GENDER GAPS IN TRANSFER OF IMPROVED BEE KEEPING: A CASE OF THE MAASAI COMMUNITY IN TRANS MARA, NAROK COUNTY, KENYA

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DECLARATION

I confirm that this thesis is my original work and has not been presented in any other university/institution for certification.

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DEDICATION

I dedicate this work to my husband Mr. John Miriti, Kennedy Mwenda and Victor Kathendu, my sons. John, I really thank you for the commendable sacrifice, moral and material support that you accorded me during the four years of study. Kennedy and Victor, you are my inspiration; as your mother, you have never complained during my absence but instead encouraged me to soldier on. God bless you all always.

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OPERATIONAL DEFINITION OF TERMS

Apiaries	The area where men and women in Trans Mara have placed their hives for bees to live in.
Beeswax	Substance produced by bees and is used to build honey comb.
Brood	All stages of immature honey bees which include eggs, larvae and pupae.
Crude	A mixture containing ripe honey (ready for harvesting) and unripe (the one that is not ready). At harvesting time, wax, honey comb, bees and brood are all mixed into one container.
Gender blind	Ignoring roles, responsibilities, capabilities and needs of women and men in honey production
Gender neutral	Denoting a word or expression that cannot be taken to refer to one gender only in improved bee keeping practices.

Gender inclusive	Incorporating needs, responsibilities, capabilities, and policies of all regardless of their gender in improved bee keeping value chain
Gender integration	Process of assessing implications for women and men in the planned action and policies in improved bee keeping with an ultimate goal of achieving gender equity in access to benefits accrued from bee keeping products
Gender responsive	Process of overcoming bias and discrimination in order to benefit all gender who are participating in improved bee keeping value chain
Honey Comb	**S**tructure made of hexagonal cells in which honey bees rear their young and store food.
Improved Bee Keeping	Enhancement of the bee keeping equipment from traditional ones to more advanced
Modern value chains	Farming mainly for commercial purposes. E.g. traditional bee keeping (traditional value chain) while improved is (modern value chain)

Pro-Poor agro enterprises	Commodities that are believed to have an impact on both food security and income generation to resource-poor men and women farmers
Refined honey:	Clean liquid that has been strained to remove all particles of beeswax and other material. Nothing else is added so it is still the pure stuff which the bees made in the hive
Semi-Refined Honey:	The liquid that remains when wax is skimmed off the top of crude honey and it sinks to the bottom as it is heavier. It still contains particles of wax and other debris such as bee's legs
Technology	Any new skills, physically constructed structures or machinery that can make farming easier and profitable
Traditional value chains	Farming for subsistence and not for commercial purposes, e.g. before bee technology, majority of men and women were using its products mainly for home consumption while minimal was sold.

ABBREVIATIONS

ALV	African Leafy Vegetables
CIGs	Common Interest Groups
FAO	Food and Agricultural Organization
FGD	Focus Group Discussions
FHHs	Female Headed Households
GDP	Gross Domestic Product
GOK	Government of Kenya
HH	House Hold
HHH	House Hold Head
IFAD	International Fund for Agricultural Development
KARI	Kenya Agricultural Research Institute
KARLO	Kenya Agricultural Research and Livestock Organisations
KI	Key Informant
KII	Key Informant Interviews
MHHs	Male Headed Households
MOLD	Ministry of Livestock Development
NALEP	National Agriculture and Livestock Extension Programme
NGO	Non-Governmental Organisation
O.I.	Oral Informant (s)
PACT	Act Change Transform (NGO registered in Kenya by name
TOTs	Training of Trainers
WEAI	Women Empowerment in Agriculture Index

ABSTRACT

In Kenya, beekeeping is well established and can be successfully carried out in about 80% of the country. The improved enterprise has many advantages and can be practiced favourably by resource poor men, women, and youth. However, the bee sector remains largely underdeveloped due to the fact that in many parts of the country, it is still carried out traditionally and passed through inheritance. Consequently, since it is a male domain, men mostly inherit it leaving women and youth who are new in the enterprise vulnerable. This study sought to explore gender gaps in the transfer of improved bee keeping among the *Maasai* community in Trans Mara, Narok County. This was achieved through identifying the levels of participation of men and women in Improved Bee Keeping, decision making power among bee keeping households (HHs), and the challenges they face. Investigative survey design was used with both quantitative and qualitative approaches. The target population included men and women in improved bee keeping groups. The study used Blumberg (1984) gender stratification theory which argues that gender inequalities are intertwined at various levels from households to local communities. Stratified random sampling was used for HH surveys. A total of 372 respondents were interviewed. Structured and semi-structured questionnaires were used for Household (HH) surveys. Data collected was analysed using SPSS and Stata computer software. The study found that while women are actively involved in bee keeping, their participation in accessing improved equipment, trainings and better marketing channels is low in comparison to men's. This is due to capital constraint, gender related factors such as mobility and time, and cultural perceptions, factors that challenge them more than men. Consequently, their level of participation remains low in parts of the chain where value is high. In male headed households (MHHs), men make most or all decisions concerning purchase and sale of productive assets including land and cattle. They also control most productive resources including income from bee products. Most women make decisions concerning purchase and sale of chicken while none own land or cattle. The major challenges in improved bee keeping are lack of access to; capital, trainings, ready markets, and domination by middlemen (brokers). Consequently, women are more vulnerable which continues to widen the gender gap in the bee keeping value chain. The study recommends that improved bee keeping projects should collaborate with other stakeholders such as extension officers, research institutions and county governments in order to adopt gender responsive strategies that can enhance participation, equity in access to trainings and benefits accrued from bee products and access to ready and better markets. Household and neighbourhood empowerment, for instance, sharing improved equipment, construction of training cum collection centres within localities, formation of marketing associations to minimize middlemen, are some of the strategies suggested.

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Literature has provided some evidence on causal relations between gender and livestock production (Herath 2007; Deshingkar, Farrington, Rao, Akter, Sharma, Freeman, and Reddy, 2008; Flintan 2008) however, Herrero, Thornton, Notenbaert, Wood, and Msangi, (2010) argue that there is scarcity of quantitative information on this subject, especially if the global demand for animal products in coming decades is to be met. According to Katinka (2014), technology transfer among conservative communities is supposed to increase productivity through improved access to technologies adapted to them, improve food security and nutrition.

Dirk (2012) argues that steps must be taken to empower resource poor farmers during technology transfer in order for them to take advantage of the newly available technologies. For example, awareness-building efforts are crucial in order to counteract the damaging traditional beliefs and promote equitable participation within the household. This reduces discrimination related to age and/or gender. Ruchi, Youjin, Chung, Karl, Nadia, Robin, Olivia, Monique, Daphne, Jenny, and Marina, (2012) argue that in developing countries, gender gaps in agriculture and livestock production have existed for decades yet majority of rural people depend on it for income, food security and economic development.

However, governments, donors and development practitioners now recognize this fact but their commitment to gender equality is less robust. For example, an earlier study by Ayoade (2009) in Nigeria revealed that there was a higher adