farmer illiteracy compound access to agricultural information and technologies leading to low output and limited access to markets. This is worsened by poor access to credit by producers in spite of a well-developed financial sector. Moreover, there is weak institutional capacity in determining farmer training needs, making many farmers especially small-scale ones invest in farming largely from a point of ignorance rather than information (Republic of Kenya, 2007a; 2008; 2009d). When this is the case, food production capacity is not exploited to its fullest, meaning below optimum production and attendant food scarcity.

The cross-pollination of the foregoing factors are compounded by largely unreliable weather patterns in ASALs that account for about 80% of the country's total land area Republic of Kenya, 2007a; 2009d). As a result, food insecurity in Kenya has persisted half a century now into self-rule. Some of the reasons for this state of affairs may also lie in the way the sector is governed as well as poor producer prices that discourage farmers from maximum utilization of arable land to produce food crops for both subsistence and the market. Such issues make farming largely an investment that comes with many risks that makes returns more or less unpredictable. The resultant production uncertainties therefore work to discourage investment in the sector for fear of losses. This way, the perennial food insecurity in the Mbeere drylands of Embu County can be partly explained.

2.2.6. Socio-Cultural Organization of the Mbeere Ethnic Group

Embu County is mainly inhabited by the Bantu speaking Aembu, Ambeere, Akamba and Agikuyu ethnic communities who have more similarities than differences regarding sociocultural and economic organization. These socio-cultural and economic similarities include language, livelihood activities, family organization and belief systems among other important artifacts. Indeed, intermarriage especially between the Ambeere and the Akamba ethnic communities has brought about socio-cultural cross-pollination such that they can almost be taken as one community. The foregoing is important for national cohesion and mutual coexistence given the current political polarization that has lately taken root in the country.

Among the traditional Ambeere ethnic group who are the majority in the Mbeere drylands of Embu County, the father is the head of the household and therefore has the overall authority, to be consulted over all major decision making regarding the household including children circumcision, marriage, feasts and sharing of wealth among his sons (Chesaina, 1997; Ng'ang;a, 2006; Mwaruvie, 2011). Indeed, he has traditional authority to make decisions without consultation whatsoever. However, with western education, Christianity and generally women economic and social empowerment, this trend cannot be said to be 100% intact. Therefore, women among the Mbeere ethnic community have some decision making latitude and therefore empowered, although like elsewhere, more need to be done to make them more empowered.

Mwaruvie (2011) has documented the gender dimension of division of labor among Ambeere households as shown in Table 2.2. Nevertheless, the study (Mwaruvie, 2011) was done from a historical point of view and specifically touching the period 1500-1914 AD. Given that gender relations and generally culture are dynamic on temporal and spatial scales, it is expected that this is likely to have changed since. Nonetheless, some of the practices are still intact and as such, it cannot be said that modernization and westernization has led to complete overhaul of the traditional social structures. Table 2.2 is on gender division of agricultural labor in a typical Ambeere household.

Table 2.2: Traditional Ambeere Household Gender division of agricultural labor

Type of work	Men	Women	Both
Erecting fence around homestead/farm	X		
Clearing bush for new farms	X		
Planting			X
Weeding			X
Threshing grains		X	
Harvesting crops			X
Guarding crops at night	X		
Guarding crops in the day		X	
Guarding/grazing livestock			X
Making beehives and barrels	X		
Harvesting honey	X		

Source: Mwaruvie, 2011: 111

Table 2.2 shows that women largely undertake routine and somehow daily chores that require their physical presence at home while men mostly executed duties that did not require to be undertaken daily. This means men could get time off and participate in off-farm activities while their women counterparts were largely unable to enjoy the same privilege. Chesaina (1997) says that the Ambeere ethnic group is highly patriarchal, in which man is the head of the household and therefore the owner of property such as land and its attendant resources. Indeed, like many other Kenyan ethnic groups, succession and inheritance are along male lineage, which implies that women have low social status in the Mbeere ethnic group. Hence, Chesaina (1997) has pointed out that women form a majority in the workforce given that traditional division of labor is based on gender and assigns more duties to women as opposed to their men counterparts.

As pointed out by Chesaina (1997) and amplified by Mwaruvie (2011), men tend to be engaged in non-recurrent jobs as women engage in recurrent and most time-consuming

tasks. The same was also found out by Mwenzwa (2011) among the Akamba ethnic group of Mwingi in Kitui County, which incidentally borders the Mbeere dryland areas of Embu County. In such state of affairs, the expected contribution of women in food production and general development is largely curtailed. As such, the whole society stands to suffer through getting a lower level of development including below optimal food production.

2.3. Theoretical and Conceptual Framework

2.3.1. Introduction

Any empirical study should be grounded on theory since the theory provides secure grounds on which a study can come up with preliminary answers to research questions. In this way, a theory enhances meaningfulness of research, drives it towards validity and therefore it is essential in understanding the variables at play regarding a research problem (Mwenzwa, 2011). The study is grounded on the following theories: Role Theory, Social Learning Theory and Gender Schema Theory. The theories summarise the role of socialization into gendered roles and how they impact on development activities with particular reference to food production and household food security.

2.3.2. Role Theory

Role theory is based on the study of a role, which is seen as a cluster of social cues that guide and determine an individual's behaviour in a certain setting. Role theory is one of the theories of socialization, which unlike the others focuses on role enactment. It is associated with W. Archer (1889) as expounded by Lindsey and Aronson (1968) and

Santrock (2007), who opine that an individual's overt conduct in a particular setting forms the initial specifications of role enactment. For any role one has to play as a result of being in a certain position, there is a role expectation, which is the central concept in role theory. It is this role expectation that makes men and women engage in masculine and feminine activities as per definitions of the society in which they are members.

Role expectation comprise of rights and privileges, duties and obligations of any occupant of a social position, in relation to others occupying other positions in the social system. The occupant of a certain position is thus expected to exhibit behaviour which goes along with the position and which should be in line with the socially sanctioned norms and values. The structure of role expectation in a social system is organized so that meaningful behavioural unity emerges to create order. As such, people play certain roles in order to complement other people’s roles and as such result into the ordered society in which we live.

The foregoing implies that roles in a social system are complimentary and role expectations facilitate social interaction by providing those who interact with means of reciprocal prediction of behaviour. An occupant of a position ought hence, to behave in a way expected of his/her position by the normative group of which he/she is a member (Lindsey & Aronson, 1968; Mwenzwa, 2011a; Santrock, 2007). For example, in society particularly those organized around patriarchy, women are culturally expected to be submissive to men. Although the conformity and submission to men is not forced, it is

conceived by culture and it hence comes with sacrifices that may be detrimental to development.

On the other hand, men are expected to exhibit masculine behavior in its cultural meaning and implications. Men for example may be expected to be hardy, versatile and outgoing, which is interestingly not expected of women. As far as gender is concerned, role expectations hence define the limits of tolerated male and female behaviour which need not be overstepped due to attendant sanctions. These sanctions may come in the form of withdrawal of privileges and respect that go with conformity (Santrock, 2007). Hence, role expectation which is acquired during the process of socialization induces conformity in the individual as far as societal norms, values and beliefs are concerned.

Role theory hence can be seen as the approach to social structure that locates its basic constraints in stereotyped interpersonal expectations that have been manufactured by the society and institutionalized using the cultural umbrella of reality. Thus, the basic idea in this theory is that being a man or a woman means enacting a general role definitive of one's sex, the sex role. This means that the process of socialization into sex-specific roles produce feminine or masculine characteristics and behaviour and their attendant institutionalization. The institutionalization is made possible by the presence of social institutions like the family, the school, religion and the government that promote their values in the individual (see Lynch, 2007).

Socialization imposes sex-specific roles and constraints that shape behavior, self-images, attitudes, aspirations and ambitions. Girls are expected to be passive and obedient while boys should be active, outgoing and competitive in preparation for the future private and public spheres respectively (see Hooks, 1984; Santrock, 2007). Given that role expectations are constitutive of the privileges, duties and obligations of any occupant of a social position, it is expected that the role player's behaviour is dependent on the behaviour of those occupying complimentary positions (see Solomon et al, 1985; Beal, 1994).

In this study, gender-role socialization was emphasised as an important driver that defines division of labour in society including that based on gender. This perspective was therefore seen as useful in determining the specific roles that men and women play in dryland farming resulting from gender-role socialization. It is expected that the expectation of these gendered-based roles have an impact on the way dryland farming activities are organized and executed. Therefore, the execution of roles determines not only the labor invested in the activity but also the outcome. In particular, the role women and men play in dryland farming determines the amount and quality of food produced and by extension household food security.

2.3.3. Social Learning Perspective

According to Bandura (1977), Social Learning perspective is based on the idea that we learn from our interactions with others in a social context. Hence, by observing the behaviours of others, people develop similar behaviours particularly when the copied behaviour attracts approval or rewards from the society. According to this theory, also

called Social Cognitive Theory, an individual's behavior is shaped by the reaction of others and more so when it is rewarded or punished.

Hence personality is shaped through learning as people observe and process information about their social environment in order to maximize favorable outcomes from others (Bem, 1981; 1983; Weiten & Lloyd, 1997). The punishments or rewards act as deterrents and reinforcements respectively and therefore work to shape and institutionalize certain behavioral patterns. While the rewards and punishments may not be physical, their behaviour reinforcing ability is so effective that men and women develop masculinities and femininities respectively.

As a result, since reactions to behavior are specific to sexes; people tend to develop masculine and feminine behavior including involvement in certain livelihood activities that the society defines and approves as specific to ones gender. Likewise, behaviors that are ignored by the society are likely to fade away while those reinforced for example through rewards are likely to be repeated in anticipation of additional rewards. For example, if women submission to men is cherished by the society, then women are more likely to submit to men in order to avoid societal sanctions and disapproval.

The main way that gender behaviours are learned is through the process of observation, courtesy of which children observe the behaviour of adult people around them acting in various ways, some of which relate to gender. They pay attention to some of these people (models) and encode their behaviour. At a later stage they may imitate the behaviour they have observed, but more emphasis is given to enacting behaviour that is likely to get

societal approval. The child is more likely to attend to and imitate those people it perceives as similar to itself (Bandura, 1977; Santrock, 2007).

Consequently, it is more likely to imitate behaviour modeled by same-sexed people and thus aligning oneself with the respective gender-specific expectations. In addition, people around the child are likely to respond to the child's imitated behaviour with either reinforcement or punishment, which to a large extent will determine how children behave throughout their lives. Behaviour in this context includes the activities they undertake as well as their aspirations and career choices.

The foregoing reinforcement is more certain when they act in gender-specific ways and punished or ignored for contrary behaviour (Beal, 1994; Santrock, 2007). Moreover, the child is also expected to have observed the consequences of other people's behaviour and will be motivated to imitate the behaviour which has been reinforced and avoid imitating the behaviour that was punished. For people to learn, Santrock (2007) and Beal (1994) concur that two concepts are important: role models and their representativeness.

As far as role models are concerned, people copy the behavior of those they admire for example parents and significant others including teachers and religious leaders. For this reason, the absence or presence of role models of a certain gender is significant for the development of gender-specific behavior or otherwise (Beal, 1994). In addition, the development or otherwise of such behavior is also aided by the general society through its various social rewards and punishments structures to the particular individual.

As far as representativeness is concerned, Beal (1994) has pointed out that people want to copy the behavior of others who they think are appropriate or usual as opposed to those who are unusual. Hence, boys tend to imitate masculine behavior while girls are more likely to emulate feminine behavior. It is important to state that the definition of what is feminine or masculine behaviour is the province of a particular culture at a certain time, given that it changes on spatial and temporal scales. The imitation is more effective as long as each is sure what they are imitating is socially acceptable and typical of their gender. As a result, it can be inferred that different treatment of boys and girls by the society, largely shapes their respective behavior, ambition and the future activities including career choices. As such, they learn and internalize behavior by observing and imitating same-sexed role models (see Bem, 1983; Ickes, 1993).

However, Brain (2000) cautions that although individuals learn through observation and imitation, not any behavior is imitated and internalized. Hence people model and imitate behavior that they believe will maximize rewards and minimize punishment, which is basically pro-social as opposed to anti-social behavior. For this reason, reinforcement such as approval by the society is important for modeling and imitation of behavior as it determines whether certain behavior is copied or not. Hence for behavior to be copied, the role model must be attractive to the observer and at the same time the consequences of his/her behavior must get societal approval. It is instructive to point out that reinforcement is motivational since one is more likely to repeat the same behavior if the consequences are favorable to him and especially when they get society approval.

As far as the development of gender roles is concerned, children learn what is culturally appropriate for each gender first from their parents and significant others within the family and subsequently as they interact with others in social institutions in their social milieu (see Santrock, 2007). These institutions may include the school, religion, market and peer groups. In their growth and development, children observe, imitate and eventually internalize the specific attitudes and behaviors that their culture defines as gender appropriate by using other males and females as roles models (see Ickes, 1993; Juni, Rahamin & Brannon, 2001; Lynch, 2007).

The bottom-line is that gender socialization implies that boys and girls are treated differently and put into different learning environments. As a result, they develop different skills, needs, desires, wants, aspirations and temperaments. This means they become different people, men and women throughout generations so that their differences become largely accepted and regarded as natural and given (see Lynch, 2007).

Hence, sex-role development is seen by this theory as deriving from an internalization of characteristics of same-sexed parent, reinforced by an effort to contrast oneself from the opposite sexed-parent and the attendant roles in Freudian framework of analysis (Bem, 1981; 1983; Juni, Rahamin & Brannon, 2001; Santrock, 2007). From the foregoing and as far as this theory is concerned, it can be inferred that the roles women and men take respectively in agricultural production in general and dryland farming in particular are partly a consequence of gender role socialization early in their lives.

The theory was therefore useful in this study in explaining why men take different roles from those of women as far as dryland farming is concerned. However, it needs to be pointed out that gender roles are culture and community-specific and dynamic across time and space dimensions. For this reason, some deviation from the culturally-sanctioned social organization of the resident communities including gender-based division of labor was noted and highlighted. The consequence of gender-role socialization is manifested in the way people behave and the particular economic activities that they engage in, including their roles in food production.

2.3.4. Gender Schema Framework

Gender schema theory refers to the hypothesis that people learn about what it means to be male or female from the culture in which they live and accordingly adjust their behaviour to fit within its gender norms and expectations (Bem, 1983). It therefore concerns the development of an internal mental framework, which organizes and directs the behaviour of an individual as a male or female. For example, the gender schema of being male might include believing that one can play football and actually engages in it.

This means, an individual's attitude and behavior are guided by an internal motivation to conform to gender-based socio-cultural standards that may sometimes border on stereotypes (Bem, 1981; 1983). Hence, just like in the case of Social Learning Theory, observation, imitation, rewards and punishment are the main drivers of the development of gender-specific behavior (see Santrock, 2007). Nonetheless, in Gender Schema

Theory, an individual's mental framework is important for gender roles to develop and be sustained.

However, unlike the Social Learning Theory in which individuals are largely motivated by the rewards of others as a result of the behavior they exhibit, in the gender schema theory, the emphasis is on internal as opposed to external motivation and reinforcements. While interaction with the social environment is important for sex-role development, in this theory, individuals construct their own gender world, with minimal external influence. Gender Schema Theory hence (see Bem 1981) focuses on the role of individual cognitive organization in addition to environmental socialization.

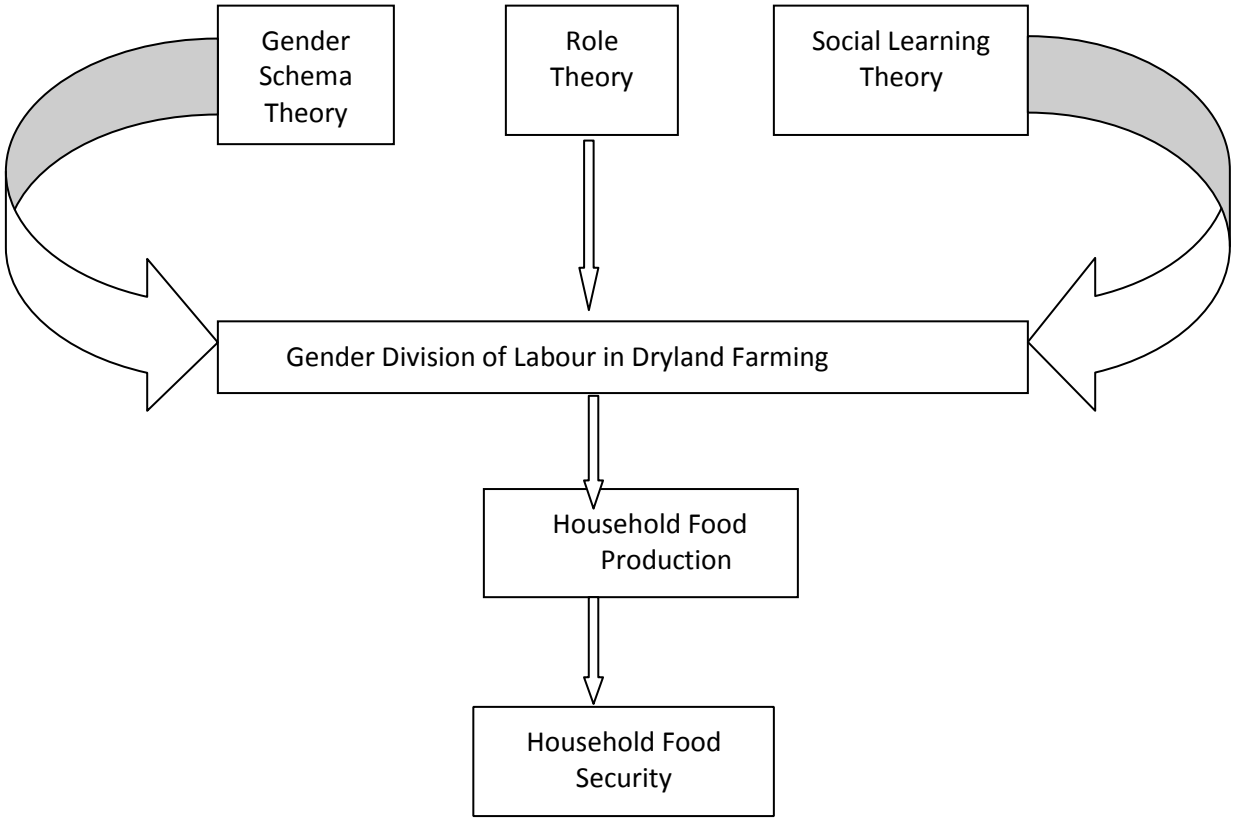
This theory postulates that children learn how their cultures and/or societies define the roles of men and women and then internalize this knowledge as a gender schema, or unchallenged core belief. Children's perceptions of men and women are thus an interaction between their gender schemas and their experiences (see Beal, 1994). Eventually, children will incorporate their own self-concepts into their gender schema and will assume the traits and behaviors that they deem suitable for their gender. This may partly explain the development of attitudes and behavior that are regarded as transgender.

It is through the gender schemas that children see and construct their world leading to the development of gender-specific attitudes, expectations, skills and beliefs. These are internalized, become institutionalized in their behavior and this is how the development

of gender-based roles could partly be explained. In adult life, people adopt behaviors that are gender-specific as a result of the mental schemas that were learned and internalized early in their lives. In this study, like the other theories, the Gender Schema Theory was used to explain why men take some tasks as women take different ones in development in general and dryland farming in particular. More specifically, the theory was important in explaining behavior and engagement in activities that are regarded as transgender. Figure 2.1 is the diagrammatic exposition of the theoretical framework.

2.3.5. Theoretical Framework

Figure 2.1: The Theoretical Framework



2.3.6. Conclusion

From the discussion and conceptual framework, it is clear that the three theories are important in explaining the development of gender-specific attitudes, behaviors and roles among individuals as dictated by their particular socio-cultural environment. The three theories therefore explain the development of gender-specific roles, albeit slightly from different angles. It is the execution of the gender-specific roles among other factors that determine the roles that people play in development. In turn, it determines the quality and quantity of food produced by a household through dryland farming. Moreover, food produced at the household level and post-harvest activities and practices determine whether a particular household is food secure or not. The reasoning is that food production alone is not sufficient to ensure household and community food security. Hence, what happens to the food once it has been produced including storage and marketing are important factors in determining household food security. Moreover, who takes charge of the food once it has been produced in terms of storage, marketing and how proceeds from the sale are appropriated is also important in determining household food sufficiency.

These are some of the issues that were of concern to this study that cannot be explained by the theories, but by empirical field data that was collected during the study. From the study and in relation to the three theoretical constructs, the assignment of roles in dryland farming with regard to gender is understood to have a bearing not only on the quantity of food produced, but also household and community level food security. The roles men and

women play in dryland farming have everything to do with socialization and the attendant institutionalization of gender roles in the social environment in which they live.

2.4. Operational Definition of Key Concepts

2.4.1. Drought

In this work, drought is defined and conceptualized according to the UN Convention to Combat Desertification (UNCCD, 2005). It is therefore taken to mean the naturally occurring phenomenon that exists when precipitation has been significantly below normal recorded levels, causing hydrological imbalances that adversely affect soil productivity. In this study we are making reference to agricultural drought, the moisture deficiency that adversely affects crop production, vegetation growth and related activities.

2.4.2. Drylands

Drylands are defined in climatic terms as areas of limited and low annual rainfall that are not only erratic, but also highly inconsistent and variable. Hence, the main characteristics of dryland is the negative balance between annual rainfall and evapotranspiration rates, making rainfall scarce, unreliable and concentrated during a short rainy season. In this particular study, drylands were defined to mean the semi-arid cultivated and non-cultivated lands with occasional moisture deficiency, but where rain-fed farming as opposed to irrigation is practiced.

2.4.3. Farming

Mbithi (1974) sees farming as a way of life, a cultural as well as an economic activity for the sustenance of the family. In this study, farming was defined and taken to mean the human manipulation of the physical environment in growing various crops for the sustenance of the household members. It was therefore meant to include such activities as land preparation, sowing/planting seeds, tending crops in the farm, harvesting, storage and marketing and related

activities.

2.4.4. Dryland Farming

This is seen as cultivation of crops in areas where annual rainfall is more than 750mm but less than 1150mm and therefore where dry spells do occur, although crop failure are less frequent (see Panda, 2008). It is therefore a type of farming practiced in semi-arid areas without irrigation by planting drought-tolerant crops and maintaining a fine surface tillage or mulch that protects the natural moisture of the soil from evaporation. In other words, it is a system of growing crops in arid or semi-arid regions without artificial irrigation, but by using techniques that ensure reduced moisture loss through evaporation such as mulching.

2.4.5. Food Security

This refers to the availability of food and one's access to it. As such, a household is considered food secure when its occupants do not live in hunger or fear of getting starved. Food security hence exists when all people, at all times, have physical, social and

economic access to sufficient, safe and nutritious food to meet their daily dietary needs and food preferences for an active and healthy life. However, the study did not entirely rely on this FAO (2017) definition and hence effort was made to determine the meaning of food security from the perspective of the community. From this latter perspective, food security meant having food of your own or when neighbors had food, without necessarily going to the details of its type and or nutritional composition. As such, so long as there was some food for the family members to subsist on, that was regarded as food security by the study community.

2.4.6. Household Food Security

Households are food secure when they have all year-round access to the amount and variety of safe foods their members need to lead active and healthy lives. At the household level, food security refers to the ability of the household to secure, either from its own production or from the market, adequate food for meeting the dietary needs of all its members. As far as household food security is concerned, effort was made to determine its meaning from the perspective of the study population. In the community perspective as unearthed by this study, household food security refers to a situation in which there was food to eat in a household such that family members do not go without food, irrespective of whether the food was balanced diet or otherwise. More precisely, a family was seen as food secure if it had maize in the store or when one family member especially the head of the household was doing business or had a white collar engagement.

2.4.7. Gender

Gender refers to the socially constructed roles, behaviours, activities and attributes that a given society considers appropriate for men and women or the different roles and responsibilities attributed to men and women in society. Hence, it means the social definitions and interpretations of biological and physiological differences between men and women subject to historical and cultural change (Common Wealth, 1995; Stolen, 1991). This is the definition that was adopted for the purpose of this study.

2.4.8. Gender Division of Labour

This is adopted from Mwenzwa (2011a) and is looked as the assignment of duties to men and women in relation to gender identities, irrespective of individual technical and educational competency and capacities. This means that the basis of assigning such duties is patriarchal authority rather than individual ability and skills. Men-only tasks, women-only tasks and unisex tasks were determined and how such arrangement impacts on food production and security at the household level through dryland farming. In this particular study, gender division of labour was looked at as the assignment of farming duties and responsibilities to men and women.

2.4.9. Household

Household is a residential grouping in which housework is divided and performed by household members. The household is therefore the basic residential unit in which economic production, consumption, inheritance, child rearing and shelter are organized and carried out. A household may therefore be synonymous with individuals who share a

dwelling, who may or may not be related biologically. Hence, parents, children, relatives and house helps who stay and subsist on the homestead and its resources may be taken to mean members of the same household.

2.4.10. Gender Mainstreaming

This is the process of ensuring justice in the distribution of benefits, access to and control of resources, responsibilities, power, opportunities and services between men and women. It ensures women and men, girls and boys have equal chance and access to and control over resources, opportunities and benefits at all levels. It involves integrating a gender perspective into design, implementation, monitoring and evaluation of development policies, plans, programs, projects and legislation at all levels.

2.4.11. Gender Equity

This is the process of allocating resources, programs and decision-making fairly to both males and females and requires we ensure that everyone has access to a full range of opportunities to achieve the social, psychological and physical benefits that come from participating and leading in development activities. Entails the provision of fairness and justice in the distribution of benefits and responsibilities between women and men and it recognizes that women and men have different needs and power and that these differences should be identified and addressed.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1. Introduction

This chapter provides an overview of data collection methods and attendant tools, sampling procedures, data analysis techniques and the expected outcomes of this study. In addition, the chapter provides a detailed and concise description of the county in general and the study area in particular including political and administrative units, livelihood activities, climatic conditions, physical features, social organization of resident communities and population characteristics among other important issues.

The study utilized the triangulation method of social investigation and hence employed both qualitative and quantitative methods of social investigation. However, more emphasis was given to qualitative as opposed to quantitative methods of social investigation. In order to get as much information as possible, several sampling procedures and methods of data collection were utilized in line with the aim and objectives of the study.

3.2. Study Site Description

3.2.1. Embu County: An Overview

Embu County covers an area of 2,818km² and is located 0 º 8º and 0º 50º latitude and 37º 3º and 37º 9º longitude. It borders Kirinyaga County to the West, Kitui County to the East, Machakos County to the South and Tharaka-Nithi County to the North. The North-Western stretch of the county borders Mt. Kenya forest, one of the five water towers

earmarked for rehabilitation as proposed in the Kenya Vision 2030 (Republic of Kenya, 2007a). It is administratively divided in to five (5) sub-counties namely Embu West, Embu North, Embu East, Mbeere North and Mbeere South, the latter two that are largely semi-arid while the former three are high potential agroecological zones (Repubic of Kenya, 2013; County Government of Embu, 2013). Nonetheless, Embu West sub-county is composed of a largely urban population given that it includes Embu Town situated on the Nairobi-Meru Highway, about 145km North of Nairobi City.

The county rises from 515m at Tana River basin in the East to about 4,570m above sea level in the North West, the latter that is part of Mt. Kenya Forest. It has several physical features including the Mwea plains, several perennial rivers, valleys and semi-arid drylands. As a result, an assortment of both cash and food crops are grown by local farmers including coffee, tea, maize, beans, millet, bananas, Khat (*miraa*), and many fruits and vegetables for both subsistence and commercial purposes. More important, the county houses part of the Seven Folks HydroElectric Power Project that includes Kiambere, Gitaru, Kamburu, Kindaruma and Masinga dams along the River Tana. These power stations are the major source of hydro-electric energy for the whole country (Republic of Kenya, 2002; 2013, County Government of Embu, 2013).

The county has a bimodal rainfall with long rains being experienced between March and June while the short rains come between October and December. The rainfall varies with attitude but averages 1,067.5mm (640-1,495mm) annually, while temperatures range between 12ºC in July to a maximum of 30ºC in March, with intra-county variations

owing to differences in attitude and other geographical features (Republic of Keya, 2013; County Government of Embu, 2013). The population of the county is estimated at 543,221 people as per the 2009 Kenya Population and Housing Census (KPHC), with rural population pegged at 80.3% (Republic of Kenya, 2002b; 2002c; 2009c; 2009d; 2013; County Government of Embu, 2013).

Given that most of the population is rural-based, agriculture employs close to 70% of the population, with 87.9% of households being engaged in agricultural activities. Arable land makes up 2,168km² of the total land area, which cash crops taking 19,000ha while food crops take 14,000ha. Unemployment in the county stands at 12.7%, with absolute poverty rate being 37.45%, food poverty at 39%, which afflicts more people in the rural as opposed to urban areas (Republic of Kenya, 2002b; 2002c; 2009c; 2009d; 2013; County Government of Embu, 2013).

3.2.2. Mbeere Drylands of Embu County

Mbeere drylands posit largely below average human development indicators courtesy of unreliable weather patterns, aridity responsible for deficiency in soil moisture and high thermal stress during certain parts of the year (Republic of Kenya, 2002c; 2009a; 2009c; 2009d; 2013; County Government of Embu, 2013). The drylands of Embu County lie between latitudes 0º 20’ and 0º 50’ South of the Equator and longitudes 37º 16’ and 37º 56’ east of the Greenwich Prime Meridian. They cover an area of 2,092km², with a total population of roughly 220,340 people by 2008 and hence a density of about 105 people per km² (Republic of Kenya, 2002b; 2009d).

As at 2018, the Mbeere drylands were divided into two sub-counties namely Mbeere South and Mbeere North that are in turn divided six divisions including Gachoka, Mwea, Evurori, Siakago, Kiritiri and Makima. In addition, they are divided into two parliamentary jurisdictions (constituencies) namely Mbeere South (formerly Gachoka) and Mbeere North (formerly Siakago) that also form the two sub-counties (Republic of Kenya, 2002c; 2009a; 2009c; 2009d; 2013; County Government of Embu, 2013).

The Mbeere drylands had a population of about 231,503 people as per 2010 population projections, which is sparsely distributed and spread in approximately 37,036 households, about 30% of which are female-headed (Republic of Kenya, 2002b; 2002c; 2009c; 2009d; 2013). This population is mainly concentrated around major market centers like Ishiara, Siakago, Kiritiri and Karaba. Others are concentrated around water sources such as rivers and dams, where irrigation farming and fishing take place. The rest of the drylands is predominated by dryland farming and livestock rearing. The most densely populated divisions in the district are Mwea and Gachoka with 209 and 130 persons per km^2 respectively according to the 2009 Kenya Population and Housing Census. In general, the females are more than males in the Mbeere drylands, with the ratio being 9:10 as at 2008 (Republic of Kenya, 2009d).

This is largely informed by the aridity of the area, which is a push factor for rural-urban migration particularly for males in search of employment opportunities to supplement returns from dryland farming and livestock rearing. This is suggestive of the prevailing gender division of labor and resources including power. Of the six divisions, Evurori, Siakago and Gachoka have the highest incidences of poverty in that order. Many of the

poor are found in Ndurumoni and Kiangombe locations in Evuvori division, Makima and Riakanau in Mwea division, Mutitu and Muminji in Siakago division and Kiambere and Mutuobare in Kiritiri division. This study was specifically carried out in Kiritiri and Gachoka divisions of Mbeere South Sub-County in Embu County, Kenya.

3.2.3. Mbeere South Sub-County

The Mbeere South Sub-County where the study was carried out is administratively divided into four (4) divisions namely Kiritiri, Gachoka, Mwea and Makima. The divisions are in turn divided into eleven (11) locations, which are subsequently divided into twenty-four (24) sublocations as shown in Table 3.1.

Table 3.1. Mbeere South Sub-County Administrative Areas

Divisions	Locations	Sub-Locations
Kiritiri	Kithunthiri	Kithunthiri
		Gacegethiori
	Mavuria	Mavuria
		Kombomunyiri
	Mutuobare	Kindaruma
		Gacavari
	Kiambere	Kiambere
		Ntharawe
	Gichiche	Gichiche
		Njigo
Gachoka	Mbeti South	Gachoka
		Gachuriri
		Kiamuringa
	Kianjiru	Kirima
		Nyangwa
	Mbita	Mbita
		Gikiiro
Mwea	Karaba	Karaba
		Wachoro
	Riakanau	Riakanau
		Gategi
Makima	Makima	Mwea Grazing
		Makima
		Mbondoni

Source: Office of the County Commissioner, Embu County, 2016

This study was specifically carried out in Kiritiri and Gachoka divisions in which Mavuria and Mbeti South locations were sampled from each division respectively. From Mavuria Location, the study was carried out in Mavuria and Kombomunyiri sub-locations while in Mbeti South Location, the same was carried out in Gachoka and Kirima sub-locations (see 3.3 for sampling procedure).

According to the County Government of Embu (2013), of the estimated population of 220,340 in the Mbeere drylands as at 2008, 50.2% are absolutely poor (approximately 0.6% of the national poverty). Various sectors of the local economy contribute differently to household income with agriculture accounting for approximately 80%, rural employment 10%, wage employment 2% and urban self-employment at 6% among others. Farm sizes range from 3.5ha to 20ha, with only about 3,000ha under food crops mainly for family subsistence.

Various crops grown include maize, sorghum, millet, beans, cowpeas, green grams, pigeon peas, cotton, tobacco, coffee and mangoes while zebu and sahiwal and indigenous livestock are reared. Mbeere drylands are also a honey production zone in addition to fishing particularly along River Tana. Of late, some parts of the drylands have embraced the growth of *muguka*, a variant of *miraa* (khat) whose leaves are chewed as a stimulant. As this study found out, the crop had brought a transformation by way of improving food security for some households, while disadvantaging others as a result of rampant alcoholism and associated evils in the area.

Generally, the drylands slope from the Northwest to the Southeastern, with the attitude ranging from approximately 500m on the Tana River basin to about 1200m at the Kiangombe Hill. Five major rivers including Tana, Thiba, Rupingazi, Thuci and Ena all except Tana, flow south eastwards from Mt. Kenya. On its part, Tana River has tributaries originating from Mt. Kenya and the Aberdare Ranges (Republic of Kenya, 2002b; 2009d; 2013). The drylands have a bimodal pattern of rainfall although it is

largely unreliable ranging between 640mm and 1100mm annually, with most parts of the drylands receiving an average rainfall of 550mm per annum.

The rainfall pattern and amount is typical of semi-arid areas of Kenya and hence conducive for dryland farming as defined in 2.4.4. Temperature in the areas ranges between 20ºC and 32ºC, with July and September being the coolest and warmest months respectively. There is however climatic variation in the drylands especially towards the south eastern parts informed by proximity to Masinga, Kamburu, Kiambere and Kindaruma dams along the Tana River that form part of Kenya's Seven Folks Hydro-Electric Power Project (Republic of Kenya, 2002b, 2013).

Generally, this area is a semi-arid with more than 50% of the population living below the poverty line ($1 a day). With an area of approximately 2,092.50km², about 1,690km² is arable, while about 591km² is water mass mainly hydro-electric power dams along the Tana River. In addition, exploitation of natural resources is largely unregulated and done from a point of ignorance, leading to environmental degradation. The major economic activities are dryland and irrigationbased farming of various crops such as maize, beans, cow peas and green grams.

In addition, horticultural crops, *miraa* (khat), tobacco, cotton, livestock rearing, small-scale entrepreneurial activities and fishing are also carried out. Moreover, exploitation of natural resources including charcoal burning, quarrying and sand harvesting among others, form part of the economic engagements. Most of these livelihood activities are

largely for household subsistence and hence dissuades re-investment and savings due to the limited returns. As a result, poverty indices are high as manifested in the low development indicators such as low levels of literacy and poor farming methods.

According to the Embu County Profile (Republic of Kenya, 2013), the major projects for the 2013-2017 planning period in agriculture were in food security and income generation. In this particular case, the government proposed strategies to enhance extension services and the promotion of drought-tolerant crops and small-scale irrigation (Republic of Kenya, 2009d). An important environmental concern is the fact that about 91.1% and 5.5% of the households use firewood and charcoal respectively as cooking fuel (KNBS & SID, 2013). In addition, 86.7% of the household use traditional stone fire place which implies energy wastage and loss (Republic of Kenya, 2002b; 2009d; KNBS & SID, 2013).

The foregoing has had adverse consequences on forest cover, which in turn affects the already deficient soil moisture to the detriment of dryland husbandry on which about 80% of local households subsist. Interestingly, only 0.2% of households use solar energy as fuel even though sunshine in this semi-arid region is abundant and hence remotely exploited. However, this may partly be explained by the high poverty indices and inadequate access to information, the latter given that about 8.2% of the household do not have radios or any other mean of getting information except oral communication (see Republic of Kenya, 2009d; 2013).

3.3. Sampling Procedures and Sample Size

3.3.1. Introduction

In the study, sampling was done at different levels and by use of various techniques at each level, in line with data requirements and the method that was used to collect the data. The different levels at which sampling was done and the respective sampling techniques are highlighted in the subsequent paragraphs.

3.3.2. Sampling the Administrative Areas

The general concern of the study, gender division of labour in dryland farming and household food security was the criteria upon which the specific study areas were selected. As such, purposive sampling technique was used to sample both the county and the sub-county, given that both have the required characteristics as expounded by Panda (2008) and Widtose (2010). These characteristics include inadequacy and uncertainty of annual rainfall, low soil moisture retention capacity, intercropping of largely drought-tolerant crops, easily erodible soils, low crop yields per unit piece of land and large land holdings among others.

Two administrative areas in the Mbeere drylands of Embu County were purposively selected based on poverty indices as provided by the Kenya National Bureau of Statistics office in Embu County. In this case, two of the most food insecure divisions (Kiritiri and Gachoka divisions) were purposively identified to be the focus of the study. From each of the sampled divisions, a location was sampled randomly by way of writing names of the locations in each division and then randomly selecting a piece of paper from each

division leading to the selection of Mbeti South Location (Gachoka Division) and Mavuria Location (Kiritiri Division). From these two locations, two (2) sub-locations were sampled randomly. In this case, the two sub-locations in Mavuria location were selected (namely Mavuria and Kombomunyiri), while in the selection of sub-locations in Mbeti South location, the names of the three sub-locations were written in different pieces of paper, the papers were folded and put in a container. The cup was shaken and then two pieces of paper picked randomly leading to the selection of Gachoka and Kirima sublocations. It is from these administrative areas that households were sampled and the overall sample of the administrative areas was as shown in Table 3.2.

Table 3.2: Sampled Administrative Areas in Mbeere South Sub-County

Division	Location	Sub-Location
Kiritiri	Mavuria	Mavuria
		Kombomunyiri
Gachoka	Mbeti South	Gachoka
		Kirima

3.3.3. Sampling Households and Individuals

Depending on the number of households in a chosen location, the appropriate sampling technique was accordingly used. From the selected study sites (sub-locations), households were listed and their total numbers determined (sampling frame). From these numbers, households were divided into clusters by sub-locations and proportionate samples determined as percentages of the total households in the particular study location. Households in which members were interviewed during the survey were sampled using systematic sampling procedure in each sampled location.

It started by making a complete list (sampling frame) of all households in each sampled sublocation, from which a sampling interval was determined. Such a list was prepared with the help of local administration officials including Assistant Chiefs and village headmen/women who are particularly familiar with their areas of jurisdiction. The determination of the sampling interval was done bearing in mind the envisaged sample size (150 households) and the number of households in each location.

Once the sampling fraction/interval was determined (5 was the sampling interval), then individuals were selected from the sampled households while taking care to strike a gender balance in the selection. For example, if a woman was sampled and interviewed in one household, then in the next sampled household, a man was interviewed. However, this was not always the case because it depended on the availability of the said individual, given that ruralurban migration and other population dynamics may mean that more women than men are resident in rural areas such as Mbeere drylands of Embu County. In each sampled household, the target for interview was the married couple, mostly between the ages 25 and 70 years. While it had been projected that about 200 households would be sampled, this number was revised to 150 households due to statistical saturation

In addition, key informants and focus group discussion participants were sampled purposively given that the study targeted information-rich respondents in terms of occupation, experience and training where applicable. In summary, the study used purposive, cluster and systematic sampling procedures to collect data in order to achieve study objectives. While purposive sampling was used to select the Mbeere South Sub-

County and the administrative divisions, cluster sampling was used to select the sub-locations (sub-locations were the clusters). On its part, systematic sampling was used to select the households from which individual men and women were interviewed. The sampled households from the four (4) sub-locations were as presented in Table 3.3.

Table 3.3: Household Sample Size

Sub-Location	**Men**	**Women**	**Total**
Mavuria	18	24	42
Kombomunyiri	17	18	35
Gachoka	17	21	38
Kirima	15	20	35
Total	67	83	**150**

Table 3.3 shows that in total one hundred and fifty (150) households were sampled and studied in which 67 (44.7%) men and 83 (55.3%) women were interviewed using the household questionnaire.

3.4. Unit of Observation and Analysis

The unit of analysis in this study was the households (as defined in sub-section 2.4.9) in which married couples were targeted for interview. However, in case these were not available during the time of the interview, then a call back was arranged during which an interview was carried out. Nevertheless, some of the call backs did not materialize and any such households were accordingly replaced with neighbouring ones. Alternatively, as mentioned earlier, any competent adult found in such a household and who was a member of the household was interviewed.

Such an individual was interviewed on condition that he/she was competent to give the required information, in this case gender division of labour regarding dryland farming activities in the particular household. In a situation where the sampled individual declined to be interviewed, then such a household was discarded and replaced with the next one until the sample size was attained. Most important, the study was designed such that interviews were contacted in private to afford the respondent the necessary confidentiality and ethical requirement of social research with human subjects.

3.5. Study Methods and Tools

This study used both qualitative and quantitative methods of social investigation including focus group discussions, key informant interviews, a survey, observation, photography and desk research as explained hereunder. The study therefore yielded both quantitative and qualitative data that was analyzed and presented using descriptive statistics and narratives in line with the study objectives. However, more emphasis was placed on qualitative methods of social investigation as well as for data analysis and interpretation.

3.5.1. Survey

Survey research involved administering interview schedules to 150 individuals in different households in the four sub-locations that were sampled, in which 67 men and 83 women were interviewed. The survey research was especially selected for the purpose of facilitating standardization of the procedure for all respondents to enhance generalizability of findings. The interview schedules had both open-ended and closed-

ended questions and were uniform for all individual respondents. Since gender division of labour is not the only determinant of household food production, during the study, control for other factors where possible was done such as in the case of white collar employment. In this particular case, effort was made to study only households that depended largely on dryland farming and related activities. This method of data collection used a household questionnaire/interview schedule as a tool of data collection to get both quantitative and qualitative data.

3.5.2. Focus Group Discussions (FGDs)

Focused Group Discussions helped in learning any farm-related norms, practices, beliefs and gender division of farm work of the study population. It was used to investigate the likely impact of these practices, beliefs and division of labour on individual household food production and subsequently food security in the study area. This was therefore apt in this case since the study had more to do with socio-cultural and economic behaviour of the target population. It had been proposed that there would be four (4) Focus Group Discussions in the two administrative areas that were the focus of the study-Gachoka and Kiritiri administrative divisions.

However, eight (8) focussed group discussions were carried out. These groups were made up of the following participants: Field Agricultural Extension Officers from both administrative areas, Youth Farmers group in Gachoka Division, selected group of miraa farmers from both administrative areas and Women Farmers' Group in Kiritiri Division.

Others included adult men in Gachoka Division, adult women in Kiritiri Division, male youth in Kiritiri Division and Female youth in Gachoka Division.

Each of these groups was engaged separately from the other. Based on the information collected from the eight groups in FGDs, there was no particular need for more since gaps were filled by data from Key Informant Interviews, direct observation and documentary review. The study utilized Focus Group Discussion Guide and gender calendars as a tool of collecting qualitative data. Gender calendars were particularly used to determine the daily schedules of both men and women and the respective duties assigned to and carried out by members of each gender. The aim here was to determine the roles men and women played in dryland farming as well as the relative time each used daily on these activities.

3.5.3. Key Informant Interviews (KIIs)

Key Informant Interviews were carried out with community members (farmers), local administrators and agricultural extension officers to determine the gender dimension of dryland farming in terms of how farm-based food production activities were shared out among household members. In this endeavor, the socio-economic organization of the resident community was determined through information collected from community elders as well as literature review. Much of this information was basically collected through oral narratives regarding the sociocultural organization of the study population, with emphasis on farm-based food production activities.

The foregoing information was sought from relevant government and local NGO staff particularly field agricultural extension officers to determine the gender division of labor in farm-related activities and how this impacted on household food production and security. There were seventeen (17) key informant interviews that included four people above 80 years of age who were instrumental in providing the oral history and food philosophy of the traditional Ambeere ethnic group. This number was determined on the basis of the principle of statistical saturation. That is statistical saturation is arrived at when additional interview do not yield any new information and/or insights.

Statistical saturation is attained faster in the study of population that exhibit more homogeneity than heterogeneity. The key informants who were drawn from the two sampled administrative areas: Gachoka and Kiritiri divisions of Mbeere South Sub-County, Embu County were as follows: Sub-County Agriculture Extension Officer in-Charge (Male); two Divisional Agricultural Extension Officers (Kiritiri and Gachoka Divisions); 2 male farmers in Gachoka Division; female farmer in Gachoka Division and a female farmer in Kiritiri Division. Others included a youth farmers' group leader (male) in Kiritiri Division; a miraa farmers in Kiritiri Division; cereals store proprietor in Rwika Market of Gachoka Division; Chairlady of Women Farmers Group in Kiritiri Division; administrator (Assistant Chief (Macang'a Sublocation in Kiritiri Division and administrator (Assistant Chief)-Mbeti South Sub-Location, Gachoka Division. The key informants who provided the oral history and food philosophy of the Ambeere ethnic group were made up of 83-year old retired male teacher; 82-year old retired male prison

officer; 93-year old female farmer (all in Kiritiri Division) and 87-year old male farmer in Gachoka Division.

3.5.4. Observation

Observation checklists were used in the assessment of farming practices including soil conservation measures, types of crops grown and involvement of individuals in the activities among other relevant issues in the study area. A special attempt was made to seek the assistance of community and opinion leaders during the observation and documentation of findings accordingly, which yielded valuable data. There was only one checklist used for each of the two administrative divisions that were sampled for study.

Given the objectives of the study the observation checklist was tailored to capture the following issues from a gender perspective where applicable: Soil conservation practices, rainwater harvesting and conservation strategies; measures taken to mitigate moisture loss/water loss control practices; types of crops grown bearing in mind the local climatic conditions; Farm sizes versus productivity and cropping systems. Others included crop protection strategies employed by local farmers and agricultural technology employed, risk reduction/spread strategies in case of crop failure and ecological threats/impediments to dryland farming in the study area.

3.5.5. Desk Research

This was the initial activity for the study involving the review of selected documents around the research problem and the study area was reviewed in order to enrich the final

report. These documents provided an overall background for the study and also information to aid the formulation of data collection tools, while placing particular emphasis on literature on gender roles as they relate to agricultural production in general and dryland farming in particular.

3.5.6. Photography

Due to the need to capture as many issues as possible and given that researchers' memory may not capture all interesting events and practices, photography was used to provide important illustrations in the final output/report. Important farm practices such as agro-forestry, exploitation of natural environment, soil conservation and related activities were captured using photography. This went a long way in supplementing the other methods of data collection as well as enhancing the validity of the information collected.

3.6. Methods of Data Analysis and Interpretation

3.6.1. Analysis of Quantitative Data

Analysis of quantitative data was done using the Microsoft Excel in which data entry occurred simultaneously with data collection to cut down on time spent on this exercise. The collected data was analyzed and presented thematically using both descriptive statistics and narratives as highlighted hereunder.

3.6.1.1. Descriptive Statistics

These are simple statistical methods, which do not support or falsify relationships between variables but simply help in the description of data. This study used frequencies

and percentages because of their ability to distribute the responses according to the various values of the study variables. They were used due to their ability to transform raw data into numerical form. Given that the study gave more emphasis to qualitative data analysis, any descriptive statistics were computed using Microsoft Excel.

3.6.2. Analysis of Qualitative Data

Qualitative data was analyzed manually but thematically taking into account the gender and socio-economic differences regarding dryland farming activities and household food security. In addition, the analysis of qualitative data was done bearing in mind the objectives of the study and the questions whose answers were given by the data. The qualitative data was analyzed using the following modes of analysis.

3.6.2.1. Content Analysis

This was primarily concerned with meanings and symbols in the language of the study participants from which primary conceptual categories were assigned. It was particularly concerned with replication of information among respondents out of which informed inferences were made on the interplay between gender division of labour and food production at the household level and by inference household food security.

3.6.2.2. Conversation Analysis

This was particularly used to analyze focused group discussions data bearing in mind the need to identify and input significant opinions from the study participants regarding the gender division of labour and its implications on food production and security at the

household level. It required the study facilitator to guide the focus group discussions in order to capture opinions of the participants out of which informed conclusions were made to validate the final report. During focus group discussions, the study team endeavoured to guide the discussions into fruitful course based on the study aim and objectives. This was important given that FGD participants could digress into irrelevant issues from time to time. Nonetheless, this was taken care of by the FGD facilitator who re-focussed the FGD around the study theme through probing questions.

3.6.2.3. Discourse Analysis

This mode of analysis was mainly used to build on and reinforce both content and conversation analysis. It went beyond conversation and content analysis to discern meanings of both verbal and non-verbal expressions of study participants. This was for the reason that some study participants did not explicitly give all the information concerning their relationships with their spouses regarding sharing of food production tasks. This hence required the research team to critically examine their languages, both verbal and non-verbal in order to have a clear understanding. In particular, the tone of the language and facial expressions were carefully analyzed especially where more emphasis was put without the respondent necessarily verbalizing it. Out of these verbal and non-verbal expressions, appropriate conclusions and recommendations have been made to enhance dryland farming and food production.

3.6.2.4. Context Analysis

This involved the analysis of the socio-economic background of the research participants to determine the resources available to them and whether this was associated in any way

with their involvement in farming activities. This was done by analysing the research participant's biodata captured using the household questionnaire. In addition, biodata from key informants and focus group discussion participants was also collected. Moreover, participants' attitude towards sharing of farm tasks was also a source of vital data in determining the socio-cultural organization of the community and by extension gender-based division of farm labour. In addition, government documents such as policy papers were also subjected to contextual analysis.

3.7. Study Limitations

In practice, there are many challenges that researchers come across while in the field that may be the consequences of several factors both external and internal to the researcher. During the study, a number of challenges were encountered that delayed its completion and hence prolonged the study period. Nonetheless, some of the challenges were important to ensure the collection of data that would stand the test of time in terms of validity and reliability. Indeed, some of the challenges were inevitable given the need to collect data during both the dry and wet seasons so as to capture and compare data in both.

Other challenges included language and communication barrier, the busy schedule of study participants, management of data, balancing work and studies and the bureaucratic procedure of obtaining the research permit among others. Nonetheless, the challenges were surmounted and therefore did not negatively affect the quality of the collected data in a significant way. The challenges are hereunder discussed in more detail.

Seasonal Variation of Farm Activities

In order to capture activities during the busy and slack seasons of the year, the study was scheduled to run through both wet and dry seasons in order to capture data in terms of economic activities and people's involvement in them particularly from a gender perspective. This was necessary to facilitate data comparison to be carried out regarding the duties of men and women during these two periods. This meant that the study was delayed and therefore the study period prolonged in order to collect data during the two seasons particularly through direct observation in farms. Whereas this delayed and prolonged the study period, it did not compromise the quality of data but actually enriched it a great deal. This observation is based on the reasoning that the comparative analysis of data for both seasons made more inclusive, rich and informative.

Communication/Language Barrier

The language of the study participants (Kimbeere) was slightly different from that of the researcher (Kikamba), which in some instances posed communication difficulties. This was particularly when interviewing a few respondents who were illiterate, many of who were initially shy to use Kiswahili due to poor mastery of the language. It is to be noted that about 13% of those surveyed had no formal education (see Table 4.1) and these presented some difficulties during the interviews.

However, the difficulty was successfully surmounted by enlisting the support of two (2) research assistants who were not only local but were also fluent and hence conversant with the local language (Kimbeere). Besides, in the study area, there were also pockets of

the Akamba ethnic group who were fluent in both Kikamba and Kimbeere language, which are very close to one another. As a result, this difficulty did not at all compromise the quality of data collected and hence the findings of the study can be relied upon as a representative of the true picture on the ground.

Recruitment and Participation of Interviewees

As expected in any study, it was not easy to get and schedule interviews with study participants given their busy schedules particularly during the wet season. This is particularly when some of the farmers were busy in their farms and related domestic chores. However, *miraa* farmers were interestingly more busy during the dry season when *miraa* as to be watered and mulched to minimize evaporation. With relation to busy schedules, while it was relatively easy to get respondents from the various households that had been sampled, frontline agricultural extension staff were not easily available and it proved somehow difficulty scheduling interviews with them.

In addition, there were several instances of absenteeism in sampled households that had to be replaced. As a result, many households were sampled accidentally but this did not compromise the quality of data collected given that many of the households exhibited significant homogeneity in terms of livelihood activities and cultural practices. Due to the homogeneity of the study population and as it has been pointed out elsewhere in this work (see 3.4.3), the initial projected sample of 200 households was scaled down to 150 households due to statistical saturation.

The difficulties discussed in the foregoing paragraphs partly delayed the study and was responsible for prolonging it. In particular, while it was difficult to schedule interviews with frontline agricultural extension staff as key informants, it was more difficult to schedule a focus group discussion with these staff. However, the foregoing did not compromise the quality of data given that while the interviews delayed, they were finally scheduled and executed later. In addition, the delays facilitated the use of observation technique of data collection particularly when respondents were busy in their farms. Observation was particularly important in this study to corroborate information collected using other methods such Focus Group Discussions and Key Informant Interviews.

Official Red-Tape

It is a statutory requirement in Kenya to obtain a research permit that authorizes one to undertake a study, which involves some bureaucratic procedures right from the university to the National Commission for Science, Technology and Innovation (NACOSTI), the County Commissioner's Office and to the government offices at the local level. This bureaucratic procedure although necessary can and did delay and hence prolong the study period given that all offices involved were supposed to give their node before the study could be carried out. Nonetheless, at the end of the day all the necessary official authorization was obtained and the study undertaken as expected, with the necessary adjustments and rescheduling.

Again, the procedure and the attendant adjustments and rescheduling did not compromise data quality but only did delay and prolonged the study period. In addition, the process of

reaching and recruiting research participants required formally communicating and going through various government offices as per regulations regarding research in Kenya. Nonetheless, having being briefed on the logistics involved and having had prior knowledge of the procedure involved, members of the study team were psychologically prepared and went through the process successfully.

Logistical Issues

In every undertaking including research, there are normally logistical issues that must be surmounted for effective implementation of a research undertaking in order to ensure validity and reliability of results. In research for example, what may be on paper as the proposal and research instruments may not necessary be transferable to the actual research without alterations and input from time to time.

During this study, it was realized that the survey instrument had to be altered after pretesting given that it had not captured important issues while some of the questions could not be easily translated in local language. As such, this challenge was overcome through effecting the necessary adjustments in the questionnaire to capture the intended information. Otherwise without the changes, it would have been difficult to collect the data using the interview schedule. This would in essence compromise not only the quality of data collected, but also its validity and reliability, leading to inappropriate findings, conclusions and recommendations.

Compensation to Research Participants

Any study would definitely consume resources including time and more important for research participants, time that would otherwise have been spent in more productive activities. As such, given that research participants and especially key informants and focus group participants lost their time during the interview, there was need for compensation for their inputs and efforts. This was in addition to the challenge that the study was self-sponsored and hence the compensation was supposed to be borne by the researcher. While the participants did not demand any compensation for their time, it was deemed prudent to give them a token after the interviews and this was with regard to focus group participants. While this was a financial challenge on the part of the research team, it was partially offset by financial assistance from the French Institute of Research in Africa (IFRA) through its budgetary assistance to postgraduate students.

CHAPTER FOUR

PRESENTATION OF THE RESULTS

4.1. Introduction

The data that forms part of this work was collected during the months of February 2015 and October 2017 in Kiritiri and Gachoka Divisions of Mbeere South Sub-County in Embu County, Kenya. The study used various data collection methods namely; survey, focus group discussions, direct observation, key informant interviews, photography and desk research. There were eight (8) focus group discussions, seventeen (17) key informant interviews while 150 households were surveyed using the household questionnaire. From these households, eighty-three (83) women and sixty-seven (67) men were interviewed, with their ages ranging between twenty-four (24) and over sixty (60) years. Some of the key informants especially from the local community were however relatively elderly with their ages ranging between seventy-six (76) and ninety-three (93) years of age.

The key informant interviews were carried out with local administrators, women farmers' group leader, a youth group leader, retired civil servants, prominent farmers and Field Agricultural Extension Officers (FAEOs). Moreover, the focus group discussions were carried out with a youth farmers' group, FAEOs, men farmers in both Gachoka and Kiritiri divisions and a women farmers' group among others as explained in *Chapter Three* (Methodology) of this work. In addition to the foregoing methods, there was also an observation checklist and the use of secondary data to corroborate the first-hand information. For example, through the use of an observation checklist it was possible to

identify the various crops grown, people involvement in farming activities and the soil conservation measures undertaken by local farmers. This information was cross-checked using other methods of data collection including literature review, while more evidence of the farming activities was captured through photography.

4.2. Respondents' Biodata

4.2.1. Age Structure

The study interviewed one hundred and fifty respondents, both men and women in the sampled households, with their age being as shown in Figure 4.1.

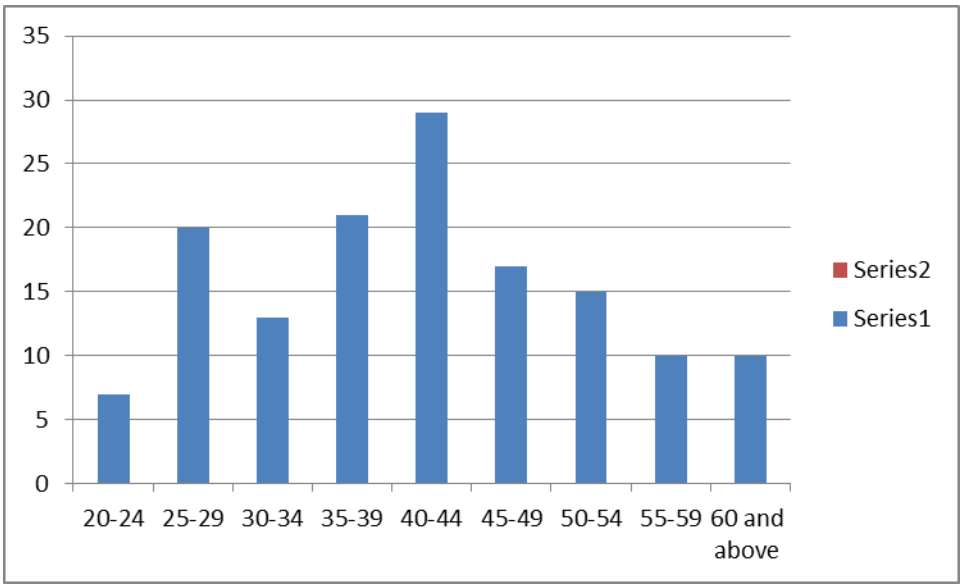


Figure 4.1: Age structure of the respondents

From Figure 4.1, it can be observed that the study sample comprised of respondents whose majority were in the age bracket, 30-54. It is also observable that majority (93.33%) were within the economically active age brackets, implying they were competent in giving the information given that they are likely to be involved actively in

dryland farming. In addition, that there were more women surveyed than men could be explained in two different ways: one, women unlike men were more involved in reproductive activities including farming and other domestic chores and therefore likely to be either in their farms or at home and therefore the high probability of being sampled. Two, due to rural-urban migration in search of better livelihoods in urban areas to supplement farming, men are expected to be fewer at home given that they are more likely to migrate into towns and other areas as opposed to their women counterparts.

4.2.2. Respondents' Level of Education

It is acknowledged that the level of education of an individual determines to a great extend their access to information, its understanding and institutionalization. It is therefore expected that the higher the level of education, the better placed is an individual to access and understand information and use it to improve their welfare. As such, this study sought to determine the level of education of the respondents and the results are as presented in Table 4.1. As shown in Table 4.1, 13.33% of those interviewed had not been to school, 41.33% had primary school level of education while another 13.33% had attained tertiary level of education. In addition, and as shown in Table 4.1, only 4% of those interviewed had university level education.

Table 4.1: Respondents' Level of Education

Highest level of education attained	Frequency	Percentage
None	20	13.33
Primary	62	41.33
Secondary	42	28.00
Tertiary/college	20	13.33
University	6	4.00
Total	**150**	**100.00**

As shown in Table 4.1, a significant majority of those interviewed (83%) had only up to secondary school level of education, with the implication that most of the information they used in farming was either traditional knowledge or the skills they got from FAEOs. While secondary school level of education may not necessarily be adequate for effective dryland farming, the minimal contact between the farmers and FAEOs made it more ineffective. Nonetheless, it was determined that the long experience of some of the farmers worked well and FAEOs had informally converted three (3) farms owned by those experienced farmers into demonstration farms. During a focus group discussion with FAEOs in Mbeere South Sub-County Agriculture office at Kiritiri Town, one of the FAEOs, with the concurrence of the rest explained,

> *There are interesting success stories particularly those who have been working well with us. Although they are not so many, we can proudly say that we have had an impact particularly working with the relatively old women farmers who have attended our trainings religiously as history and our records can attest. Such farmers are always asking us about weather forecasts, new pesticides, availability of fertilizers and are also the ones on record as having taken soil conservation and water harvesting activities more seriously. In addition, they have many varieties of crops to spread the risk of one crop failure. During the dry season, they are the ones who flood the local markets with citrus fruits-there is always*

> *something to eat for their families. We have informally been using three of these farmers as local extension officers and their farms for demonstration when we carry out agriculture extension education activities.*
>
> FAEOs focus group discussant, Kiritiri Division, May 2016

The foregoing is a testament that while FAEOs have been working despite the logistical challenges that they have to contend with, many farmers are yet to play their rightful role and are hence partly responsible below potential food production and attendant food insecurity. This is for the reason that farmers fail to implement what is extended to them by the FAEOs. At the very worst, some of them fail to attend meetings and demonstration sessions with the FAEOs as attested by the latter. In essence this partly explains the largely below potential food production and resultant food security in the Mbeere drylands of Embu County.

During a focus group discussion with a women farmers' group and while acknowledging the foregoing, a 47 year old farmer in Kiritiri Division opined,

> *We cannot ignore the role of the officers in giving us information and we cannot say in confidence that we do not have the right information. However, to put in practice what we know is the major problem. Take for instance when am required to grow sorghum and millet as drought tolerant crops yet I am alone in my household-my husband is working in Meru, my children go to school and many times I have to work without a farm hand against many household chores. I have to tend the farm, look after livestock and yet fetch water and firewood and prepare a meal for the children before they arrive from school. Sorghum and millet growing that they recommend to us requires that you are in the farm the whole day scaring birds at least for two months before you harvest. When you harvest there is the threshing before you can get money to buy other foods. These crops also fetch very little returns against the intensive labour that has to be invested. It is very time consuming and involving growing the drought tolerant crops for me and many*

> *other households. I would rather grow maize and beans than the so called drought tolerant but labour intensive crops that will not provide food to my family immediately upon harvest.*
>
> 47 year old female farmer, Kiritiri Division, September 2016

On further interrogation it was revealed that of the 150 individuals interviewed, only 33 (22%) had ever attended a short training related to agriculture and or farming. The rest had never been trained in any way in agriculture and it can be deduced that the foregoing is partly responsible for below optimal food production and hence food insecurity in the study area. However, a good number of farmers had acquired vital farming skills through experience over the years including soil conservation and application of fertilizer and pesticides. It is expected that increasing level of education facilitates the acquisition of other forms of knowledge including that to do with agriculture and food production. When the reverse is the case, food production is not expected to go up given that people do not have the perquisite knowledge and skills to undertake effective farming activities.

From the same bio-data of those interviewed in the 150 households surveyed as shown in Table 4.1, it was deduced that all the twenty (20) respondents who had not attended formal schooling were women. In addition, at each subsequent level of education, the percentage of men was more than that of women except at the university level, where out of the six (6) university graduates, four (4) were women. Given the foregoing scenario, it is important to interrogate at the theoretical level, the interface between level of education and acquisition of appropriate information, skills and knowledge. This was however beyond the scope of the present study.

4.2.3. Respondents' Religious Affiliation

Religion, religious beliefs and practices have an important bearing in the economic behaviour of people and generally economic activities including farming. For example, Max Weber's philosophy of *Protestant Ethic and the Spirit of Capitalism* (Weber, 1930; Abraham, 1982; Ritzer, 1992) is grounded on Christianity and its attendant belief and practices with relation to hard work and accumulation of wealth. It was therefore deemed important to determine the religious affiliation of the respondents and the results are as shown in Figure 4.2.

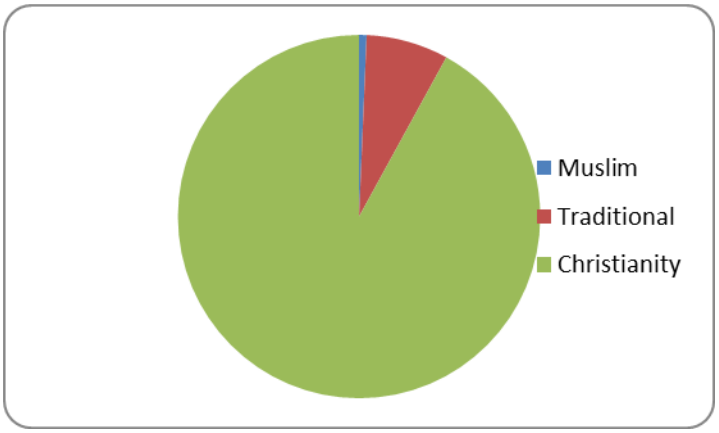


Figure 4.2: Religious affiliation of respondents

From Figure 4.2, it is observed that majority of the respondents were Christians (92%), which in essence means that most economic activities including farming were influenced by Christian values, behaviour, beliefs and practices especially hard work and the need to accumulate wealth. While there were few traditional believers, the proportion of the Muslim population was negligible and hence could not perhaps have any influence on economic activities such as farming. It is not therefore surprising that a shown in Table 4.3 majority of respondents had farming as their main occupation. Indeed, some of the

respondents had multiple occupations perhaps in order to reduce the risks associated with dependence on a single livelihood activity.

4.2.4. Respondents' Main Occupation

The occupation of an individual determines to a great extend their livelihood and by extension their welfare and that of their households. As such, the study sought to determine the respondents' main occupation and the results are as shown in Table 4.2. In this particular case, *main occupation* is defined as the most important livelihood option that support the household of the respondent by providing basic needs especially food. This however does not mean that local residents had only a single occupation. Rather, many locals had multiple undertakings to eke a living.

Table 4.2: Respondents' Main Occupation

Main Occupation	**Frequency**	**Percentage**
Farming	122	81.33
Permanent employment (private sector)	10	6.67
Permanent employment (public sector)	6	4
Casual employment	6	4
Business	3	2
Quarrying	3	2
Total	**150**	**100**

As shown in Table 4.2, farming is the main occupation for most residents standing at 81.33% despite the many climatic challenges in the area. This is followed at a distant by employment in the private sector (6.67%), employment in public sector and casual employments, both at 4% and then business and quarrying at 2% each. Interestingly and against expectations in a dryland area, no respondent cited livestock rearing as their main

occupation. Nonetheless, and as found out by the study, the occupations indicated in Table 4.2 are not the only economic engagements in the study area, rather there were many other occupations from which residents of the Mbeere drylands eked a living.

4.2.5. Respondents' Average Monthly Income

An individual's income to a great extent determines their purchasing power and welfare especially if they are able to meet their basic and other needs. In addition, an individual's level of income determines their ability to access and utilize information, affordability of agricultural inputs and by extension ability to produce food and improve household welfare. This study therefore sought to determine the average monthly income of the respondents and the data is presented in Table 4.3.

Table 4.3: Respondents' Average Monthly Income (in 1000 KES)

Income Bracket	Frequency	Percentage
≤9	105	73.43
10-19	18	12.59
20-29	8	5.59
30-39	5	3.49
40-49	4	2.8
≥50	3	2.09
Total	**143**	**100**

From Table 4.3, it is clearly indicated that majority (73.43%) of those interviewed had low incomes of up to Kenya Shilling (KES) 9000 a month, which translates into about KES 300 a day. While this may seem to suggest that the residents were above the poverty line of about $1 a day, many had unstable incomes that fluctuated with weather conditions given their dependency on natural environmental resources. It also needs to be

pointed out that many of them had incomes below the poverty line and a significant majority were therefore poor. Indeed, due to the unreliable weather conditions manifested in erratic rainfall, food poverty was severe for most of the year. According to the data collected, majority of those with incomes above KES 9000 were either engaged in business, white collar jobs or were *Miraa* farmers.

4.3. About the Study Area

4.3.1. Livelihood Activities

In order to ensure household welfare, individuals must of necessity involve themselves in different economic activities. In the study area, it was noted that for the purpose of eking a living households were actively engaged in various livelihood activities, with most of the respondents getting involved in multiple activities. As such, there were several livelihood activities in the study area and the study captured them as shown in Table 4.4. The data presented in Table 4.4 was generated from an open-ended question and hence eliciting multiple responses from a single respondent. This is because, like in many other areas, people in the Mbeere drylands had multiple livelihood activities in order to spread the risk of failure in one livelihood activity.

Table 4.4: Local livelihood Activities

Livelihood Activity	Frequency of responses	% of sample	% of total responses
Crop farming	146	97.33	29.67
Livestock rearing	139	92.67	28.25
Miraa growing	66	44	13.41
Trade/business	54	36	10.98
Quarrying	24	16	4.88
White collar jobs	21	14	4.27
Brick making	8	5.33	1.63
Charcoal burning	7	4.67	1.42
Firewood harvesting	7	4.67	1.42
Transportation	7	4.67	1.42
Bee keeping	6	4	1.22
Fishing	5	3.33	1.02
Gambling	2	1.33	0.41
Total	**492**		**100**

As shown in Table 4.4, there are several livelihood activities in the study area with crop farming being the most popular at 97.33%, notwithstanding the climatic challenges of aridity and erratic rainfall. Crop farming is closely followed by livestock production having been cited by 92.67% of those interviewed as an important livelihood activity. As shown in Table 4.4, *miraa* growing and trade follows with 44% and 36% respectively, while quarrying and white collar jobs were cited by 16% and 14% respectively of the interviewed people.

Other activities included brick making (5.33%), charcoal burning, firewood harvesting and transportation all at 4.67%, bee keeping 4%, fishing 3.33% and gambling at 1.33%. Overall, it is noted from Table 4.4 that most of the livelihood activities are dependent on the natural environmental resources, pointing to the possibility of natural resource exploitation that borders on degradation. As shown in Table 4.5, these livelihood

activities are normally carried out under very difficult environmental and human-based challenges.

4.3.2. Challenges to Livelihood Activities

It is understood that every livelihood activity comes with challenges and hence humans must necessarily put effort to achieve their goals and more so in the fulfilment of their basic needs. As a result, this study sought to determine the various challenges to local livelihood activities and the data is presented in Table 4.5. Table 4.5 therefore is a depiction of the respondents' opinions in terms of what they thought stood in their way to eke sustainable living and improve the welfare of their households.

Table 4.5: Challenges to Livelihood Activities

Livelihood Activity Challenges	**Frequency of responses**	**% of sample**	**% of total responses**
Poor weather conditions	146	97.33	14.05
Poverty	130	86.66	12.51
Joblessness	121	80.66	11.65
High temperatures	112	74.66	10.78
Poor markets	90	60	8.66
Untimely arrival of inputs	87	58	8.37
Pasture for livestock	77	51.33	7.41
Cost of farming inputs	56	37.33	5.39
Cost of labour	45	30	4.33
Rocky soils	41	27.33	3.95
Laziness among youth	34	22.66	3.27
Ignorance	30	20	2.89
Water logging	23	15.33	2.21
Farm sizes	23	15.33	2.21
KenGen prohibition of fishing	12	8	1.15
Wild animals	12	8	1.15
Total responses	**1039**		**99.98**

As expected in a semi-arid area such as the Mbeere drylands of Embu County, one of the most important challenges to local livelihood activities, which largely depended on the natural environmental resources, was cited as poor weather conditions (97.33%). This was followed closely by poverty (86%), joblessness (80.66%) and thermal stress (74.66%) in that order. Other challenges included poor market for farm produce (60%), untimely acquisition of farm inputs, (58%), pasture for livestock (51.33%), cost of farm inputs (37.33%) and cost of labour (30%) among others. It is noted that despite the high dependency on the natural environmental resources for livelihood by local residents, the challenges that go with these livelihood activities remain largely related to the natural environment. This in essence questions the sustainability of such activities in the midst of weather variability in the study area.

4.3.3. Food Security Status

Food security is an important indicator of development and hence vital for the realization and sustainability of other development indicators. Thus, when a household or a community is food secure, it is expected that other indicators such as educational attainments, health status and civic engagement are stimulated, with the end result being the improvement of human welfare. Given this information, this study sought to understand not only the food security status of the local households, but also the residents' understanding of what is meant by food security and the attendant challenges to ensuring the latter.

In the understanding of food security, the residents were required to name its indicators and Table 4.6 presents the various indicators of food security in their thinking. It ought to be noted that the data presented in Table 4.6 was generated from an open-ended question and hence eliciting multiple responses from a single respondent. This is because a respondent had several issues that in their opinion were food security indicators.

Table 4.6: Local Food Security Indicators

Food security indicator	**Frequency of responses**	**% of sample**	**% of total responses**
Food in store/farm	145	96.67	27.15
Adequate rainfall	130	86.67	24.34
White collar job/salary	85	56.67	15.92
Enough maize	83	55.33	15.54
When I have money	57	38	10.67
When neighbours have food	20	13.33	3.75
When Miraa is ready for harvesting	14	9.33	2.62
Total responses	**534**		**99.99**

As shown in the Table 4.6, food security has various indicators and therefore its conceptualization had multiple meanings to different people in the study area. For example, 96.67% of those interviewed were of the opinion that when people have food in the store or farm, then they were food secure. This implies that food accessibility is equated with food security for 96.67% of the residents of the Mbeere drylands. Another opinion was that so long as there was adequate precipitation, food security was ensured, which was the view of 86.67% of those interviewed. This is an indicator of the importance of weather conditions in ensuring food security in the Mbeere drylands.

Yet, another 56.67% of those interviewed were of the view that so long as one had a salaried job especially permanent one, then their households were regarded as food secure, the natural weather conditions notwithstanding. As shown in Table 4.6, slightly more than half of those interviewed (55.33%) were of the view that in as long as one had maize in the store, their households were food secure, even as 38% of others believed that food security meant purchasing power in terms of monetary liquidity in the words of Economist Maynard Keynesthat possession of money guaranteed food security in a household.

Perhaps to demonstrate the generosity associated with many African traditional practices regarding food, 13.33% of those interviewed were of the opinion that when their neighbours had adequate food, they were as well food secure. This in essence implies that in the study area, community members practiced food sharing with those who were thus disadvantaged. In addition, 9.33% of others looked at food security as ensured when *miraa* was thriving and ready for harvesting.

Overall, it is clear that the definition of food security in local terms implied both its possession and accessibility especially grains, their nutritional composition notwithstanding. The foregoing definition is slightly different from the formal meaning of food security which includes its accessibility, availability, affordability and effective utilization. Despite these local food security indicators, food insecurity in the Mbeere drylands of Embu County remains a significant affront to local development. Accordingly, this study sought to understand the causes of food security in the study area

and the results are shown in Table 4.7. Given that data in Table 4.7 was drawn from an open-ended question, respondents gave multiple responses that in their opinion were causes of food insecurity in the study area.

Table 4.7: Causes of food insecurity

Cause of Food Insecurity	**Frequency of responses**	**% of sample**	**% of total responses**
Inadequate rainfall	148	98.67	13.33
Poverty	130	86.67	11.71
Inadequate financial resources	120	80	10.81
Late onset of rainfall	87	58	7.84
Failure to grow crops	86	57.33	7.75
Early cessation of rainfall	81	54	7.30
Overburdening of women	76	50.66	6.85
Crop pests and diseases	72	48	6.49
Failure to use farming inputs	67	46.67	6.04
Misuse of food produced	50	33.33	4.50
Laziness and ignorance	41	27.33	3.70
Soils inability to retain water	34	22.67	3.06
Poor soil conservation methods	34	22.67	3.06
Poor farming methods	30	20	2.70
Farm sizes	29	19.33	2.61
Drug abuse especially alcohol	25	16.67	2.25
Total responses	**1110**		**100**

Table 4.7 shows that there was a multiplicity of food insecurity explanations, many of which are related to natural weather and environmental conditions, even as human-induced factors were as well cited by those interviewed. Overall, inadequate precipitation was seen by many (98.87%) as the most significant cause of food insecurity, while for 86.67% of others looked at poverty as being responsible for food insecurity in the study area. Related to poverty was inadequate financial endowment by households, which was

cited by 80% of those interviewed as a principal cause of food insecurity in the study area.

As shown in Table 4.7, and from a gender perspective, about 50% of those interviewed were of the opinion that women were overrepresented in farming activities while at the same time being burdened by other household chores to get effectively involved in food production activities. As such, men physical labour was seen as underutilized in farming activities, hence leading to the production of below potential quantity of food than otherwise would be. In addition, late onset of rainfall and failure by farmers to grow crops was looked at as a cause of local food insecurity by 58% and 57.33% respectively.

On their part, early cessation of rainfall and crop pests and diseases as drivers of food insecurity in the study area were cited by 54% and 48% of those interviewed respectively. Direct observation in farms revealed that pests were actually a menace to food production in some farms especially among the relatively poor households as shown in Plate 4.1, which maize crop attacked by army worms in a farm in Mbeti South Location, Gachoka Division

Plate 4.1: Maize attacked by Maize Stoke Borer in Mbeti South Location, May 2016

Back to Table 4.7, another 46.67% and 33.33% of the respondents cited failure by local farmers to use farming inputs and misuse of the food produced as push factor towards local food insecurity. Closely following these were laziness of the local population and inability of the soil to retain water at 27.33% and 22.67% respectively. On their part, 22.67% and 20% of the respondents respectively believed that poor soil conservation methods and inappropriate farming methods contributed to food scarcity in the area. Yet, 19.33% of those interviewed looked at farm acreage as too small to produce adequate food for their households, while for 16.67% of others, food insecurity was a consequence of drug abuse especially alcohol. The latter is apparently related to misuse of food produced which was cited by one-third (⅓) of those interviewed as a food insecurity driver in the study area as shown in Table 4.7.

4.3.4. Soil and Water Conservation Activities

For successful food production to moderate household food insecurity, a minimum threshold of activities must of necessity be carried out including water and soil conservation. These are expected to not only reduce moisture loss through evapotranspiration, but also help to preserve soil nutrients and sustain soil productivity. As a result, this study sought to determine the local soil and water conservation activities and the results are as shown in Table 4.8. Given that many respondents employed multiple soil and water conservation activities, they accordingly gave multiple responses as presented in Table 4.8.

Table 4.8: Soil and Water Conservation Activities

Conservation activity	Frequency of responses	% of sample	% of total responses
Fencing farms	76	50.66	20.77
Mulching	63	42	17.21
Using FYM	53	35.33	14.48
Terracing	47	28	12.84
Agro-Forestry	31	20.66	8.47
Using creeping plants	23	15.33	6.28
Tractor ploughing	7	4.66	1.91
None	66	44	18.03
Total responses	**366**		**99.63**

As shown in Table 4.8, residents of the Mbeere drylands carried out several soil and water conservation activities, with some of them undertaking a multiplicity of these activities simultaneously on their farms. These activities include fencing of farms to ensure soil is not trampled upon by livestock and human beings to make is loose and hence increasing its vulnerability to wind and water erosion. This was cited by half

(50.66%) of the respondents, while 42% of others indicated that they did mulching using several materials including vegetation and maize stalks to prevent moisture as well as soil nutrient loss through evaporation and soil erosion respectively.

Table 4.8 also shows that 35.33% of those interviewed used Farm Yard Manure (FYM) to sustain and preserve soil fertility and productivity, while 28% of others indicated that they used terraces to prevent soil erosion by surface run-off and rainwater loss. Others (20.66%) still used to plant trees (agro-forestry) as a strategy to preserve soil moisture loss, even as 15.33% of others indicated using creeping plants such as *docilis lablab,* locally known as *njavi*. Given that *njavi* grows horizontal and are leafy, they provided natural mulch in addition to being a source of food. Their mulching utility is provided by the canopy that their leaves form as they grow horizontal to the ground.

In addition, 4.66% of others used tractors for ploughing, not only to aerate the soil but also break it down and allow water to percolate. This helped to ensure that surface run-off is retained in the soil and prevents washing away of soil nutrients. Plate 4.2 shows a tractor at work on a farm in Mbeti South Location, Gachoka Division in March 2016.

Plate 4.2: A tractor tilling in Mbeti South Location, Gachoka Division, March 2016

Back to Table 4.8, 44% of those interviewed indicated that they did not make any conscious attempts at soil and water conservation. This is interestingly and against expectations especially in a semi-arid environment. This is expected to escalate soil erosion, water loss and reduce soil fertility and productivity. Such households are not expected to produce enough food for their members, meaning possibility of household level hunger that works to bring down other development indicators.

4.4. Climatic Constraints and Opportunities for Dryland Farming

Weather conditions play a very important role in enhancing livelihood activities particularly farming and related activities. While climatic conditions can make the environment conducive for farming, it can also stand as an impediment especially in ASALs such as the Mbeere drylands of Embu County. As such, climatic conditions may present opportunities as well as challenges to dryland farming. Consequently, this study

sought to understand the constraints and opportunities for dryland farming in the study area.

4.4.1. Challenges to Dryland Farming

While this study was more concerned with the socio-cultural issues as far as dryland farming was concerned, it was also deemed appropriate to understand the climatic challenges and opportunities to dryland farming in the study area. Table 4.9 presents these challenges to dryland farming in the Mbeere drylands of Embu County in the opinions of the respondents. Given that many farmers faced multiple challenges related to dryland farming, a single respondent gave several challenges as presented in Table 4.9.

Table 4.9: Challenges to Dryland Farming

Weather/climatic challenge	**Frequency of responses**	**% of sample**	**% of total responses**
Unreliable rainfall	147	98	17.99
Dry weather/arid conditions	141	94	17.26
Late onset of rainfall	132	88	16.16
Early cessation of rainfall	105	70	12.85
Pests and diseases	67	44.67	8.20
Poor soils/infertility	66	44	8.08
High temperatures	66	44	8.08
Rocky soils	37	24.67	4.23
Loss of rain water	22	14.67	2.69
Soil erosion	19	12.67	2.33
Water-logging	15	10	1.84
Total responses	**817**		**99.71**

As shown in Table 4.9, most of the challenges to dryland farming in the study area have more to do with the weather patterns. Therefore, and as indicated in the table, inadequate

precipitation was seen by the vast majority as problematic as it was cited by 98% of those interviewed. This was followed by dry weather/arid conditions at 94% even as 88% of others blamed late onset of rainfall as the reason for below potential dryland farming in the study area. Plate 4.3 taken in Mavuria Location, Kiritiri division in September 2015 typifies aridity in the study area.

Plate 4.3: Exemplification of aridity in Riamurai area, Kiritiri Division 2015

Closely related to late onset of rainfall was the early cessation of rainfall, cited by 70% of those interviewed while pests and diseases as an impediment to dryland farming was cited by 44.67%. It was interesting that while 48% of the respondents looked at crop pests and diseases as a cause of food insecurity (see table 4.7), it was only 44.67% of the respondents who cited this as an impediment to dryland farming (see Table 4.9).

In addition soil infertility and high temperatures were both seen by 44% of those interviewed as the reason that stood in the way of effective dryland farming. Related to

soil infertility was rocky farms and loss of rainwater, which in the opinion of 24.67% and 14.67% respectively, hindered effective dryland farming. To partly illustrate the foregoing, Plate 4.3 shows a rocky part of a forest, which rules out significant food production. The rocky surface of the forest can neither retain adequate water for support vegetation and crop growth. When converted into a farm, such is only a waste as illustrated by Plate 4.4 taken in Rwika area of Gachoka Division in May 2015.

Plate 4.4: Rocky part of a farm in Mbeti South Location, Gachoka Division, May 2015

The rocky part of a farm shown in Plate 4.4 can only support the growth of scanty vegetation that may not suffice for animal feed, let alone growth and maturation of food crop. In addition, the farmlands near this particular rocky area were also threatened by urban sprawl especially occasioned by the presence of Jeremiah Nyagah Technical Institute. This institution has and continues to attract learners from across the country. As

a result, the demand for accommodation facilities and generally the consequences of urbanization have led to the encroachment of physical infrastructure into farmlands. This minimizes the land available for farming and in effect may reduce the amount of food produced.

Back to Table 4.9, it is shown that in some areas that were sloppy, soil erosion worked to highly challenge dryland farming and hence a hindrance to dryland farming in the opinion of 12.67% of those interviewed. In some low-lying areas in the study area, water-logging was cited as an affront to dryland farming according to 10% of those interviewed.

Hence, during the rainy season, some farms that lie along river valleys become water-logged and hence unsuitable for farming. While the water-logged area may have sufficient crop nutrients, they may also be victims of acidification particularly where water has no outlets. Hence, the water-logged area may remain unutilized, which in effect reduces the acreage of land available for crop production. In the end, this negatively affects food production, which trickles up to household and community food security. Although water-logging was not very highly pronounced in the study area, Plate 4.5 taken on a farm in Gachoka Division in April 2016 is illustrative.

Plate 4.5: Waterlogged farm in Rwika, Gachoka Division, April 2016

Plate 4.5 which shows a water-logged part of a farm in Gachoka Division looks like a river, but it is actually swampy. This is due to its relative position in a river valley, hence its ability to collect rain water leading to water-logging. This is a challenge to dryland farming in the sense that the water eats into farmland as a result reducing the acreage of land available for crop production. While such water would have been used alternatively for horticulture, many of the farmers were unable to utilise it partly for lack of skills, information and financial resources.

Despite these natural weather challenges, local farmers are still able to eke a living through dryland farming. While this livelihood activity came with the challenges, local farmers and the population in general seemed conscious of their environment and hence suggested several strategies for enhancing dryland farming as presented in Table 4.10. During the study, it was noted that many farmers employed a combination of strategies to

combat climatic challenges to dryland farming and hence gave multiple responses as shown in Table 4.10.

Table 4.10: Strategies to counter climatic challenges to dryland farming

Strategy	**Frequency**	**% of sample**	**% of total responses**
Providing irrigation water	122	81.33	24.11
Sinking/constructing boreholes	99	66	19.57
Sowing/planting on time	63	42	12.45
Intensive soil conservation	46	30.67	9.09
Pump water from Tana River	36	24	7.11
Engaging in business	33	22	6.52
Intensify extension education	29	19.33	5.73
Growing drought tolerant crops	23	15.33	4.55
Increase livestock herds	21	14	4.15
Diversification into poultry	18	12	3.56
Provide miraa seedlings	16	10.67	3.16
Total responses	**506**		**100**

As shown in Table 4.10, 81.33% of those interviewed were of the opinion that if irrigation water was provided, this would go a long way in revitalizing dryland farming and by extension food production and household food security. Given that the study area partly borders Tana River, this was expected given that residents were prohibited from using the water in Kamburu HydroElectric Power (HEP) Dam (one of the 7 Folks Hydro-Electric Power Project along River Tana). Indeed, 24% of those interviewed suggested that water needed to be pumped from River Tana and into a reservoir from where it can be channelled into their farms using ducts.

It is also shown in Table 4.10 that 66% of the respondents believed that sinking boreholes would work to improve farming even as timely sowing of seeds and intensive soil conservation were cited as possible strategies to revitalize dryland farming by 42% and 30.67% respectively. In addition, 22% and 19.33% of other respondents were of the opinion that engaging in business and intensifying extension education would work to increase local food production and reduce household food insecurity.

4.5.2. Opportunities for Dryland Farming

Despite the challenges and strategies for revitalized dryland farming discussed in the proceeding paragraphs, the study sought to determine the various opportunities for dryland farming in the study area and the results are as shown in Table 4.11. It was noted that to each particular farmer there were various opportunities available in dryland farming and therefore they gave multiple responses as presented in Table 4.11.

Table 4.11: Opportunities for dryland farming

Opportunity	**Frequency of responses**	**% of sample**	**% of total responses**
Providing irrigation water	132	88	25.48
Sinking boreholes	129	86	24.90
Enough/plenty of land	96	64	18.53
Growing cash crops	53	35.33	10.23
Credit facilities	36	24	6.95
Availability of Extension Officers	29	19.33	5.60
Training farmers	26	17.33	5.02
Drought tolerant crops	17	11.33	3.28
Total responses	**518**		**99.99**

As shown in Table 4.11, 88% of those interviewed were of the opinion that provision of irrigation water was important given that water was available in the adjacent River Tana,

while sinking boreholes was seen by 86% of the respondents as vital for increasing the amount of water available for crop farming. While the former may not necessarily be feasible in the short-term given that the Tana River waters were purely for the production of Hydro-Electric energy, the latter was driven by the understanding that some local farmers had sunk boreholes that they were already using for horticulture and the growing of *miraa*.

Another opportunity cited by 64% of those interviewed was the availability of land that could be annexed to increase the acreage under crops to increase food production. Nonetheless, even where cropland acreage were relatively large, soil infertility and aridity stood in the way of farmers benefiting from economies of scale in farming. This is compounded by the invasion of farmlands by *muguka*, effectively decreasing the land acreage under food crops. It was also determined that 35.33% of those interviewed believed that local farmers should shift from food crop production to the production of cash crops including green grammes and *miraa*. It was the opinion of 24% of the respondents that provision of credit for farming would work well to increase food production and assuage household food insecurity.

In addition as attested by Table 4.11, the availability of FAEOs was seen as an important opportunity by 19.33% of those interviewed. This is more so given that the officers provided answers to farmers' queries although the interaction between the two was not optimal. Related to the availability of FAEOs was the training to farmers by these officers which in the opinion of 17.33% of those interviewed was seen as an important

opportunity that could be utilized to help farmers gain vital food production knowledge and skills. Against expectations, only 11.33% of farmers cited the growth of drought tolerant crops as an opportunity to revitalize dryland farming in the study area as attested by data in Table 4.11. This is understandable given that the attitude of many local farmers regarding the growth of labour intensive but drought tolerant crops as captured in focus group discussions.

With regard to the growth of drought tolerant crops, it was determined that, while farmers had the information, the will to do so was wanting given the intensity of labour required. During a focus group discussion with a women farmers' group and while acknowledging the foregoing, a 47 year old farmer in Kiritiri Division was of the opinion that investing in drought tolerant crops was a luxury that local farmers could not afford. For her, the output from such investment was not worth the intensity of labour and hence better be avoided for less labour intensive crops like maize and beans.

With such attitude and conviction towards drought tolerant crops, it is expected that many would not cite it as an important opportunity for improved food production in the study area. This however was highly recommended by FAEOs despite the resistance mounted by local farmers

4.5. Gender Division of Labour and Dryland Farming

Food production generally requires the investment of financial and physical resources and the concerted efforts of family members and other stakeholders within the agricultural

sector. Short of the foregoing, food production is expected to be below optimum, which will have negative implications on household food security and wellbeing. Data from the study and especially regarding gender division of labor in food production activities shows its physical production is principally the work of women, assisted by their children and hired farm hands.

On the other hand, the work of men as far as farming activities are concerned in the study area remained largely directive and supervisory. This is attested by the data presented in Table 4.12, a clear testament and depiction of the gender division of labour far as farming was concerned in the study area. The food production activities in question may include but not limited to preparation of farms, sowing seeds, weeding, tending crops, mulching, harvesting and threshing of grains. Sometimes women supplemented their labor with those of their fellow women especially in cases of illness or where such women were organized into self-help groups.

Table 4.12: Gender division of farm labour and related activities

Role	Male	Female	Both
Land ownership	√		
Farm work supervision	√		
Sowing seeds		√	
Weeding			√
Mulching		√	
Daily tending of crops		√	
Digging terraces	√		
Harvesting		√	
Threshing grains		√	
Decision on what to plant	√		
Fertilizer application			√

Pesticide application	√		
Marketing produce			√
Growing *miraa*	√		
Marketing *miraa*	√		

Where men were indicated as having taken leading roles, in many instances, their work remained logistical and supervisory in nature. As far as conservation activities were concerned, evidence shows that this took a gender dimension as well with women taking the bulk of these activities especially where heavy financial investment was not involved. From Table 4.12, there is an apparent gender division of labour regarding farm work, making it appear that men are the most burdened given that they have more farm duties than their women counterparts.

These roles include decision making on what to be planted, digging terraces, farm work supervision and both fertilizer and pesticide application as well as growing and sale of *miraa*. Women on the other hand are depicted as being more involved in daily tending of crops, marketing farm produce except *miraa*, weeding, harvesting, threshing grains and sowing seeds. Figure 4.3 shows the gender share of work, in which a casual look implies that men undertake more farm work than their women counterparts.

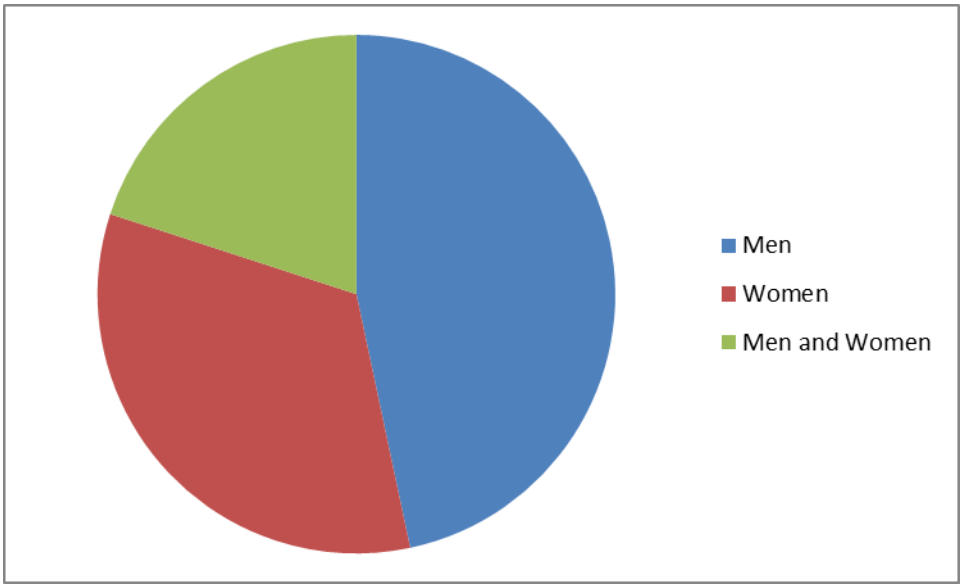


Figure 4.3: Gender share of farm roles

Whereas Figure 4.3 shows that men undertake more activities than their women counterparts, a closer scrutiny of the fifteen farm roles (Table 4.12) shows that the duties performed by women are not only routine, but also repetitive and requires their physical presence in the farms. These include daily tending of crops including guarding against wild animals, sowing seeds, mulching, harvesting, threshing of grains, fertilizer application and marketing of farm produce. On the other hand, men roles were more or less occasional and some did not necessarily require their physical presence either at home or in the farms.

To illustrate the foregoing, a 57 year-old grassroots administrator in Gachoka Division, who is also a local resident, explained the scenario in the following words:

> *I do not have to be physically present at home to give instructions to my family as to which crop to be planted on which part of the farm, neither I have to physically show them the livestock that they should take to the market. A phone call would suffice to make my family execute my decisions. For example, when I was working away from*

> *home in the 1980s, I could simply write a letter to my wife before the onset of rainy season in which I would spell out what ought to be done and I did not expect any exceptions. Whether I am at home or not, I can and have always made binding decisions regarding any issue in my household including farming activities. By the way, men by their nature are expected to and do work like that everywhere you go*.
>
> 57 year-old grassroots administrator, Gachoka Division, February, 2016

It is notable that although there seems to have been a clear gender division of labour, it does not necessarily mean that men could not undertake some of the roles that are expected to be done by women. On the other hand, women in many cases observed undertook and continue to undertake some of the roles that are culturally assigned to men. For example, there are men who did weeding and threshing of grains, while some women as well took part in the harvesting and marketing of *miraa*. Thus, gender division of labour was not rigid given that exceptions were observed. Nevertheless, from the data it is clear that women did the bulk of farm work especially the tedious, manual, repetitive and generally work that required their physical presence. This partly explains why there was a more close contact between FAEOs and women as opposed to their men counterparts.

It is observed that women actually did most of the physical production of food in addition to other family welfare related chores. This may be interpreted to mean that food insecurity in the Mbeere drylands of Embu County could partly be explained by the less than optimum direct involvement of men in food production at the household level. While the foregoing may be the case, it should not be construed to mean that men were

inactive in food production; rather, their involvement was seen as less optimal and many times indirect.

While men did a few duties as far as farm work was concerned, their role generally remained supervisory, delegating the bulk of the tasks and related chores to women to execute and/or supervise. It needs to be pointed out that while the foregoing was generally the case, there were men who were actively involved in food production on their farms, especially those who did not have other livelihood engagements. Interestingly, many other men were very active in paid farm work in other households as opposed to their own. Nonetheless, in many cases where they were not directly and actively involved in food production in their farms, they were indirectly used to procuring farm inputs and labor from other households to help their families. A 48-year old male teacher who was also a farmer in Kiritiri Division explained during a key informant interview,

> *I am normally very actively involved in food production activities in my household given that this season (March/June 2016) alone I used about half of my salary to procure high breed maize seeds, fertilizer, paid for a tractor to plough my three and half (3.5) acre farm and hired a few casual laborers to help in sowing of seeds, weeding and application of pesticides. I expect to hire casual laborers when it comes to harvesting and threshing of maize. This is what I have been doing over the years because I take it as my responsibility. If we were to quantity the individual contributions that we make in food production as a family, I am likely to have done more single-handedly than the rest of the family members put together. Mark you this is likely to be the trend in many other families around here. In fact, for a family to succeed in food production there is indisputably the hand of a man. This should not however be taken to imply that women contributions are negligible in food production whatsoever, because we all have different but important roles to play in this endeavor. For example, my wife is*

> *very good at organizing how farming would be done. She is better in bargaining with casual workers-I can't match her on that!*
>
> 48 year-old male farmer/teacher, Kiritiri Division, June 2016

There was divided opinion among women regarding their contribution versus that of men in food production and related activities. While some were of the opinion that women did the bulk of food production activities, others opined that men invested more in this endeavor. The former group cited the tedious and time consuming activities that required their physical presence as far too much work as opposed to the roles men played. In a focus group discussion with women farmers in Kiritiri Division, a 36-year old participant while supporting the assertion that women do the bulk of farm work explained,

> *I have to wake up very early in the morning to start the domestic chores before thinking of the farm. Once I get in the farm at about 8.00am in the morning or thereabouts, sometimes it is dusk that will drive me home. Many times I have to forgo lunch particularly during week days when my children are in school. I have to do this repeatedly almost on a daily basis until I harvest the crop and then there is the threshing that comes with maize, cowpeas, green grammes and beans. All along my husband only sends money for some of the activities from Kericho. I am not complaining, but compare that versus his work and tell me sincerely who does the most farm work between the two of us.*
>
> 36 year-old female farmer, Kiritiri Division, June 2016

Those who held contrary opinion during the same focus group discussion argued that men undertook more farm work than did women, although most of the time indirectly. Indeed, as reported during the focus group discussion, there were women who by their own admission ostensibly did *nothing* as far as farm work was concerned. One of them, a 33-year old who was working with the Catholic Diocese of Embu revealed that for two years she had never visited one of their farms which she explained was located seven (7)

kilometers away from their home. She explained her work commitment as part of the reason but also said that farming was not one of her passions. Another focus group discussion participant, a 29-year old trained teacher who was a housewife explained her position as follows,

> *My husband gets involved in farming activities indirectly by providing the financial resources required, and I have to supervise all the activities done by hired farmhands. If supervision is work, then I do more than him but I am also alive to the fact that he has to work for the money. Imagine he will be going for peace keeping in Somalia starting next month. Just imagine how he has to earn his money through risking his life and many are men who go through the same experience. I think looking at the risks involved in his work, then I can says that he does much more farm work than I do. Honestly ladies let's give credit where it is due and stop giving unnecessary excuses. For those of us whose husbands are working elsewhere, do we expect them to come and get involved directly in sowing or weeding? Then what would be my role in farming honestly? That for me would be asking for too much from them.*
>
> 29 year-old female teacher/farmer, Kiritiri Division, June 2016

Flowing from the two verbatim quotations, it is clear that both men and women were involved in dryland farming, whether directly or indirectly. Apparently, it is beyond the scope of this study to quantify both financially and the man-hours spend by men and women in food production activities. This is particularly the case given that they played different, yet crucial and complementary roles to enhance the food security of their households.

When the foregoing happens, then household are assured of food security and welfare and the same is expected to be replicated at the community and national levels. Nonetheless, this may not necessarily be the case in all households as attested by field data. For example, there were cases reported of men who rarely took an active role in farming and

vice versa. In fact, direct observation during the October/December 2015 short rains can attests to the foregoing assertion. Direct observation in six (6) of the sampled households only found women engaged in farming assisted by either children, relatives, friends and hired hands.

4.6. Gender-Based Constraints and Opportunities for Dryland Farming

It is notable that climatic conditions play an important role in food production by determining the amount of soil moisture available for germination and development of crops. These weather conditions may come as either opportunities or constraints to effective food production. Natural weather notwithstanding, this study also investigated gender-based opportunities and constraints to dryland farming in the study area. While some of these opportunities and constraints were general in nature, some others were gender specific and therefore affected men and women differently in their efforts to revitalize food production.

4.6.1. Women-Specific Opportunities and Constraints

To understand dryland farming opportunities and challenges from the perspective of women, the study sought to determine the opportunities that were available to the 83 women interviewed in order for them to effectively get involved in food production activities. While most of the opportunities mentioned by those interviewed were related to financial resources and hence individual purchasing power, others were related to skills acquisition and the prevailing local gender relations. Nonetheless, all worked to pull down women investment and impact regarding dryland food production. An important

observation is that a single woman farmer had multiple opportunities for dryland farming and hence gave multiple responses as shown in Table 4.13.

Table 4.13: Women related opportunities for dryland farming

Opportunities	**Frequency of responses**	**% of sample**	**% of total responses**
Women Group Loan	55	66.26	30.22
Direct involvement in farming	46	55.42	25.27
Training on agricultural extension	31	37.35	17.03
Financial resources from MFIs	23	27.72	12.64
SACCO loan	12	14.46	6.59
Access to loans using payslip	6	7.23	3.30
Ability to afford farming inputs	5	6.92	2.75
Making crop acreage decisions	4	4.82	2.20
Total	**182**		**100**

As shown in Table 4.13, an important opportunity for investment in dryland farming was financial resources from the local women groups in the form of loan. This was used to procure agricultural inputs such as fertilizers, pesticides and seeds as well as labour. Women group loans as a source of finance and hence an opportunity for women to engage in dryland farming was cited by 66.26% of the 83 women who were interviewed during the study. In addition, 55.42% of the women interviewed opined that their direct involvement in dryland farming was another opportunity to invest their energies and skills in this activity. In some instances women did determine what and how acreage to be put on crops according to their family food needs.

Another important opportunity for dryland farming as cited by 37.35% of the women interviewed was the training opportunities availed by the Ministry of Agriculture (MoA)

through which they gained vital knowledge and skills in crop farming and related activities. These other activities include fertilizer and pesticide application and post-harvest handling of farm produce. Notably, women had more interaction with FAEOs than their men counterparts, perhaps because the former were more directly involved in farming activities than the latter. It was also evident that the level of farming knowledge and skills was relatively higher among women than their men counterparts.

Another source of financial resources was the various Micro Finance Institutions (MFIs) especially the Kenya Women Finance Trust (KWFT), which advanced loans to women through their organized groups. As such, 27.72% of those interviewed said that they normally got loans from MFIs, although not all the money was invested in farming activities given the various challenges associated with dryland farming especially the unpredictable weather conditions. To many local farmers, investing financial resources in farming was perhaps the greatest risk due to the largely unpredictable precipitation. Thus loans could be utilized to purchase livestock, poultry and the payment of school children fees among other needs.

Some of the women interviewed were members of local Savings and Credit Cooperative Societies (SACCOS) from where they could get loans at a repayment rate of 1%. Hence, 14.46% of those interviewed mentioned that they were in a position to get loans from SACCOs, while 7.23% of others reported that since they were in salaried employment they could get loans from banks using their employment status as collateral security. Some 6.92% of those interviewed had the ability to afford farm inputs including

fertilizers and pesticides and hence looked at this as an opportunity which they used to produce food for their households.

Despite the gender relations that were largely tilted in favour of men, 4.82% of the women interviewed reported that they had decision-making power over what to be grown on the family farm and the acreage to be put under cultivation. All the foregoing were the opportunities available to women for engagement in dryland farming activities in the study area. It can however be opined that these were not enough to exploit women full potentials in dryland farming. For example, that only 4.82% were able to make binding food production decisions mean that the opinions of 95% of others did not significantly count in this endeavour, which represents a lost opportunity. It can therefore be concluded that the lost opportunity is partly responsible for below potential household food production, which partly explains local food insecurity.

Conversely, the study also determined the challenges that stood in the way of women effective involved in dryland farming. Through interviewing the 83 women who were part of this study, several of these challenges were identified. It is noted that just like the case of opportunities, the challenges were related to ownership of resources and the prevailing gender relations including the relative decision making power in farming. It is acknowledged that to each respondent, there were several constraints that stood in their way and hence the question elicited multiple responses as presented in Table 4.14.

Table 4.14: Women related constraints for dryland farming

Constraints	Frequency of responses	% of sample	% of total responses
Household chores	74	89.15	20.11
Cost of farm inputs	71	85.54	19.29
Inadequate financial resources	66	79.52	17.93
Farm-based decision making power	53	63.86	14.40
Cost of farm labour	44	53.01	11.96
Land ownership rights	39	46.99	10.60
Inability to control produce appropriation	21	25.30	5.71
Total responses	**368**		**100**

Table 4.14 indicates that, of the 83 women interviewed 89.15% opined that household chores stood in their way of effective involvement in dryland farming given that they took much of their time that would otherwise be invested in food production. Cost of farm inputs such as fertilizer and pesticides in the midst of inadequate financial resources were cited by 85.54% and 79.52% of those interviewed respectively as a hindrance to investment dryland farming.

The study also determined that inability to make binding farm-based decisions (63.86%) and cost of farm labour (53.01%) did work to pull back women efforts towards effective food production. Some 46.99% of others cited land ownership rights as a setback to their efforts in this endeavour, implying that women potentials were not fully utilized given that their opinions and decisions mattered little. Moreover, 25.30% of others said that given that most of the times they could not control farm produce appropriation especially financial returns to their households, this acted to demoralize them as far as farming was concerned. This partly explains the food security status in the study area and other areas with similar climatic conditions and gender relations.

It is therefore clear that women were disadvantaged in food production activities in the sense that they were largely unable to successfully challenge men decisions as to the acreage of land to be put under cultivation. Such decisions rested with men and therefore women in most cases were mere implementers. With regard to the foregoing, a 49 year-old woman farmer in Mbeti South Location, Gachoka Division explained her predicament with regard to decision-making in the following words during a focus group discussion,

> *My family has about twelve (12) acres of land in one parcel out of which seven (7) are set aside for grazing and the rest is farmland. In March 2013, my husband made the decision to put three (3) acres of the farmland into muguka[1] (miraa) growing leaving the family to grow food crops on a two (2) acre portion of the family land. This can hardly feed the family and leave any produce for the market. It was a surprise but since he is the head of the household, I had to execute his decision. Even if he puts the rest of the land on other uses, I will have to go by his decision. As women we are used to men making unilateral decisions even when the decision is clearly to the disadvantage of family food production and welfare. You can be sure this is not unique to my family, it happens all over this area.*
>
> 49 year-old female farmer, Gachoka Division, October 2015

Conversely, men did not see any problem with unilateral decision making regarding farming activities. As was revealed in other key informant interviews and focus group discussions the foregoing was not unique to this particular household, but a reality that many other women have had to learn to live with. For example, during a key informant interview a 57 year-old grassroots administrator in Gachoka Division, who was a local resident summed it that he was the final decision maker in his household. The resultant disempowerment of women in matters arming implies lost opportunity in the utilization

[1] a variant of miraa grown in the Mbeere drylands of Embu County

of human labour and below potential food production even in the midst of favourable weather conditions. Hence, weather conditions were not therefore sufficient to ensure maximum production of food. Rather, gender relations and related practices played and continue to play an equally significant role in food production.

4.6.2. Men-Specific Opportunities and Constraints

Regarding challenges and opportunities for men in dryland farming, it is apparent that men comparative to women had an upper hand in these activities given the opportunities available to them. As such, this study sought to determine the opportunities available to men in dryland food production. Like their women counterparts, men had several opportunities to utilize in dryland farming and therefore gave multiple responses as presented in Table 4.15.

Table 4.15: Men related opportunities in dryland farming

Opportunities	**Frequency of responses**	**% of sample**	**% of total responses**
Ability to make binding decisions	64	95.52	19.05
Land ownership status	62	92.53	18.45
Land use decisions	60	89.55	17.86
Ability to make crop acreage decisions	56	83.50	16.67
SACCO loan access	45	67.16	13.39
Credit access using land title deed	38	56.71	11.31
Credit access using payslip	11	16.41	3.27
Total responses	**336**		**100**

As shown in Table 4.15, there were several opportunities available to men for them to actively and effectively engage in dryland farming. For examples, 95.52% of the 67 men who were interviewed said that they were able to make general decisions that were

binding to their households. Indeed, 89.55% of those interviewed were of the opinion that they made land use decisions without consulting their family members, while 83.50% of others said that they had the ability to make crop acreage decisions without reference to any of their family members. These are very crucial decisions that may determine the quantity and type of crops to be grown by a household and hence its food security status.

More important, land ownership as found out by the study was largely tilted in favour of men and this increased their ability to make binding decisions in their households. Hence, 92.53% of the men interviewed during this study looked at land ownership as an opportunity for them to actively engage in dryland farming activities. This is because they were in a position to make decisions comparative to their women counterparts.

Perhaps because most land in the study area has been officially surveyed and land title deeds issued, 56.71% of those interviewed said that they were in a position to use title deeds to access loans from banks and SACCOs, the proceeds of which they could invest in farming. However, key informant interviews revealed that much of the loan proceeds were not necessarily used in farming but other activities including luxuries and payment of school fees for their children. As this study found out, while eight (8) women owned land in the study area, all men interviewed owned land. Land ownership here is defined to mean not only physical access but also the ability to appropriate and dispose of the same at will. Further, ownership also includes the authority to determine land use including crop growing, grazing or whether to leave it uncultivated.

It was the opinion of 67.16% of the men who were interviewed that they had the ability to access SACCO loans, while 16.41% of them reported that they were in paid employment and were in a position to use their formal job statuses to access bank and MFIs loans. However, while some had access to loans, many looked at loans as a risk given that getting a loan did not guarantee adequate precipitation. This is looked at from the vantage point that farmers in the study area largely practiced rain-fed agriculture, making it a highly risky investment given the unpredictability of rainfall patterns.

Despite the foregoing opportunities available to men to engage in dryland farming, they faced some challenges although compared to women, their challenges were seeming self-imposed due to gender socialization, while other were occupation-related in nature. As such, the study sought to determine the constraints standing in the way of men effective involvement in farming, which are presented in Table 4.16.

Table 4.16: Men-related constraints for dryland farming

Constraints	**Frequency of responses**	**% of sample**	**% of total responses**
Male chauvinism	51	76.12	29.82
Loan ceiling	42	62.68	24.56
Engagement in other livelihood activities	36	53.73	21.05
Indirect involvement in farming	27	40.29	15.79
Land size	15	22.38	8.77
Total responses	**171**		**99.99**

As shown in Table 4.16, 76.12% of men who were interviewed gave challenges that are related to gender socialization and hence can be reduced to male chauvinism. Some of the excuses that were given as challenges to active and direct engagement in dryland farming

activities included the belief that farm work is feminine and therefore men should be remotely involved. There was also the feeling that men's role in farming ought to be supervisory in nature. The foregoing can be deemed as male chauvinism that worked to reduce the potential of a family to produce food.

It was also determined that 62.68% of the men interviewed said that when it comes to access to loans, credit ceiling either from SACCOs or banks was a limiting factors so that they were unable to invest as they may prefer. In addition, some of the men interviewed (53.7%) were of the view that since they were engaged in other livelihood activities outside their homes, they were not in a position to actively and directly engage in farming activities. 40.29% of others still, opined that they were indirectly involved in farming, which was corroborated by use of both focus group discussions and key informant interviews.

Regarding the challenges men faced in dryland farming and as shown in Table 4.16, 22.38% of those interviewed cited land sizes as a significant impediment to their involvement. This is more so given that their attempts to increase food production was thwarted by the diminishing land sizes resulting from land sub-division across generations. The small land sizes were in the midst of other factors such as inadequate precipitation, aridity, inability to afford agricultural inputs and poor choice of crops. The crosspollination of these challenges worked to minimize productivity per unit piece of land and hence partly explains local food production and security status.

4.7. Crop Varieties, Acreage and Output

Agriculture in the form of small-scale food and cash-crop production is the major economic activity in the Mbeere drylands with notable crop varieties being maize, beans, sorghum, millet and peas. Others include cowpeas, green grammes, black peas (*njavi*) cassava, pigeon peas, sweet potatoes, and citrus fruits such as mangoes, oranges, watermelon and papaya. There were also few cases in some households that were involved in the cultivation of tobacco for local consumption.

As for many other locally grown crops, the output varied significantly by acreage and financial investment so that those who invested more harvested more per unit piece of land, if weather conditions were favourable. For example, those who used fertilizer and other agro-chemicals and sowed on time among other activities, harvested on average twelve (12) 90kg bags of maize per acre. The same case may apply for beans while many other crops, the quantification may be difficult due to seasonal variations as determined by weather patterns.

Generally, many farmers could not recall from memory the quantity of harvest especially for crops that are grown for family subsistence. Nevertheless, on average as found out by the study the harvest per acre for each crop was modest compared to what Kenya Agricultural and Livestock Research Organization (KARLO) recommends. For example, according to an Agricultural Officer at KARLO-Embu[2], it is expected that in the drylands of Mbeere 15 bags (90kg) of maize should be harvested in one acre of land, all conditions

[2] in a personal communication

held constant. However, the crop yield per acre for the various crops are as presented in Table 4.17.

Table 4.17: Average crop harvest per acre of land

Crop	Average yield per acre (in 90kg units)
Maize	7
Beans	6
Cowpeas	9
Green grammes	4
Pigeon peas	3
Docilis lablab	1
Millet	1
Sorghum	1
Finger millet	0.5

As shown in Table 4.17, when precipitation is favourable, local farmers in the study area on average harvested about seven (7) 90kg bags of maize, six (6) 90kg bags of beans, nine (9) 90kg bags of cowpeas and four (4) 90kg bags of green grammes. It is instructive to point out that the foregoing crops were the most commonly cultivated in the study area. In addition, and as shown in Table 4.17, other crops grown although to very common were pigeon peas, *docilis lablab* (*njavi*), millet, sorghum, finger millet, and sweet potatoes. Plate 4.6 shows a farmer displaying green beans in Kiritiri Division in December 2015.

Plate 4.6: A farmer in Kiritiri Division Displays green beans, December 2015

In addition to the foregoing crops, the study sought to determine from the perspective of both the local farmers and the FAEOs whether there were other crops suitable for the local climatic conditions. It was determined that a variety of other crops were viable locally, yet were either grown in significantly small scale or were not grown at all. These included sisal, cotton, pigeon peas, French beans, cassava, tobacco, papaya, Irish potatoes, watermelon, *docilis lablab* and vegetable such as kales and tomatoes. As a result, the study sought to determine the reasons why local farmers were reluctant to grown these crops despite their viability given the local weather conditions. It was determined that farmers had several reasons why they avoided the cultivation of certain crops, which are presented in Table 4.18.

Table 4.18: Reasons why farmers did not grow some locally viable crops

Reason	**Frequency of responses**	**% of sample**	**% of total responses**
Does not provide food immediately	98	72.59	13.78
Lack of information about the crops	89	65.92	12.52
Inadequate precipitation	84	62.22	11.81
Limited reach by FAEOs	78	57.78	10.97
Skills and knowledge to grow crops	77	57.04	10.83
Poor market for produce	72	53.33	10.13
Poverty	67	49.63	9.42
Ignorance/neglect	56	41.48	7.88
Land scarcity/size	34	25.18	4.78
Intensity of labour required	34	25.18	4.78
Laziness	12	8.89	1.69
Total responses	**711**		**98.59**

As shown in Table 4.18, the farmers who were interviewed had various reasons why they gave little attention to such crops on a small scale or were not growing them at all. As a result, 72.6% of the farmers interviewed opined that since some of those crops did not provide food immediately, this worked as a reason for them not to grow them. 65.9% of others cited lack of information to grow the crops, while 57.8% of others had poor reach by FAEOs as the reasons why they could not grow these crops. With regard to poor reach by FAEOs, one of them in

Gachoka Division acknowledged it thus,

> *Our contact with the farmers is minimal given the decrease in the extension budget by the government even as the poverty status of many farmers, most of whom are peasants, works against their ability to cost-share the extension expenses with the government. Due to this farmers are yet to embrace and institutionalize the demand-driven style of agricultural extension service provision and normally accuse us of laxity, while in real sense our ability to reach them is limited by resources. Without adequate funding I do not want to believe there is more we can do than we are already doing. Even with the devolution of agricultural extension to the counties,*

> *which was expected to be accompanied by resources, the resource challenges still persist.*
>
> A FAEO in Gachoka Division June 2015

While emphasizing the minimal contact between farmers and FAEOs, for information dissemination, a 63 year-old male farmer in Kiritiri Division explained that they had to rely on *old information* that was given to them in the late 1970s and 80s and/or experience gained over the years. It is acknowledged that frequent contact between the farmers and the FAEOs is important in enhancing crop and livestock production activities. As shown in Table 4.18, 62.22% and 57.04% of those interviewed cited inadequate precipitation and inadequate knowledge and skills respectively as the challenges standing on their way to grow the crops. It is notable that the latter has a relationship to the poor reach by FAEOs and hence inadequate information on the part of the farmers.

A reason cited by 53.33% of those interviewed was poor market for some of the crops especially for cotton and sisal. In regard to market access, a key informant, 93-year old male farmer in Muraru area of Gachoka Division narrated how both sisal and cotton growing in the study area in the 1960s and 70s collapsed in the hands of middlemen in the following narrative:

> *Cotton was introduced to Mbeere by the Kamba ethnic group and the Indians, the latter who eventually build a ginnery at Kitui Town. We used to sell our cotton to the Kitui Ginnery and these people used to pay us very well and timely. With time, our Kirinyaga brothers constructed a ginnery at Mwea (in Kirinyaga County) and enticed us with very attractive prices. We reasoned that given the good prices and the fact that Mwea was nearer than Kitui, we resorted with one accord to do business with the Mwea Ginnery. With time and against our expectations, the Mwea Ginnery*

> *proprietor started not only delaying payments, but also significantly reduced the price. At one point we delivered cotton and we were never paid at all and the ginnery closed down. We were very disillusioned and one after the other we abandoned cotton growing for other crops-that is the sad story of how we abandoned cotton growing in this area.*
>
> 93 year-old male farmer in Muraru, Gachoka Division, March 2017

According to the same key informant whose information was corroborated by another key informant, 85-year old female farmer,

> *Sisal was introduced to the Mbeere drylands by some local people who had gone to work in Thika Sisal estates during the colonial era. They then connected us with the factory in Thika and like their cotton counterparts in Mwea, they started with very attractive prices and our sisal produce was paid upon delivery. Later, the Thika proprietor started using middlemen to collect the sisal instead of collecting directly from the farmers as was the case when they started. Then the delay in payments started, we were so discouraged that we significantly reduced sisal acreage only leaving little for local consumption in the form of making baskets and weaving of ropes. In fact, when the delays in payment started, the history of cotton growing was very fresh and it worked to make us cautious. Nowadays you rarely see people plant sisal in this area although those who have that experience are now becoming fewer.*
>
> 93 year-old male farmer in Muraru, Gachoka Division, March 2017

Back to Table 4.18, it is clearly shown that 49.63% of those interviewed cited poverty as a reason why some people may not grow the crops. This is perhaps related to another 25.18% who were of the opinion that the intensity of labour required dissuaded the poor from growing crops such as millet and sorghum. These are particularly labour intensive crops that require physical presence in the farms as they ripen to keep birds away. Moreover, 44.48% of others cited ignorance and neglect as part of the reason not to grow some of these crops.

While ignorance and neglect were cited as reasons that worked against the growth of some of those crops, it is also possible that market and ability to immediately provide food to the family also worked in dissuading farmers from growing them. The study also found out that, 25.18% of those interviewed opined that some of those crops competed for land acreage with crops that provided food immediately to the family. As such, crops such as sisal, cotton, millet and sorghum had to be foregone by the farmers. Moreover, 8.89% of the farmers interviewed most of who were above 50 years of age, cited laziness among the youthful farmers as a reason why some of the viable crops were not grown locally particularly the labour intensive ones such as millet and sorghum.

4.7.1. Miraa Growing and its Implications on Food Security

A significant cash crop which has lately predominated farms in the Mbeere dryland particularly in the study area is a *miraa* (khat) variant, locally known as *Muguka.* With the introduction of *muguka*, food crop land has decreased with obvious decrease in the amount of food produced. This is against unreliable and unpredictable weather patterns, poor farming technology and other anthropogenic activities that further degrade the environment. This partly explains the perennial food insecurity in the Mbeere drylands of Embu County especially when the intersection of gender, land ownership, decision making power and weather patterns conspire to decrease food production. This may mean decreased household and community food security, which in turn affects other local development indicators to the great disadvantage of community welfare.

However, it was pointed out in key informant interviews and focus group discussions that the introduction of *muguka* has also worked to improve food security for some households in the study area given the income accruing from the crop. Indeed, reports were numerous in which many families' level of income and hence purchasing power was greatly increased with the introduction of the crop. That notwithstanding, the new cash crop was more of a curse than a blessing to other households. This is in the sense that its cultivation and marketing was largely vested in men, some of who appropriated returns in ways that were counterproductive to household welfare. In particular, *muguka* cultivation came with increased alcoholism as reported by many respondents during this study.

As the new crop took away part of the food crop farmland, climate change and its vagaries heightened challenges of food production even as income from the crop was utilized casually including in the taking of liquor. A FAEO who has worked in the area for close to seven (7) years opined that *increasing muguka acreage apparently came with increased income and drunkenness among many farmers to the detriment of family welfare*. He also reported of increased promiscuity and neglect of families by their breadwinners with increased income from *muguka*.

With regard to *muguka* cultivation and the appropriation of the returns from the crops, a 54 year old local administrator in Gachoka Division was very explicit in equally condemning the introduction of the crop as well as in pointing out the benefits that came

with its cultivation. With regard to the benefits of the introduction of the crop, the administrator explained,

> *Before the introduction of the crop a few years ago, if one owned a mabati-roofed house, one had to be working with the government or having a very good business. One of the impacts of the introduction of the crop is these iron-sheet roofed and stone-walled permanent houses you can see around. Actually, when the crop was introduced I can give testimony of several children who have been educated by their parents up to the university level. Cases are also many in which some people who had no livestock can now stand tall and talk of their livestock among other assets and achievements. It would be wrong for me to say that the crop has not substantially transformed livelihoods for the better in this area.*
> 54 year-old male local administrator, Gachoka Division, July 2016

The foregoing sentiments are a clear testament of the benefits that came with the introduction of the crop in the study area. With the use of survey and the focus group discussions, the latter with local residents and FAEOs the sentiments of the local administrators were corroborated. On the other hand and with regard to *miraa* (*muguka*) cultivation, the administrator's sentiments painted a picture of a crop that should not have been introduced in the area in the first place in the following words,

> *The introduction of this crop has made our work most difficult of all times. There are so many domestic problems that are presented to me including domestic violence especially against women, drunkenness and alcoholism, family neglect, alcohol-related assault and immorality. I can confidently report to you that what is reported in this office concerning these issues is just but a tip of the iceberg and they all have their genesis in the devil in this crop (miraa). This society is rotten to the core, to the extent that morality and decorum has been thrown out of the window. There are so many drug addicts and school dropouts among the young men such that you really do not know who will marry our daughters. The number of bars has increased many-folds in this area with the introduction of this crop. The destruction that this crop will leave*

> *here in the next few years cannot be fathomed out. If you like, this crop is a double-edged sword sir.*
> 54 year-old male local administrator, Gachoka Division, July 2016

This presents a moral dilemma as to whether the crop ought to be cultivated or not. While *miraa* is not a food crop, it has been demonstrated that its returns can be used for the procurement of food and assuage household food insecurity. Its only problem is the identified social evils it is associated with, which work to disadvantage some families as far as food production and household food security are concerned. With proper utilization though, families can be assured of their daily bread among other needs.

An interesting feature of this crop is that it is not possible to conclusively quantify its output and value. This is mainly because there are few socio-economic studies regarding the crop in terms of the quantity produced and value. This can partly be explained by the fact that its daily harvesting and marketing as well as seasonal variation in its price and quantity harvested makes it difficult for its output and value to be quantified. Moreover, it may escape both the county and central government tax bracket for reasons related to the time of harvesting and marketing. Many farmers harvest it either in the evening or very early in the morning so that between 6.00am and around 7.30am the farmer has already handed over the produce to middlemen and brokers. These in turn transport it to different parts of the county.

4.8. Gender and Post-Harvest Practices

4.8.1. Food Storage

To assuage household food insecurity, the actual production of food is important but not enough given that how the food is handled and used thereafter becomes very important. This is because in some instances it may be appropriated in ways that may be counterproductive to household and community food security. This is important bearing in mind that dryland farming is dependent on natural weather patterns and if these are not favorable, then it would be difficult for food security to be ensured.

Generally, dryland farming takes place against erratic and unreliable precipitation patterns and hence the need for safe custody of food in anticipation of low seasons. This means that due to the seasonality and unreliability of rainfall in the Mbeere drylands, it is out of question to grow food throughout the year. This in essence implies that the food produced need to be stored in a way that it is safe from post-harvest pests and adverse weather elements. As it emerged, there were both traditional and modern ways of food storage as practiced by local residents.

Traditional Food Storage Methods

From key informant interviews especially among the elderly, it was determined that the traditional Ambeere household had an elaborate grain storage scheme that had a gender dimension. A key informant as far as farming and food storage, 87 year-old male farmer in Kiritiri Division narrated the gendered way in which food was stored in the traditional

set up. He explained that food storage was done at two levels that were determined by whether the grains were threshed on not.

According to the key informant, before grains were threshed, they were normally stored in traditional granaries (cribs). The traditional granary was a circular structure made up of interwoven sticks in such a way that the structure was well aerated. Its roof was grass-thatched and the thatch made very thick so as not to allow rainwater to reach the stored grains. The storage partition of the granary was elevated about one (1) meter above the ground and supported by wood posts so that there was an empty space below the storage partition. This space could be used as an enclosure for goats, sheep or calves. An improved granary is constructed in the same way but it may be rectangular in shape and its walls made of industrially-processed wood and iron sheet-roofed. A traditional Ambeere granary (local, *Ikumbi*) is as shown in Plate 4.7.

Plate 4.7: Traditional Ambeere granary (*ikumbi)*, Mutuobare area, March 2016

After threshing the grains were normally preserved with special anti-pest herbs and kitchen ash in specially made containers locally known as *Mururu* (pl. *Miruru*). The Ambeere *Mururu* is the equivalent of Akamba *Kiinga*, a grains container made up of interlocked sticks that are normally interwoven with grass to form a gourd-like container with a small mouth at the top, from where threshed grains were put in. *Miruru* are of different sizes, with some big enough to accommodate about a ton of threshed grain especially millet, sorghum and cowpeas (these are the traditionally widely grown crops in the Mbeere drylands). According to the key informant, which was corroborated by other key informants, the traditional food storage schemes are however fading away in favor of the modern methods.

Plate 4.8 shows a man doing final touches on a traditional Ambeere grains storage container (*mururu*).

Plate 4.8: Traditional Ambeere *mururu*, Mutuobare area, March 2016

The head of the household, usually the man, made several *Miruru* and depending on the quantity of harvest each season, one or several *Miruru* were designated for him, while the rest were designated as belonging to his wife or wives for the purpose of storing grains. Once the grains were in the *miruru*, there was an elaborate procedure for their use. Grains from the *miruru* designated as belonging to wife or wives were to be used first under the watchful eye of the head of the household or any male relative (the food overseer). Once the wives' *miruru* were exhausted of grains, those belonging to the man were then put into use.

The overseer had an obligation to occasionally monitor food use in terms of how much was used and how much was available for family use. The overseer therefore estimated how much food was left to take the family to the next harvest and wherever necessary, he could decree how much was to be consumed each day depending on the size of his family and its food needs. The aim here as explained by key informants was to ensure that the food available lasted the dry season and that more was left to be used as sowing seeds in the subsequent season. It was also meant to ensure that there was no food wastage whatsoever in order to guard against household level hunger.

In addition, the grains set aside as seeds for planting in the next season were not stored together with the ones meant for family consumption. Such, especially maize were stored in two different ways: one, they were hanged above the kitchen fireplace so that they gathered soot, which prevented destruction by post-harvest pests such as weevils and rodents. Two, they were threshed, mixed with some special herbs locally known as *mutaa* and kitchen ash and stored in gourds until the next onset of rainfall when they were prepared ready for sowing.

Regarding food for family consumption, while stored in the *miruru,* food was preserved and hence protected from post-harvest pests through several traditional methods which in some cases, were combined to make the food last for several years. In particular, food was preserved using kitchen ash and *mutaa* that acted as post-harvest pest repellants. To prevent any foreign elements from entering the *mururu* storing the grains, its mouth was sealed with cow dung and occasionally opened to check for possible pest intrusion.

More important, 86 year-old female farmer in Kiritiri Division explained that the *mururu* was specially made such that it was aerated and kept in an empty space but the area specially fenced and a roof put on top to keep domestic animals and rainwater at bay. Thus preserved and stored, key informants concurred that grains could last ten (10) rainy seasons (five calendar years given that each calendar year had two rainy seasons in Mbeere drylands). However, as reported by key informants, this indigenous knowledge is slowly being lost and from the estimation of the 86 year-old key informant, it was just a matter of time and the information will completely disappear. She put it,

> *This technology is not written anywhere and even if you write now I am not sure the present generation is interested in it-it has lost touch with tradition completely. My age-mates are in their sunset years and after they are gone, the knowledge will disappear as well. It has particularly been destroyed by the white man's way of grain preservation (use of agro-pesticides) but who knows what those chemicals are made of? Who knows what harm they can cause to our bodies? At least we are sure the herbs, ash and cow dung are not harmful to us. I am sure by the time my children are my age, this knowledge will be nowhere*
>
> 86 year old female farmer in Kiritiri Division, September 2015

With the use of *Mururu*, households were able to store food so that it was not destroyed by pests and ensure it was available during the slack season to safeguard family members from starvation.

Modern Food Storage Methods

There were differences in terms of the way food was handled once it left the farm and sometimes it was sold straightaway on-farm. However, this latter practice was uncommon and where it was practiced, it was restricted to green maize, watermelon and some other

fruits and vegetables. With regard to how food was stored, many households used the traditional cribs, improved granaries and stores for their grains, which have led to many cases of aflatoxin reported in the county as FAEOs concurred. While some used anti-weevil pesticides for their stored farm produce, others used traditional methods such as application of kitchen ash and *mutaa*. The latter particularly led to post-harvest grain losses, partly affecting household food availability and security.

The modern ways of food storage also involved the use of nylon and sisal-made sacks in which food was mixed with anti-pest chemicals and kept in stores that may or may not be extensions of the main living house in a homestead. Unfortunately and as reported by key informants, the modern methods of food storage have not been foolproof against post-harvest crop pests and food thus stored is unexpected to last long compared to the traditional methods in the thinking of the relatively elderly key informants.

Nonetheless, FAEOs concurred that pests may have become more adapted and resistant to food storage chemicals with time and hence rendering stored food more vulnerable to destruction. As a result, many farmers as it was determined opted to dispose of a large part of their farm produce to avoid losses occasioned by destruction by weevils, rodents and other post-harvest pests. So how was food produce disposed of for example through sale and who was in-charge of which activity? We now turn to discuss how food produce was marketed, who was in charge of doing what and how the proceeds from the sale were appropriated.

From a gender perspective, men largely determined how much to be stored for occasional family consumption. Men therefore played significant roles in this activity as a 57 year-old administrator in Gachoka Division, who was also a local resident explained,

> *As a man and therefore the head of my household I have the overall responsibility of ensuring that my family has adequate food throughout the year and there are no excuses whatsoever when my family goes without food. Even though I have a government salary, it is not enough to meet all family needs and as such, I have to invest a lot in farming. So, it goes without saying that I must be actively involved on how food is handled and used after it has been harvested. It is my sole responsibility to provide the appropriate chemicals to prevent destruction of the food by weevils in the store-she can do the bit concerning application of the pesticides. Once I am done with my role, the rest I delegate to her and I expect exceptional execution from her. I also have a particular role to give instructions as to what happens to the food in the store and I don't have to physically inspect the family food store to know how much is left each day-this is the responsibility of my wife to brief me occasionally to ensure I am informed before food is depleted. This gives me adequate time to explore other alternatives to supplement the food available in the family store. I personally determine the quantity and type of food to be sold in case of bumper harvest to meet other family needs. Although this is not a unilateral decision, most of the time the final decision remains mine given that I am also the one to replenish the family food store in future. Sir, if you leave some responsibilities to your wife, she will inform you when the last kilogram of maize is in the cooking pot and the panic that follows may make your blood pressure rise!*
>
> 57 year-old Administrator, Gachoka Division, July 2016

The preceding quotation underscores the importance of decision making as far as post-harvest food handling and practices are concerned. It also brings out an important gender dimension that may work for or against household food security. This is in the sense that given that making the final decision is largely vested on men while the actual work is done by women, then it can work against family food security if men made decision that

were irresponsible such as disposing of all the farm produce. However, when they make responsible decision, this can assuage household food insecurity and improve its members' welfare. In addition, given that the physical work of post-harvest food handling is largely that of women, then it follows that their role in this endeavor is very crucial to ensure household food security.

The foregoing observation is corroborated by data from both key informant interviews and focus group discussions as attested by a 54 year-old female farmer during a focus group discussion in Kiritiri Division. She explained,

> *Women by their nature are very mindful of family livelihood and in particular, the food available for family subsistence. Personally and as I expect other women to do, I religiously guard the family food store to ensure that grain weevils are kept at bay through use of appropriate storage chemicals. One cannot compromise the family subsistence, not when you have invested a lot of time and labor on it. When there is food in the store, we are all happy as a family and children feel a sense of security. Therefore I must execute my duty as the family resources caretaker including livestock and food in the store.*
>
> 54 year-old female farmer, Kiritiri Division, June 2016

From the foregoing exposition, it is clear that post-harvest practices are very important to ensure household food security and welfare. In addition, there is an apparent but unofficial gender-based division of labor and specialization as far as post-harvest handling of food crops is concerned. From the data collected it also emerged that while the gender-based roles are important to ensure food availability and security at the household level, this can only be assured if they are executed bearing in mind the future welfare of the family.

Thus the existence of the division of labor is not adequate to ensure household food security, the efficient execution of the roles is expected to alleviate household food security a great deal. It would though seem that the decisions men make regarding post-harvest handing of food is of paramount importance to assure food security to their households. This assertion is based on the observation that it is the decisions made by men from which women took cue and therefore determining the latter's subsequent action.

4.8.2. Farm Produce Marketing

Farm produce especially after a bumper harvest was disposed of even as some was set aside and stored for family use. In this regard, marketing of farm produce had several outlets through which local farmers could sell their farm produce most of which were run by grain merchants. Interestingly, while there is a National Cereals and Produce Board (NCPB) depot at Majimbo in Embu Town, many local farmers interviewed did not seem to trust this government facility with their produce. In particular, many respondents argued that the NCPB prices were far below what middlemen offered.

According to the interviewed farmers, unlike middlemen who collected farm produce particularly cereals on-farm, NCPB required farmers to transport their produce to its depot in Embu Town. This meant an additional cost in the form of transport on the part of the farmer. A combination of these factors dissuaded farmers from marketing their food produce through NCPB, preferring middlemen to the public facility. It ought to be emphasized that in very few instances in the recent past has there been bumper harvest in

the study area to warrant massive disposal of farm produce. Some of the marketing activities and attendant responsibilities are presented in Table 4.19.

Table 4.19: Marketing of farm produce

	Responsibility	
Marketing activity	**Men**	**Women**
Decision making on sale of produce	√	
Actual sale of farm produce	√	√
Determination of point of sale	√	
Determination of quantity for sale	√	
Appropriation of sale returns	√	√

Table 4.19 indicates that as far as marketing of farm produce was concerned there was gender division of labor although these were not entirely rigid. Nonetheless, it is shown that there were activities over which men had exclusive decision making authority, although the actual decisions may have been executed by their spouses. For example, as shown in Table 4.19, men had exclusive authority in three (3) major areas: whether food produce was to be sold, where or who to sell it to and determination of the quantity to be disposed of.

On the other hand, Table 4.19 also shows that women never made decisions and implemented them without consulting their spouses. Indeed, they were only involved in the actual sale of the produce and the planning and appropriation of returns, the two of which they are shown to have made joint decisions with their spouses. It needs to be pointed out that post-harvest food handling also includes apportioning the quantity of food to be taken to the market if any and the responsibility in terms of who does the

marketing. Moreover, it is also important to understand how returns to such food sales are appropriated within the household and how it affects household food security.

The proceeds from sale of food produce were appropriated in different ways including accessing health care, paying children school fees, household items, leisure activities and the purchase of others foods and animal feeds. These other foods include but not limited to rice, vegetables and fruits, meat and wheat flour. While in many of the reported cases there was joint decision making regarding appropriation of farm produce sale proceeds as shown in Table 4.19, there were also cases in which men made unilateral decisions. These to some extend did not work to enhance household food security. This is so given that the decisions were not only dictatorial, but the proceeds were appropriated in ways that were counterproductive to household food security.

On their part, while women made decision concerning the purchase of household items from the food sale returns such as other foods, soap, clothes for children and such other items, men on the other hand made decisions such as paying school fees for children. In general, women had a lot of say in the purchase of items whose budget was relatively smaller comparative to their men counterparts. It would seem that the budgets which women had control over were limited to a certain ceiling beyond which men made the rest of the decisions. Overall, post-harvest food handling and its appropriation has been seen to be gendered although some decisions were taken after spousal consultation. Nonetheless, the overall decision-making was the preserve of the head of the household, who were largely men or male relatives.

CHAPTER FIVE

DISCUSSION OF THE RESULTS

5.1. Gender, Resource Ownership and Food Production

In Kenya there are glaring gender inequalities as a result of unequal access to critical decision making opportunities, education and training, credit facilities, job opportunities, markets and other productive resources. These differences are largely a consequence of law, whether customary or common and socialization especially with regard to the ownership of land and other productive assets. This is despite the existence of constitutional and legal provisions of equality and gender mainstreaming across all sectors. Indeed the Constitution of Kenya read together with the Kenya National Land Policy of 2009 are very clear on land ownership across gender.

Despite the provisions, gender disparities in land ownership and control are glaring, to the disadvantage of women not only in Mbeere drylands but also the rest of the country. This has direct implications on land management, utilization and by extension food production, which in turn affects household food security. As data attests, women are relatively disadvantaged as compared to men in food production in the study area. Such a disadvantaged position has various consequences not only on the welfare of women, but also the society at large. These consequences include but not limited to food insecurity, hunger, malnutrition, starvation and the deepening of poverty.

As a result, this study found out that of the 83 women who were interviewed only eight (8) (9.64%) women owned land in the study area. While some of the women who owned

land had bought it using proceeds from white collar engagement and titles were issued in their names, others owned land by virtue of having being widowed. On the other hand, all men interviewed owned land, if we define ownership to mean not only physical access but also the ability to appropriate and dispose of the same at will. Additionally, ownership may also be defined to include the authority to determine how land would be utilized including for farming. Furthermore, land ownership was also used to mean who was officially deemed as possessing the land by virtue of their names appearing on its title deed.

Above all, customary practices were also used to determine land ownership in which case there was concurrence in focus group discussions and key informant interviews that men were the actual land owners by virtue of being heads of their households, whether titled or otherwise. During a focus group discussion with a local women farmers' group in Kiritiri Division, it was revealed that men were the sole determinants of how land would be utilized and therefore determined the acreage of land to be set aside for various uses including farming and grazing.

For the one hundred and fifty (150) households in which respondents were interviewed, there was no single case of co-ownership of land between the spouses. Indeed, some local administrators and FAEOs particularly those from the local community concurred with the community members that men were the actual land owners. This was particularly the case when traditional lenses and parameters were used to define land ownership. This left

men with the sole responsibility of making decisions on land use and attendant appropriation of resources therein.

From the exposition it is clear that cultural dictates are overbearing on matters of property ownership in general and land in particular. As such, women seem disadvantaged to the extent that there was also fear among them that men in their social milieu could connive to dispossess them of their property in the event of widowhood. Consequently, it is not foreseeable that such a person may significantly invest in the land to make it more productive in terms of food production in the midst of shaky ownership.

It can therefore be deduced that in such circumstances, optimal utilization of the land may be hard to be realized. In effect, this means below optimum food production and the possibility of household level hunger and general food insecurity. The long term overall consequence of this would be adverse effect on local and national development. This observation is made based on the thinking that when the food security status of a community is in jeopardy, development is also compromised.

It is acknowledged that ownership of resources including land gives an individual the confidence and authority to take care of the asset in a way that is both productive and sustainable. Resulting from a number of interviews among women regarding whether they ought to own land, opinion was divided. While a minority were of the opinion that they ought to own family land, interestingly more than half of the women interviewed believed that their husband’s ownership of land meant that they were co-owners. The rest

of the women respondents were non-committal and therefore did not give a response in this regard.

While many women did not feel disadvantaged due to their *landlessness*, it can be deduced that given that men had the sole authority and final say regarding land utilization, such may have partly affected dryland farming and food production in some way. This is in the sense that women could not make certain decisions without seeking the opinions of their spouses particularly regarding land utilization and in particular, the acreage to be put under food production. The inability to make such decisions worked to discourage women from investing more of their efforts in food production in anticipation of directions from their spouses. It is important to mention that decision delayed is tantamount to action delayed. In the case of food production, the result would be below optimum food production and increased food insecurity that work to delay development.

The foregoing was in the sense that women could not necessarily grow the crops which, through experience were known to be better placed to ensure household food security. In addition, in cases where this was possible and therefore practiced, determination of the acreage to be put on food crop to assuage household food insecurity was largely the preserve of men. This may have partly worked against food production and hence negatively affecting household and community food security.

Regarding the opinions of men with respect to women land ownership, the study revealed that a few men were willing and had actually apportioned land to their daughters and

sisters, especially single mothers. However, none of these cases reported women possession of land if we use land title deeds as a measure of ownership. In one case where a single mother had been allocated land, by her brother, it was revealed that her land size was not as big as those allocated to his sons. Interestingly the study found no case of any man who had or willing to allocate part of his land to his wife, by having her name on the title deed.

As such, it would seem that the legal provision on the rights of children of both genders to inherit property from their parents was alien to the local community. It was apparent that when land was allocated to women it was taken more as a philanthropic action than a legal or moral obligation. It needs to be pointed out that when women do not own land, it is also difficult for them to put effort and invest on it in line with their potentials. For example, they may not invest significantly in soil and water conservation activities and when they have to do so they may need to check over their shoulders in terms of their spouses' feelings, opinions and direction.

With such restrictions especially those related to culture, it is not expected that the level of food production would be optimal. As a result, it can be inferred that, the occasional food shortfalls that are responsible for food insecurity in the Mbeere drylands cannot be wholly blamed on natural weather conditions. Rather, human-induced factors including practices, actions and inactions are equally responsible and therefore counterproductive to food production. This is because women were disadvantaged as far as food production was concerned in the sense that they were largely unable to make binding decisions.

Such decisions would for example be in determining the acreage of land to be put under food crops or any other use for that matter. This is because, as the study revealed, women in most cases had land user and not owner rights, making them largely unable to make maximum use of the land for food production. Such decisions rested with men and therefore women in most cases were mere implementers. Indeed, the study found cases where men unilaterally reduced the acreage under food crops, opting for *miraa* cultivation.

The study revealed that the foregoing was a reality in the study area, which many other local household have had to learn to live with. Nonetheless, it was also revealed that in some households increased *miraa* cultivation meant increased household income and hence food security and welfare. That notwithstanding, the new cash crop was seen as a curse than a blessing to other households given that its cultivation and marketing was largely vested in men, some of who appropriated returns in ways that were counterproductive to household food security.

In particular and as the study revealed, *miraa* cultivation came with increased alcoholism, promiscuity, family neglect and domestic violence against women in many households in the study area, In a situation where the latter is the case, it is unexpected that households would increase their efforts in food production, in effect making them slide further into food insecurity and poor access to social services.

There were reported cases where with the introduction of *miraa*, land acreage under food crops had decreased with obvious decrease in the amount of food produced. This was against unreliable and unpredictable weather patterns in the midst of poor farming technology and other anthropogenic activities that further degrade the environment. The intersection of gender, land ownership, decision making power and weather patterns conspired to decrease food production and hence partly explaining food insecurity in the Mbeere drylands of Embu County. This in effect implies negative effect on development indicators including access to food itself, quality health care, education and information, all of which are proximate indicators of human welfare and national development. This is a clear testament of the advantages and disadvantages of *miraa* in the stud area, which poses a moral dilemma going forward.

5.2. Gender, Division of Labour and Dryland Farming

In most societies all over the world, tasks are assigned using several parameters including age, skill, gender and physical ability. None of these criteria is more pronounced in the assignment of duties and responsibilities than is gender. As such, in the study area, tasks and responsibilities were assigned with appeal to gender identity, although this was not rigid. It is observed that successful dryland farming requires effective investment in soil and water conservation activities. Hence on a gender perspective and regarding soil conservation activities, direct observation revealed that farms that were largely managed by women tended to be more prone to soil erosion particularly by water than those in which men took an active and direct role.

In other words, the study revealed that men did more soil conservation than their women counterparts. The reasons given for this were more economic than social in nature. For example, men comparative to women commanded more financial resources implying that they could deploy them in farming activities including soil conservation than the latter could. More important, that men owned land meant that they were able to make bindings decisions including those to do with soil conservation. According to this study, soil conservation activities especially those that required heavy manual work were the preserve of men.

However, an exception to this finding was observed in Rwika Location of Gachoka Division in which a farm specifically under the direct management of a man had been eroded by surface runoff leaving galleys created by surface run-off. In this particular farm in which the farmer had used a tractor for ploughing, the farm had been ploughed along as opposed to across contours. This made surface run-off leave galleys on the farm, which effectively minimized the ability of the soil to retain water for crop production. This however may be regarded as an isolated case and hence not part of the practice by local farmers.

From a gender perspective, it would therefore mean that women were more disadvantaged as opposed to their men counterparts regarding soil conservation activities. In this regard, female farmers argued that they had very little decision-making power not only regarding what land was to be used for, but also how soil was to be conserved. This is more so given that while all men (67) interviewed during the study owned land, only eight (8) out of the 83 women interviewed had the same advantage. Hence, skewed

division of labor in favor of men may have partly been perpetuated by the gender dimension of land ownership.

In addition, women farmers were disadvantaged with regard to soil conservation activities especially where financial resources were to be invested. Part of the problem here was that in many of the households surveyed, women were housewives without significant income for deployment in farming activities including soil conservation. Financial incapacity coupled with inability to make decisions meant that women were less empowered comparative to their men counterparts with regard to farming activities. This meant that the full potentials of women including decision making was not fully utilized in farming and hence partly explaining food insecurity in the study area.

In the opinion of women, soil conservation especially digging of terraces and cut-off drains was specifically and culturally meant for men to plan and execute, thus making many of the women largely disengaged from it. Indeed, key informants especially the elderly reasoned that culture had clear-cut roles and responsibilities for men and women. One of the roles of men was identified as making decision regarding soil conservation, especially where manual labor and financial investment were required. In particular, digging terraces was seen as a task beyond the ability of women, both physically and financially.

On their part, men did not expect women to be very active in soil and water conservation activities including digging of terraces and cut-off drains. Hence, it is clear that culture

with regard to division of labor is highly institutionalized and especially among the fairly elderly. More important, this kind of attitude implies that women are highly dependent on their men counterparts for certain decisions and execution of certain activities including those related to soil conservation.

By extension, this adversely affected dryland farming in the sense that this negative complementarity between men and women worked to dissuade women from participating in such important food production activities. It can hence be deduced that culture and in particular gender-based division of labor, have a direct impact on investment in farming activities generally and food production in particular. As a result, food security at both household and community levels is adversely affected, which in effect compromises national development in general.

In the context of aridity, farmers are expected to employ multiple methods of farming to maximize crop yields and the study area was not an exception. Consequently, in order to spread the risk of one crop failure amid aridity and largely unreliable precipitation patterns many farmers practiced intercropping. In this regard and from a gender perspective, it was observed that farms mainly under the direct care of women comparative to those under men exhibited more intercropping.

In extreme cases, about six (6) different crops were intercropped, which minimized yield per crop per unit piece of land in addition to making weeding and harvesting more complicated. For example, in a farm in Machang'a area of Kiritiri Division the following

crops were intercropped: maize, sorghum, cowpeas, pigeon peas, beans and green grammes. These were intercropped in a farm that had mango and orange trees and papaya on terraces. Incidentally, this farm was under the direct care of a woman.

While the intercropping was important in spreading the risks associated with one crop and minimizing soil water loss, it minimized yields per crop and hence making the harvest hardly enough for the household subsistence. On the other hand, farms especially manned by men registered less intercropping and in particular, portions of land under *miraa* cultivation had no other crops, except permanent trees like mango trees that were mainly on the farm edges or along terraces and cut-off drains.

With regard to agro-chemicals uptake, women farmers were the majority in the use of fertilizers, pesticides and food storage chemicals than their men counterparts. This was the case partly because many of the women interviewed were organized into groups that worked more closely with FAEOs as opposed to their male counterparts. Such made women access to farming information and inputs easier as opposed to men. Other activities such as mulching were also executed in a way that was gendered in nature. This was in the sense that among all the surveyed households, there was no case in which men were involved in mulching of food crops. Instead, men were more represented in mulching of *miraa* especially during the dry season. It is noted that *miraa* is a cash crop in the study area and as expected with cash crops elsewhere men played a prominent role in its production.

It was also noted that *miraa* production was more or less the purview of men as far as farming activities in the study area were concerned. This however does not necessarily mean that women were not involved in this activity, but rather according to the surveyed households, their involvement was not as pronounced as that of men. The notable involvement of men in *miraa* growing can be explained by the financial investment and return that go with the activity. Like elsewhere in the world, when crops become commercialized, their ownership is largely bestowed on men and *miraa* growing in Mbeere drylands was not an exception.

Generally, as far as direct farming activities were concerned there was significant involvement of women. This was the case largely because women were more actively involved and receptive of extension services provided by FAEOs. This was by way of being more involved in agricultural demonstration and training activities as opposed to their men counterparts. Indeed, it would seem that their comparatively higher involvement in farming and training activities gave them an edge as compared to men as far as farming know-how was concerned. However, despite women knowledge and skills in farming, these were not utilized to their full potential given that they were disadvantaged in matters land ownership and farm decision making and implementation. The foregoing implies a lost opportunity in dryland farming and food production and hence partly explaining local household food insecurity.

It was also observed that women largely got involved in farming activities that were repetitive and time-consuming such as sowing seeds, weeding, tending of crops, harvesting and threshing of grains. With the use of a gender calendar in Kiritiri Division,

it was determined that women, supported by children and in some instances hired farmhands, spend more man-hours in farms and related domestic activities than did their men counterparts. The unequal labor investment leaves a gap in dryland farming in general and food production in particular, which partly explains local household food insecurity. It is however noted that while some men may not have been directly involved in dryland farming activities, they were actively involved through their family members by way of providing resources for investment in farming activities.

It was also noted that while shifting cultivation as a practice was limited by scarcity of land, where it was practiced, it had a gender dimension. It should be noted that the Ambeere ethnic group, like many other communities in Kenya is patriarchal, meaning that men were the major decision-makers in most matters including farming activities. As heads of their respective households men had the discretion, and hence determined land use and more specifically whether to shift from one piece of land to another or leave it fallow.

Regarding the use of machinery in food production, there were several tools utilized in breaking the soil not only to ensure its aeration, but also allow water to percolate as a measure to conserve moisture. The tools used for this purpose ranged from hand hoes (jembe), machetes (pangas) mattocks, ox-drawn ploughs and tractors. The utilization of these tools was not only gender in nature, but also took a socio-economic shape. From a gender perspective, it was observed that women were more pronounced in the use of hand hoes and machetes for weeding and sowing seeds. On their part, men were more visible

when it came to the use of implements such as mattocks, ox-drawn ploughs and tractors. The latter it is noted required more physical labor, skills and resources to operate and/or supervise. Indeed, due to financial implications of tractor use, not many farmers utilized it for agricultural production in the study area.

It is important to note that although the collected data depicts a clear gender division of labour in the study area regarding farming, this does not necessarily mean that men could not undertake some of the roles that are expected to be done by women. On the other hand, it was observed that women undertook and continue to undertake some of the roles that are culturally assigned to men. For example, there are men who did weeding and threshing of grains, while some women as well took part in the cultivation, harvesting and marketing of *miraa*.

Thus, the allocation of duties was not rigid given that exceptions were observed in the study area. Nevertheless, field data shows that women did the bulk of farm work especially the tedious, manual, repetitive and generally work that required individual physical presence. This partly explains why there was more close contact between FAEOs and women farmers as opposed to their men counterparts in the study area. It is observed that women actually did most of the physical production of food in addition to other family welfare related chores. This may be interpreted to mean that the reported perennial food insecurity in the Mbeere drylands of Embu County could partly be explained by the seemingly less than optimum direct involvement of men in food production at the household level. While the foregoing may be the case, it should not be

construed to mean that men were inactive in food production; rather, their involvement was seen as less optimal and many times indirect as opposed to the direct involvement of women.

While men did a few duties as far as farm work was concerned, their role generally remained supervisory, delegating the bulk of the tasks and related chores to women to execute and/or supervise. Nonetheless, while the foregoing was generally the case, there are also men who were actively involved in food production on their farms, especially those who did not have other livelihood engagements. Interestingly, a good number of men were very active in paid farm work in other household's farms as opposed to their own. Nonetheless, in many cases where they were not directly and actively involved in food production in their farms, they were indirectly used to procuring farm inputs including labor from other households.

Flowing from the foregoing discussion and from the field data, it is clear that both men and women were involved in dryland farming, whether directly or indirectly. It was not be possible to quantify their individual contributions in this endeavor either monetarily or in terms of manhours spend in this study. This is particularly because they played different, yet crucial and complementary roles to enhance the food security status of their respective families.

Nonetheless, this complementarity was not the case in all households as attested by field data. For example, there were cases reported of men who rarely took an active role in

farming and vice versa. In fact, direct observation during the October/December 2015 short rainy season can attests to the foregoing assertion. Direct random observation in sixteen (16) of the sampled households only found women engaged in farming assisted by children, relatives and hired hands. This in essence implies less than potential food production, which partly explains household food insecurity in the study area.

5.3. Gender-Based Opportunities for Dryland Farming

It was part of this study to determine the gender-based opportunities available to local farmers to enable them effectively get involved in food production activities. It was observed that most of the opportunities available to local farmers for dryland farming were gendered in nature, with men having a clear advantage over women especially where of financial resources was concerned. While most of the opportunities mentioned by those interviewed were related to financial resources and hence individual purchasing power, others were related to skills acquisition and the prevailing local gender relations. As revealed by the study, most of the opportunities worked to pull down women investment and impact regarding dryland food production.

As the study found out, an important opportunity available to women for investment in dryland farming was financial resources from the local women groups in the form of loan. This was used to procure agricultural inputs such as fertilizers, pesticides, seeds and labour. Women group loans as a source of finance and hence an opportunity for women to engage in dryland farming was cited by more than half of the women interviewed during the study. This meant that loans from their organized groups were very important

for women. The study also found out that in only a few instances women were able to determine acreage under food crops. This was an important opportunity although its implementation as the study found out was hampered by the relatively lower decision making power of women as compared to men, the latter as heads of their households.

Another important opportunity for dryland farming as found out by the study and available to some women was the training opportunities availed by the FAEOs, through which they gained farming knowledge and skills. The farming skills include fertilizer and pesticide application and post-harvest handling of farm produce. Notably, women had more interaction with FAEOs than their men counterparts, perhaps because the former were more directly involved in farming activities than the latter.

It was also evident that the level of farming knowledge and skills was relatively higher among women than their men counterparts. This means that women comparative to men had an edge in farming skills and knowledge given their interaction with FAEOs. Nonetheless, the utilization of these skills and knowledge was below their potential given that in most cases men overruled their decisions. This acted as an impediment to food production and by extension affecting household food security.

Another source of financial resources was the various Micro Finance Institutions (MFIs), Saving and Credit Cooperative Societies (SACCOs) and women informal groups. In particular, the Kenya Women Finance Trust (KWFT) advanced loans to women through their organized groups. However, it should be noted that not all the money was invested in farming activities given the various challenges associated with it especially the

unpredictable weather conditions. To many local farmers, investing financial resources in farming was a risk given the erratic and unpredictable precipitation patterns. Thus loans could as well be utilized to purchase livestock, poultry and the payment of children school fees among other uses.

All the foregoing were the opportunities available to women for engagement in dryland farming activities in the study area. It can however be opined that these were not enough to exploit the full potential and energies of women in dryland farming. For example, that only about 5% of women were able to make binding food production decisions mean that the opinions of 95% of others did not significantly count in this endeavour. This represents a lost opportunity in dryland farming and hence an affront to household food security. It can therefore be concluded that the lost opportunity was partly responsible for below potential household food production, which in turn may partly explain local food insecurity indices.

While there were various opportunities that were available to women in the study area, it seems that men had an upper hand given the opportunities available to them comparative to those available to their women counterparts. As such, this study sought to determine the opportunities available to men in dryland food production. It was revealed that there were numerous opportunities available to them including land ownership status, ability to make land use and crop acreage decisions, access to SACCO and bank credit facilities and their employment status.

Indeed, land ownership as found out by the study was largely tilted in favour of men and this increased not only their ability to make binding land use decisions in their households, but could also use land title deeds to access loans from banks. These were however not readily available to women and therefore men had an advantage in this regard, meaning that the latter could and actually made decisions that women could not make especially due to the latter's land ownership status. The inability to make such decisions and execute them therefore stood in the way of women to effectively get involved in dryland farming activities.

On their part, while men had an advantage in this regard, this was not effectively utilized with regard to farming activities. This is because as the study found out, the credit facilities they accessed were not necessarily used in farming activities. The study however revealed that while many men could access loans, not all of them actually did so. This is because many local farmers looked at loans as a risk given that getting a loan did not guarantee adequate precipitation. This is looked at from the vantage point that farmers in the study area largely practiced rain-fed agriculture, making it a highly risky investment given the unpredictability of weather patterns.

5.4. Gender Based Constraints to Dryland Farming

Conversely, the study sought to identify the challenges that stood in the way of both men and women getting effectively involved in dryland farming. As far as women were concerned, the study found out that just like the case of opportunities, the challenges were related to economic empowerment and the prevailing gender relations including the

relative decision making power between men and women. As gender relations were concerned, the study found that women have had to contend with various challenges for their effective involvement in farming activities.

These included household nurturing and reproductive activities, farm-related decision making power, land ownership rights and inability to control produce appropriation were the major bottlenecks inhibiting women from effective involvement in dryland farming activities. This implied that women potentials were not fully utilized given that their opinions and decision were largely not binding and hence ineffective as would be expected. This is equal in effect to a forgone opportunity in dryland farming and hence below potential food production.

As far as economic empowerment was concerned, issues of inadequate financial resources, cost of farm-related inputs and farm labour were the major disadvantages that stood in the way of women getting more actively involved in dryland farming activities. A combination of these factors worked to pull down women efforts as far as farming activities were concerned, which represented a hindrance to their investment in food production. In addition, women remained largely unable to control the appropriation of income from food sale, which acted to demoralize them as far as dryland farming activities were concerned. The foregoing is expected to partly explain the food security status in the study area and other comparable areas.

It is therefore inferred that women were disadvantaged as far as food production was concerned in the sense that they were largely unable to successfully challenge men

decisions as to the acreage of land to be put under food crops or any other use for that matter. Such decisions rested with men and therefore women in most cases remained implementers. On their part, men did not see any problem with unilateral decision making regarding farming activities.

As was revealed by the study, especially key informant and focus group participants such was rampant in the study area, a reality that many women have had to learn to live with. This leads to disempowerment on the part of women in matters farming, implying a lost opportunity in the utilization of human resource and hence below potential food production. It also meant that gender relations and related practices played and continues to play a significant role in food production activities in the study area.

On the other hand, despite the opportunities available to men for effective engagement in dryland farming, they also faced some challenges. Compared to women through, men faced challenges that were ostensibly resulting from gender role socialization, while others were occupation related. The men interviewed presented challenges that can as well be summed up as male chauvinism and hence related to gender socialization including the belief that farm work was feminine. This is mere male chauvinism and only worked to reduce the potential of a family to produce food, with the net effect of food scarcity and possible household level hunger.

Other challenges included credit ceilings imposed by banks and other financial institutions, land sizes, all which acted as hindrances to their investment potential. In addition, engagement in other livelihood activities especially away from their homes was

a challenge to men in the sense that they were unable to actively and directly get involved in farming. In particular, men's attempt to increase acreage under cultivation was thwarted by the diminishing land sizes resulting from subsequent sub-division generation after the other. The diminishing land sizes were compounded by other factors such as inadequate precipitation, aridity and poor choice of crops. The crosspollination of these challenges worked to minimize productivity per unit piece of land and hence could partly explain local food production and security status.

5.5. Gender Division of Labour and Food Security

From the succeeding discussion, it is clear that gender relations and especially the division of labour in farming activities had an important bearing on food production at the household level in the study area. In particular, gender division of labour was a significant impediment to food production in the study area, which can also be concluded for other areas with similar sociocultural and economic characteristics. Flowing from this finding, it important to discuss how gender division of labour and participation in farming activities affected household food security.

It is already observed that there were several challenges that stood in the way of men and women as far as food production was concerned and therefore affecting their respective fortitude and drive to shield their families from food poverty. What role do these challenges play with regard to household food security and human welfare in general? To answer this question, it is important to look at some of these gender-based challenges to

dryland farming and their respective implications on household food security. It is from such information that appropriate conclusions and recommendations have been arrived at.

The study findings attest to the fact that women were largely disadvantaged in terms of decision making regarding cropping in their own farms. This state of affairs affected their motivation to invest and exploit their full potential in food production. As a result, the limited effort they invested in food production essentially meant that less food was and continues to be produced than otherwise would be if their contributions and potentials were invested. As such, it can be argued that the failure to utilize their full potentials meant household food insecurity in the sense that while their contributions were important in this endeavour, they were frustrated by cultural dictates of patriarchy and skewed gender relations and compounded by unfavourable weather patterns.

Therefore, the opinions and efforts of women in food production did not count as much as they ought to. Less food to households as a result of below optimal production essentially implies household food insecurity in the study area. On the other hand, it is expected that when their efforts are incorporated and count as part of the food production decision making, the amount of food produced will be increased many folds. This would ensure that food is not only available and adequate for household level consumption, but also for sale to meet other family needs. Again, this may not necessarily be achieved in the midst of unpredictable and unreliable weather patterns. Nonetheless, variable weather patterns were not entirely to blame for below potential food production in the study area.

In addition, it has been established that in many cases men made unilateral decisions regarding crops to be grown and the land acreage be set aside and put under food crop production. At face value the foregoing seems to disadvantage women in the short run, but further analysis shows that in the long run it inconveniences the whole community and the country by way of having food deficits that are known to affect development in various ways. This is because household level hunger and poverty partially contributes to national poverty indices.

As such, unilateral decision making and execution by either spouse implies less investment in farming, reduced food to the household, a precursor to food insecurity at the household as well as community levels. This trickles up to affect national development in the sense that when the basic needs of a people are unmet, national development is compromised to a great extent. How for example can a country attain the goals of universal access to education for a hungry population?

Related to the foregoing, is the land ownership structure that largely favours men who are afforded the opportunity to access credit using it. Women were in a way disadvantaged in this regard given that having land usufruct rights was not enough to motivate them to invest in the land and effectively increase food production. This means due to such disadvantages, women were expected to spare their efforts in food production, which in essence implies less food was produced and hence food insecurity at the household level.

When the foregoing food production challenges combine, the net result is decreased household food production against a rising population. When the foregoing cross-

pollinates with the high rates of unemployment and underemployment in Kenya in general and the rural areas in particular, dependency ratio is expected to significantly rise. In the dryland areas such as the Mbeere in Embu County, where dependency ratio is already high, such scenario is likely to make it worse so. The resultant food insecurity is therefore expected to negatively affect the social fabric with cumulative magnitude. The bottom-line is that gender relations with regard to food production activities have a negative impact on household food security and human welfare not just in the study area, but also across the country.

Food production generally requires the investment of financial and physical resources as well as concerted efforts of family members and other stakeholders within the agricultural sector such as FAEOs. Short of the foregoing, the food produced is expected to be below optimum, which will have negative implications on household food security and family wellbeing. Data from the study and especially regarding gender division of labor in food production activities shows its physical production is principally the work of women assisted by their children and farm hands.

On the other hand, the work of men as far as food production activities are concerned remained largely supervisory. The food production activities in question may include but not limited to preparation of farms, sowing seeds, weeding, tending crops, mulching, harvesting and threshing of grains. Sometimes women supplemented their labor with those of their fellow women especially in cases of illness or where such women were organized into self-help groups, formally or otherwise.

It needs to be pointed out that there were men who were actively involved in food production on their farms, especially those who did not have other livelihood engagements. Moreover, men were indirectly used to procuring farm inputs as well as labor from other households to help their families. Nonetheless, less than optimal investment in farming activities especially where men labor is seen as partly lost means less than potential food production, a recipe for household food poverty. In principle this affects other development indices such as access to quality health care, education and psychological wellbeing.

5.6. Synthesis

The data adduced in this study has brought to the fore several issues regarding gender, dryland farming and household food security in the Mbeere drylands of Embu County. It is acknowledged that the findings of this study are also applicable to many other areas with similar climatic and socio-cultural and economic conditions. In particular, the study has revealed that land ownership is a very important resource for defining one's livelihood, dignity and confidence. For example, it is on land that man generates his subsistence including farming and hence its possession is an important engine for social mobility.

It is also noted that land ownership is an important determinant for food production and household as well as community food security and welfare. Moreover, ownership of land and its appropriation determines the level of development of a community and the country at large given that it is the source of basic needs. In the appropriation of land and

especially for farming in the study area and perhaps elsewhere, there is an elaborate gender division of labor.

It is acknowledged that gender relations especially division of labor have an important bearing on livelihood activities including dryland farming and therefore an impact on household food security. Thus anthropogenic activities affected dryland farming and therefore household as well as community food security and welfare in the study area. These included but not limited to the gender division of labor, poor farming technology, below average uptake of agricultural inputs, poor timing of sowing and crop tending and largely ineffective contact between the farmers and FAEOs.

Data from this study has also provided evidence to show how men and women involved themselves in farming activities and how it affected food production as well as household and community food security. For example, it was determined that ownership of land was an important aspect of food production given that ownership motivated farmers to invest meaningfully not only in soil conservation but also water harvesting activities that are important to enhance crop yields and by extension food security at the household level.

The study also determined that crop growing took a gender perspective in the sense that cash crop production was largely the purview of men as women were more pronounced in the production of food crops. In particular, women were more visible in the production of food crops that were especially meant for family subsistence. With regard to post-harvest food practices, the study also established that it largely took a gender perspective,

in which men played largely indirect roles while the work of women was direct, physical and hands-on.

In the midst of the gender based division of labour are gendered opportunities in farming dryland that need to be exploited to their full potential. When and if these opportunities are utilized to produce food, it is expected that households will be able to sustain themselves and leave some food for the market. Then, the community will be in a position to meet its basic needs and move up the needs ladder in the thinking of Abraham Maslow. When the foregoing is achieved, national development will be revitalized as households and the nation at large gears towards the peak of development. The opportunities notwithstanding, natural weather stands as a significant impediment to dryland farming in the study area.

On the other hand, gender-based constraints also existed, which to some degree compromised the ability of households to produce enough food for themselves and the community at large. When this is the case, food production is negatively affected, which in turn affects the quantity and quality of food available to a household, leading to household level hunger. Nonetheless, it is important to look at these constraints closely and rework them with the aim of converting them into opportunities so that they do not have to stand in the way of dryland food production.

Drawing from the data adduced by this study, it is generally concluded that gender has an important bearing on food production and household food security in the study area. As a

result, this affects food production which in turn affects household as well as community welfare and national development in general. The likely result of the foregoing chain of adversities is that they trickle up to the national level, affecting its social fabric and perhaps leading to social evils such as negative civic engagement including conflict. This is based on the reasoning that any major conflict in society has its genesis on livelihood resources including food.

CHAPTER SIX

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

6.1. Preamble

The aim of undertaking this study was to determine the intersection of gender division of labour, food production and household food security in the Mbeere drylands of Embu County. In particular, the study had the objectives of determining the nature of household division of labour and the identification of the gender-based constraints to and opportunities for dryland farming. Once this was established, the next step was to determine how the relationship between gender division of labour in food production activities impacted on household food security status. It would be later discussed how the foregoing may trickle up to the community and the national level.

It was expected that from these findings scientific conclusions would be drawn and appropriate recommendations suggested for effective revitalization of dryland farming activities in the study area. In turn, this is expected to partly assuage local household food insecurity. The revitalization of food production and hence the improvement of household food security indices are in turn expected to trickle up to the community and national levels not only to scale down food poverty indices, but also stimulate national development. Accordingly, in this chapter data-based conclusions are reached and attendant recommendations made with regard to gender relations in dryland farming in the study area.

6.2. Conclusions and Recommendations

6.2.1. For Policy Makers

From the data adduced from various sources using different data collection techniques, several conclusions can be made. While many factors combine to determine food production and food security, inadequate access to and control of land and related resources by women in the Mbeere drylands is significant. These are compounded by unfavourable weather conditions, which largely work to demotivate local farmers from full potential investment in farming activities. In addition, it was clear from data that the potential of the Mbeere drylands for food production is higher than normally thought and that it is yet to be fully tapped. This is because even in seasons of adequate precipitation, there are notable cases of farmers who put little effort to take advantage of the farming windfall that the heavy rains bring.

It is expected that, if the potential of dryland farming and the attendant benefits are fully tapped, this can make the study area food self-sufficient. In addition, that there is more that local farmers need to do to augment food production, increase incomes and alleviate food insecurity cannot be gainsaid. Consequently and given the environmental and cultural milieu on which land is utilized, measures need to be taken to augment dryland farming and alleviate food insecurity in the Mbeere drylands of Embu County. Concerted efforts towards agriculture extension education are recommended.

It would seem that the agriculture sector was devolved to counties when they were not resource ready. As such, the single most important challenge to FAEOs in the field was

the inadequacy of resources to facilitate them to serve farmers effectively. As a result, it is recommended that the government ought to increase both financial and human resources in the Ministry of Agriculture to enhance farmer reach. This would ensure that there is adequate human resources for better interaction with the farmers. It is also recommended that the government increases the budgetary allocation to the Ministry of Agriculture to ease FAEOs extension work. The two are expected to partly bridge the human and material resources gaps and hence reach as many farmers with agricultural extension services as possible.

The intensification of farmer-extension officer interaction will be more effective in enhancing farmer skills and determining farmer needs and hence increased food production. With this in place, it is expected that household food insecurity will be lessened even with the growing population. This argument is based on the understanding that household food security is basically the precursor to local as well as national development and human welfare. It is therefore recommended that FAEOs intensify agricultural extension with an emphasis on men. This is important given that field data shows that men had the least knowledge in farming activities compared to women. Gender parity in agricultural extension training and dissemination of information is likely to be transformed into more food production and enhanced food security.

Literature on extension education has shown that farmers and adults in general are more at ease when theory is married with practice particularly in an area that is of interest to them. This implies that the agricultural extension information must marry with farmer food security needs for better uptake. To ensure the internalization and

institutionalization of agricultural extension education information, it is suggested that the Ministry of Agriculture in collaboration with the County Government of Embu provide resources to increase the number of demonstration farms in the study area. Such farms would be used as Farmers' Field Schools (FFSs) and hence act as farming information dissemination centres.

The aforementioned demonstration farms are expected to go a long way in making farmers appreciate the importance of soil conservation, water harvesting, intercropping and other related dryland farming practices. Once these are institutionalized by local farmers and cascaded to their farms under the guidance of FAEOs, it is expected that crop yields would be increased many-folds. This works well as part of the strategy to alleviate food insecurity at the household and community levels.

Basic to the foregoing intervention is that any extension activities must mainstream gender so that the contributions of men and women and other stakeholders are incorporated. A mistake that has for a long time been made by both policy makers and implementers is ignoring gender concerns or assuming that when women or men are mentioned, that is tantamount to mainstreaming gender in development. This calls for graduation from theory to practice so that gender is made to actually matter in food production activities. Indeed, it should be emphasized that no meaningful food production is achievable in the absence of gender mainstreaming.

The study determined that women as opposed to men were the ones who largely patronize agricultural extension education programmes. This means women comparative to men were more knowledgeable and hence empowered in matters agricultural production in the study area. This is particularly the case given that men largely ignored such training mounted by FAEOs. As a result, it is recommended that strategies need to be put in place to attract more men in these training and field demonstration programmes so that they can benefit from the same information in equal measure with their women counterparts. It is necessary for both men and women to benefit from agricultural extension training and information dissemination programmes regarding food production including post-harvest handling. This is expected to go a long way to revitalize food production and prevent post-harvest losses.

Kenya is generally classified as a water-scarce country, and the drylands have water deficits that are generally above the national average, which is partly responsible for below optimum food production and attendant food insecurity in the drylands of the country. This observation points to the need to institute and intensify efforts at revitalizing water harvesting and conservation activities in the study area. While these efforts are necessary to harvest and conserve water in the midst of scarcity, the way they are implemented is more important. As such, it is recommended that gender mainstreaming in this endeavour must not be optional if sustainability is expected.

It was observed that many farmers have left farms unprotected from soil erosion either by surface run-off or wind. Indeed, the extent of farm neglect is so glaring that it can rightly be inferred that most of the rain water is largely drained into streams and rivers. This has

the triple disadvantage of increasing soil erosion, reducing soil moisture content and depleting soil of nutrients. The foregoing is partly due to the fact that local farmers rarely dig terraces and cut-off drains in their farms.

In addition, most farms are tree-bare and as such making water retention largely out of the question. Hence, water flows into streams and eventually into larger water bodies to the disadvantage of farmland. It is suggested that FAEOs need to go an extra mile and intensify efforts towards agricultural extension education specifically on soil conservation and water harvesting activities. Such would be undertaken through imparting knowledge on the importance of digging of terraces and cut-off drains on both farms and forests to arrest soil erosion and minimize the speed of surface run-off. This would have the triple advantage of retaining water, preventing soil erosion and minimizing soil nutrient loss, all of which are important factors for effective food production.

It is important to look at gender division of labour bearing in mind that when one gender is disempowered in food production information, then half of the society is disempowered. As such, strategies need to be put in place to empower men in this regard while revitalizing and providing opportunities for women to take full advantage of the wealth of information they already have. The foregoing should not just be limited to food production activities, rather it should go beyond it to include post-harvest decision making and action. When such constraints are converted into opportunities, it is expected that households will be food secure.

There was disconnect between climate change and the ability of local farmers to adapt accordingly. Hence, despite the observable adverse effects of climate change, there is little the farmers seem to have changed to accommodate them. For example, with decreasing rainfall amounts over the years and continued growing of crops in the same units of land, conservation activities seem to be largely the same. Based on this information, it is recommended that conservation activities need to be intensified while mainstreaming gender in the same in order to ensure active and effective participation of both men and women.

Moreover, shifting cultivation is still practiced with little value-addition into the land for example through digging of terraces and application of other inputs to increase food yields. Hence, it is recommended that agricultural extension education on such issues should be intensified. Such activities should perhaps give more emphasis to women who are more directly involved in farming activities in the study area than their male counterparts. However, in order to achieve long term sustainable decisions and impacts, there ought to be a strategic direct and plan to mainstream gender as a strategy for improve food production.

Given the apparent neglect of drought-tolerant crops by local farmers, it is recommended that more effort and resources need to be committed and invested in extension work to augment information flow to the farmers regarding choice of crops that are suited to the local weather conditions. An important intervention strategy may require extension education for farmers to change attitude towards drought tolerant but labour intensive

crops as opposed to less labour intensive crops whose viability to local weather conditions is questionable.

An important hindrance to women effective involvement in farming activities was the question of land ownership that is tilted in favour of men. This made women largely unable to make binding land use decisions. Although this is embedded in culture, there is need for policy makers to explore the possibilities of co-ownership of land so that decisions may perhaps be made jointly between men and women. This is important to give say to women regarding farming activities, a possible way of ensuring hybrid farming decisions are made

6.2.2. For Farmers and the General Community

It was observed that there are food-cum-cash crops that can do well but that have either been neglected by farmers or are grown in small scale. For example, green grammes that FAEOs recommend are both food and cash crops, but grown by a few farmers and on small-scale. As such it is observed that increasing farmland under green grammes and other drought-resilient crops accompanied by intensified agricultural extension services stands a chance of increasing the food and incomes available to local households.

In addition, the cultivation of other drought tolerant crops that are suitable for the local natural ecology such as millet and sorghum has been neglected by farmers. Part of the problem was the amount of labour investment on these crops against expected financial returns. While this presented a dilemma to local farmers, it was the general opinion of

FAEOs that the former would be better off concentrating on weather-friendly crops, while the government only needed to streamline their market to increase incomes and motivation to the farmers.

Hence, streamlining the market for the local climate-friendly crops can work well in motivating farmers to get engaged in the cultivation of these crops. For example, strategies can be worked out in which local farmers partner with beer manufacturing companies as outlets for their sorghum and millet produce. Incidentally, when the drought tolerant crops are thus neglected by the farmers against the advice of FAEOs, the economic laws of demand and supply come into play, meaning increased prices due to farmer-induced scarcity.

As a result, it is important that farmers with the assistance of FAEOs re-evaluate their food production with a view to going back to the production of drought-tolerant crops. This should be accompanied by streamlining the bazaar through initiating local farmer marketing cooperative societies to increase farmer income. This is will do away with middlemen who take advantage of farmer apathy during bumper harvest. In this undertaking, policy makers and implementers alike are expected to mainstream gender in their activities especially during development and implementation of agriculture and food policies.

It was found that farmers at a minimum take little regard to minimizing soil moisture loss through evaporation, leading to soil moisture deficiency, decreased crop yields and

subsequent food insecurity at the household and community levels. As a result, there is very little soil moisture available given that its moisture retention capacity is reduced due to inappropriate cropping patterns. While there are many crops that can be grown to partly reduce soil moisture loss, this is not given due attention perhaps as a result of reduced intensity of interaction between farmers and FAEOs.

To partly overcome the foregoing scenario and increase crop yields, there was consensus among all FAEOs to the effect that growing of crops that are not only adapted to the local weather conditions, but also that will bring two other benefits. These benefits came in the form of acting as mulch against soil erosion and soil moisture loss and producing food for the household and the market. One such crop was *Dolicos lablab*, locally *Njavi,* which has the ability to cover the soil as it grows horizontal to the ground while its leaves provide a canopy to minimize soil moisture loss through evaporation.

Accordingly, it is recommended that the intensification of the growth of such crop among farmers is important given that it not only provides food but also income for two consecutive seasons. In an effort to invigorate the cultivation of *Dolicos lablab*, it is important that extension education in this regard mainstreams gender such that the information is effectively available across gender. Short of gender mainstreaming in this regard, the impact is expected to be insignificant and perhaps fail.

The study determined that there we grain losses post-harvest courtesy of post-harvest pests due to poor storage. This results into food insecurity despite the fact that these can

be prevented. As a result, there is need for concerted efforts at enhancing post-harvest practices including storage that ensure stored food is not destroyed by pests and hence destroyed at the expense of the family needs. This will ensure that food is available in low seasons especially during the dry season or in case of failed precipitation.

It was found out that poor harvest and thus food insecurity was courtesy of below potential use of inputs such as fertilizers, pesticides and hybrid seeds. Others include poor soil and water conservation activities, meaning heightened soil erosion, loss of soil nutrients and moisture to the disadvantage of crop farming. While poverty may partly explain this scenario, poor information access is also to blame. Accordingly, it is recommended that there ought to be intensified extension education to increase uptake of inputs such as fertilizers and pesticides in addition to the use of hybrid seeds to increase food production. Another area of emphasis on extension education to famers is on soil conservation and water harvesting, the two that are expected to sustain soil productivity for food production.

6.2.3. For Further Research

An important dimension to land ownership, dryland farming, water and soil conservation in the study area was their gender dimension. For example, field data suggested that women participation in soil conservation was partly hampered by land ownership status and negative cultural practices. Indeed, there was a general feeling of helplessness among women in terms of how land would be utilized including which crops to plant. Consequently, it is suggested that to augment women participation in conservation

activities, strategies need to be put in place to make them feel more that they own land. Perhaps it is important to encourage men to involve their spouses actively in decision-making, bearing in mind that ignoring them amount to a foregone opportunity. Nonetheless, social work research is recommended to identify the best way of approaching the issue without breaking the family bond.

Nonetheless, there is great need to put in place structures that motivate both men and women to get more involved in soil conservation and water harvesting activities. This is actually a precursor to improved food production and enhanced household food security in the study area. More effort though, need to be put on women given that unlike their men counterparts, they are remotely involved in soil conservation activities in the study are as revealed during the study. In this case, a study needs to be undertaken from a gender perspective to determine the needs and challenges of both men and women as far as land ownership and attendant farming activities are concerned.

An important aspect that was brought out by the study is that *miraa* growing presented a dilemma in terms of advantages and disadvantages. On one side was the increased household income that came with the cultivation of the crop, while on the other was the moral decadence, domestic violence, immorality and drug abuse that accompanied it. Due to this dilemma it is recommended that economists come up with a model to determine the relative benefits and detriments of *miraa* cultivation. This will provide the government the appropriate recommendation as to whether to continue or discontinue the growth of the stimulant plant in the study area.

Men and women carried out different, yet complementary roles regarding dryland farming. It was however beyond the scope of this study to quantify the relative contribution of each of them in terms of financial and the man-hours spend in dryland farming activities and hence their relative impact on food production and household food security. Accordingly, it is recommended that an economic model needs to be formulated to determine the relative contribution of each gender in dryland farming activities in the study area.

The level of education among those interviewed varied greatly across gender and age. However, the relationship between level of formal education and acquisition of agricultural production knowledge, skills and information was not determined because it was beyond the scope of this study. It is therefore suggested that an economic formula be put in place to determine the foregoing relationship in order to advice FAEOs and the government accordingly on the best approach to reach each tier according to their level of education and gender.

Some cultural aspects combined to affect people's effective involvement in farming activities including gender relations, land ownership, decision making power and weather conditions. It was beyond the scope of this study to determine the relative contributions of each of these aspects to dryland farming. As a result, it is recommended that a multiple regression equation is formulated and used to determine the relative contribution of these factors to food production and household food insecurity.

An important determination to guide future gender mainstreaming activities in farming is the determination of relative contribution of men and women either financially and the man-hours. This was however beyond the scope of this study and therefore left for further research. Hence, it is recommended that an economic model needs to be put in place for this determination, the outcome of which would be used to devise strategies for better targeted gender mainstreaming in farming activities.

6.2.4. For Policy Makers, Community and Further Research

It is observed that among the local farmers, there was overdependence on the natural environmental resources that are definitely finite. This partly explains the food insecurity problem in the Mbeere drylands and therefore calling for concerted efforts. As such, there is need for livelihood diversification to spread the risk of crop failure. Consequently, there is need for further research to determine the other viable livelihood activities that may be fed back to policy makers and implementers for the formulation of a blueprint. It is expected that the blueprint would be cascaded to farmers for implementation with the help of FAEOs at the household level.

The foregoing is based on the reasoning that there is need to ease the burden on the natural environment and take care of its degradation in the midst of aridity and related weather conditions. In this endeavour, there ought to be gender mainstreaming in order to make sure that women and men play complementary roles in livelihood diversification. Indeed, a study needs to be undertaken beforehand to determine the likely role of women

and men in the diversification of livelihood so that any intervention is done from a point of information.

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APPENDICES

Appendix I: Household Questionnaire

Gender Dimension of Dryland Farming and Household Food Security Survey My name is Ezekiel Mwenzwa, a PhD student at the University of Eldoret. I am doing a survey on the ***Gender Dimension of Dryland Farming and Implications Household Food Security in Embu County, Kenya***. The information collected will be used to advice policy makers on appropriate measures to address dryland farming to enhance food security. You have been selected randomly from the population in this area and the information you give will be treated in strict confidence. I would therefore appreciate if you could spare some time for an interview.

Section A: Background Information

1. Gender_____Division_____Location_____
   Sub-Location_____Village_____
2. Age (years) (a). 20-24 (b). 25-29 (c). 30-34 (d). 35-39
   (e). 40-44 (f). 45-49 (g). 50-54 (h). 55-59
   (i). 60 and above
3. Highest level of education attained
   (a). None (b). Primary (c). Secondary (d). College (e). University
4. Religious affiliation (a). Traditional (b). Muslim (c). Christianity (d). Others (specify) ____
5. What is your main occupation?

(a). Permanent employment (public sector) (b). Permanent employment (private sector)

(c). Casual/temporary employment (d). Business/trading

(e). Farming_____ (f). others (specify) _____

6. Average monthly income (in Kshs.)_____

Section B: Local livelihood activities

7. List the local livelihood activities in this area

a._____b. _____

c. _____d._____

e. _____f._____

8. Of the activities you have identified in 7 above, which are the most important three in ascending order for your household?

i._____ii._____

iii._____iv_____

Give reasons why you put the livelihood activities in that order in 8 above

_____

_____

_____

9. What other livelihood activities are feasible in this area?

a. _____

b. _____

c. _____

10. What are the challenges to the local livelihood activities?

a. _____

b._____

c. _____

In your own words, what are the indicators of food security in your household?

a. _____

b._____

c. _____

11. What may cause/causes food insecurity in your household?

a. _____

b._____

c. _____

Section C: Gender-Based Division of Labour in Dryland Farming

12. Use a tick (√) to indicate who undertakes these farming-related activities in your household

Tasks/activities	Men	Women	Both	Children	Entire family
Clearing bushes for farmland					
Planting /sowing seeds					
Weeding					
Fencing farms					
Harvesting crops					
Threshing grains e.g. beans					
Storing produce					
Sale of farm produce					
Use of farm produce income					
Application of fertilizer					
Pesticide application on crops					
Supervising farm work					

Section D: Soil and Water Conservation Activities

13. Name the various soil and water conservation activities carried out in this area and indicate who undertakes them=fill in the table.

Task/activities	Men	Women	Both
Mulching			
Terracing			
Tree planting/agro-forestry			
Fencing farms			
Water harvesting			

Section E: Climatic Constraints and Opportunities for Dryland Farming

16. What are the climatic/weather challenges to dryland farming in this area?

a._____

b._____

_____

_____

17. How do the climatic/weather challenges named in 16 affect dryland farming in this area?

_____

._____

_____

_____

18. What have you been doing to alleviate the problems emanating from climatic/weather conditions named in 16?

a. _____

b._____

c. _____

19. How else can the climatic/weather challenges named in 16 be tackled?

a. _____

b._____

c. _____

20. What are the opportunities for dryland farming in this area?

a. _____

b._____

c. _____

21. Have you been taking advantage of the available opportunities in this area named in 20? a. Yes b. No

22. Explain your response in 21_____

_____

_____

_____

23. What prevents people in this area from taking advantage of the opportunities name in 20?

a. _____

b._____

c. _____

d. _____

24. How can the opportunities you have named in 20 be better utilized to increase food production/enhance dryland farming?

a. _____

b_____

c. _____

d. _____

Section F: Gender-Based Constraints to Dryland Farming

25. As a woman/man, what problems do you face in dryland farming?

a. _____

b._____

c. _____

d. _____

26. What have you been doing about the problems/how have you handled them?

a. _____

b._____

c. _____

d. _____

27. What should be done to arrest the problems you have faced in dryland farming?

a. _____

b._____

c._____

28. Have there been changes for the better/worse regarding the problems you have been facing in dryland farming? a. Yes b. No

29. Explain your response in 28 above

_____

_____

_____

Section G: Gender-Based Opportunities for Dryland Farming

30. As a man/woman, what opportunities are there for you in dryland farming in this area?

a. _____

b._____

c. _____

31. Have you utilized these opportunities to your advantage in food production?

a. Yes b. No 32. Explain your answer in 31 _____

_____

_____

_____

32. What are the constraints to the use of the opportunities you have identified in 30?

a. _____

b. _____

c. _____

d. _____

33. How best can the opportunities named in 30 be utilized for maximum food production through dryland farming?

a. _____

b._____

c._____

d._____

Section H: Crop Varieties, Farm Acreage and Output

34. Name the cash crops grown in this area

a. _____b. _____

c._____d. _____

e._____f. _____

35. Name the food crops grown in this area

a. _____b. _____

c._____d. _____

e._____f. _____

36. Which other crops can do well locally but are not grown?

a. _____b. _____

c._____d. _____

e._____f. _____

37. Give reasons why people do not grow some of the crops named in 37.

a. _____

b._____

c. _____

d. _____

38. Indicate the harvest per acre of the crops named in 35 and 36 when rainfall is adequate?

Name of crop	Output/harvest per acre per season (in kg)

39. Indicate who undertakes the following activities in your household

Activity	Man	Woman	Both
Who takes care of cash crops in the farm			
Who takes care of food crops in the farm			
Who is in charge of use of returns/money from cash crops			

Section I: Implications of Gender-Based Division of Labor on Food Production

40.What would be the impact in food production if ***all members*** of the family were involved directly in it?_____

_____

_____

_____

40. Give reasons for your answer in 41_____

_____

_____

_____

_____

41. What would be the impact on food production if **only women** in your household were involved in its production?_____

_____

_____

44. Give reasons for your answer in 43_____

_____

_____

_____

43. What would be the impact on food production if ***only men*** were involved in its production in your household_____

_____

_____

_____

44. Explain your answers in 43_____

_____

_____

Section J: Gender Dimension of Post-Food Harvest Practices & Household Food Security

45. Who is specifically in charge of storing food produce in your household?

a. Man b. Woman c. Both/man and woman

46. Comment on household food security implications if food produce is stored by a man_____

_____

_____

_____

47. Comment on household food security implications if food produce is stored by a woman_____

_____

_____

48. Comment on household food security implications if food produce was stored jointly by man and women_____

_____

_____

_____

Who is specifically in charge of food produce marketing if any in your household?

a. man b. woman. c. both/man & woman

49. Comment on the household food security implications if food produce is marketed/sold by a man_____

_____

_____

_____

50. Comment on household food security implications if food produce is marketed/sold by a woman_____

_____

_____

52. Comment on the household food security implications if food produce was/is jointly sold by man and women_____

    _____

    _____

    _____

53. Who is in-charge of using farm produce returns after marketing in your household?

    a. man b. woman c. both/man & woman

54. Comment on household food security implications if a woman was in charge of appropriating returns from food produce_____

    _____

    _____

    _____

55. Comment on household food security implications if am man was in charge of appropriating returns from food produce_____

_____

_____

56. Comment on household food security implications if both man and women were jointly involved in the use of farm produce returns_____

    _____

    _____

    _____

57. Give recommendations to enhance dryland farming in this area?

    a. _____

    b._____

    c. _____

    d. _____

Thank you very much for your time and information!

Appendix II: Focus Group Discussion Guide

1. Identify the various livelihood activities in this area and rank them in ascending order of importance to the local community.
2. What are the various crops grown in this area through dryland farming? Identify both cash and food crops and who is in charge of each crop from planting to sale in the market.
3. What are the various climatic/weather constraints to dryland farming in this area?
4. How in your opinion can the constraints be alleviated
5. What are the various opportunities for dryland farming in this area?
6. How in your opinion can the opportunities be utilized for maximum food crop production?
7. What specific problems do women face in dryland farming in this area?
8. What specific problems do men face in dryland farming in this area?
9. What are the various soil and water conservation methods used by farmers in this area?
10. What measures do dryland farmers in this area take to mitigate crop failure/what are the strategies to spread risk of crop failure?
11. What are the crop protection (from pests, insects, wild animals, etc) strategies employed by famers in this area by gender?
12. Comment on the gender division of labor in dryland farming from farm preparation to marketing of farm produce and appropriation of returns in this area.

13. Who in your opinion, between men and women shoulders the heaviest responsibility in dryland farming in this area?
14. How does the gender division of labor in dryland farming affect food production and household food security?
15. What recommendations can you put forward to enhance dryland farming in this area?

Appendix III: Key Informant Interview Guide

1. Identify the various livelihood activities in this area and rank them in ascending order of importance to the local community.
2. What are the various crops grown in this area through dryland farming? Identify both cash and food crops and who is in charge of each from planting to sale in the market.
3. What are the various climatic/weather constraints to dryland farming in this area?
4. How in your opinion can the constraints be alleviated
5. What are the various opportunities for dryland farming in this area?
6. How can the opportunities be utilized for maximum food crop production?
7. What specific problems do women face in dryland farming in this area?
8. What specific problems do men face in dryland farming in this area?
9. What are the various soil and water conservation methods used by farmers in this area?
10. What measures do dryland farmers in this area take to mitigate crop failure/what are the strategies to spread risk of crop failure?
11. What are the crop protection (from pests, insects, wild animals, etc) strategies employed by famers in this area by gender?
12. Comment on the gender division of labor in dryland farming from farm preparation to marketing of farm produce and appropriation of returns in this area.
13. Who in your opinion, between men and women shoulders the heaviest responsibility in dryland farming in this area?

14. How does the gender division of labor in dryland farming affect food production and household food security?
15. What recommendations can you put forward to enhance dryland farming in this area?

Appendix IV: Observation Checklist

This guided the study team to observe and record the following information

1. Who (men/women) are more actively involved in farming activities and which activities in particular?
2. Soil conservation practices
3. Rainwater harvesting and conservation strategies
4. Measures taken to mitigate moisture loss/water loss control practices
5. Types of crops grown bearing in mind the local climatic conditions
6. Farm sizes versus productivity
7. Cropping systems e.g. intercropping, mono-cropping, etc
8. Crop protection strategies employed by farmers
9. Agricultural implements/machinery/technology used
10. Risk reduction/spread strategies in case of crop failure
11. Adaptation of local crops/plants to dryland conditions/moisture/water deficiency
12. Ecological threats/impediments to dryland farming
13. Anthropogenic activities that threaten dryland farming by gender.

Appendix V: Institutional Field Work/Research Authorization

University of Eldoret
flame of knowledge and innovation

P.O. Box 1125-30100, ELDORET, Kenya
Tel: 053-2063111 Ext. 242
Fax No. 020-2141257
E-Mail:deanses @uoeld.ac.ke

OFFICE OF THE DEAN
SCHOOL OF ENVIRONMENTAL STUDIES

REF: SES/D. PHIL/07/10 **DATE:** 28th July 2014

TO WHOM IT MAY CONCERN

RE: PERMISSION TO CARRY OUT RESEARCH

This is to introduce you to **Ezekiel Mbitha Mwenzwa – SES/D. PHIL/07/10**, a bonafide student of School of Environmental Studies, Department of Applied Environmental Social Sciences in University of Eldoret.

Mr. Mwenzwa is to carry a research on:

'Gender Dimension of Dryland Farming and Implications on Household Food Security in Embu County, Kenya'.

This letter is to request you to kindly allow him to carry out the research.

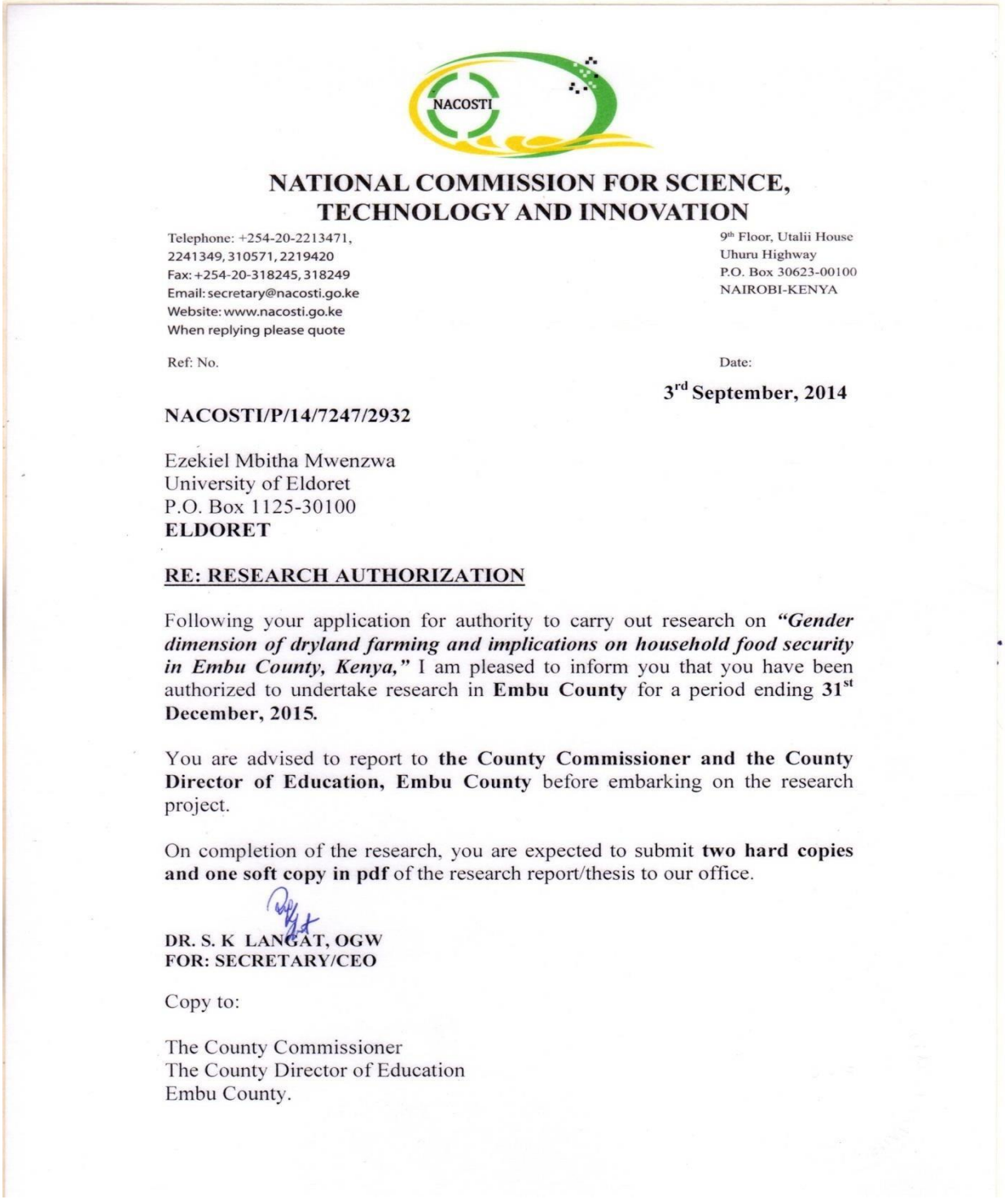
Your assistance will be highly appreciated.

Yours Sincerely,

DEAN
School of Environmental Studies
UNIVERSITY OF ELDORET

PROF. V.K. SUDOI
DEAN, SCHOOL OF ENVIRONMENTAL STUDIES

Appendix VI: Research Authorization



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Email: secretary@nacosti.go.ke
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When replying please quote

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Uhuru Highway
P.O. Box 30623-00100
NAIROBI-KENYA

Ref: No.

Date:

3rd September, 2014

NACOSTI/P/14/7247/2932

Ezekiel Mbitha Mwenzwa
University of Eldoret
P.O. Box 1125-30100
ELDORET

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on ***"Gender dimension of dryland farming and implications on household food security in Embu County, Kenya,"*** I am pleased to inform you that you have been authorized to undertake research in **Embu County** for a period ending **31st December, 2015.**

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

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

DR. S. K LANGAT, OGW
FOR: SECRETARY/CEO

Copy to:

The County Commissioner
The County Director of Education
Embu County.

Appendix VII: Research Permit

THIS IS TO CERTIFY THAT:
MR. EZEKIEL MBITHA MWENZWA
of UNIVERSITY OF ELDORET, 132-90400
mwingi ,has been permitted to conduct
research in *Embu County*

on the topic: *GENDER DIMENSION OF DRYLAND FARMING AND IMPLICATIONS ON HOUSEHOLD FOOD SECURITY IN EMBU COUNTY, KENYA*

for the period ending:
31st December,2015

Permit No : NACOSTI/P/14/7247/2932
Date Of Issue : 3rd September,2014
Fee Recieved :Ksh 2,000

.....
Applicant's Signature

.....
Secretary
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 3083

CONDITIONS: see back page

Appendix VIII: County Level Research Endorsement

THE PRESIDENCY

MINISTRY OF INTERIOR AND COORDINATION OF NATIONAL GOVERNMENT

Telegrams:
Telephone: Embu 0202310839
FAX 30040
Email ccembu@gmail.com

COUNTY COMMISSIONER
EMBU COUNTY
P.O. BOX 3 – 60100
EMBU

When replying please quote:

Ref: No. EBU.CC/ADM/3/37/VOL.I/(44) 9th September, 2014

Deputy County Commissioner
Mbeere South Sub County

RE: RESEARCH AUTHORIZATION

This is to inform you that ***Mr Ezekiel Mbitha Mwenzwa*** of University of Eldoret has been authorized to carry out research in your sub county for period ending 31st December, 2015.

His research is based on ***"Gender dimension of dryland farming and implications on household food security in your sub county."***

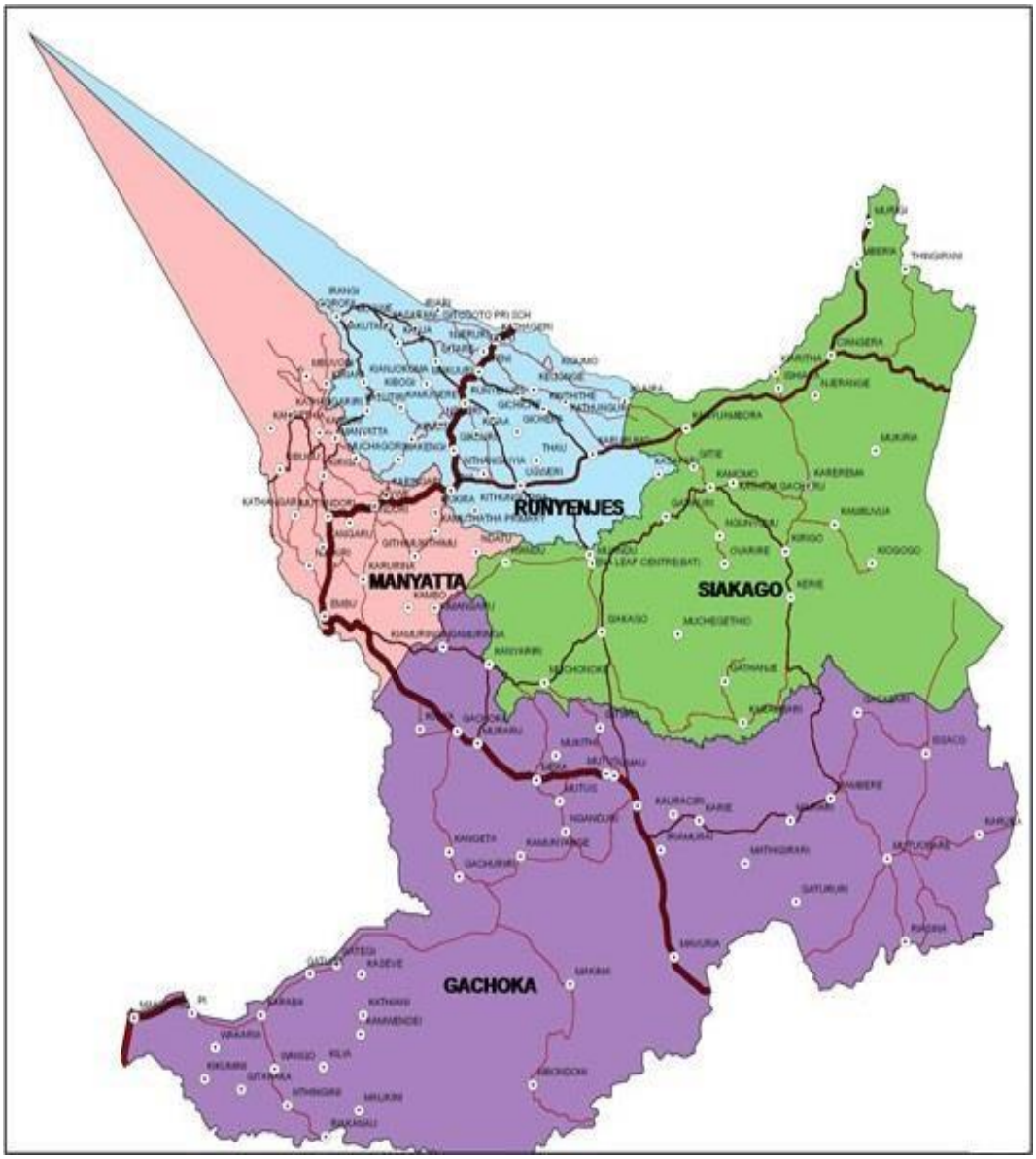
Kindly accord him the necessary assistance.

E. K. WENDOTT
FOR: COUNTY COMMISSIONER
EMBU COUNTY

Copy

✓ Mr Ezekiel Mbitha Mwenzwa

Appendix IX: Map of Embu County



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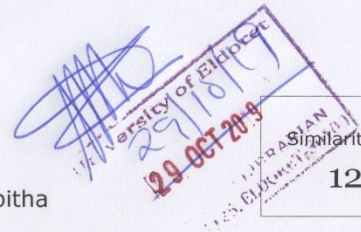

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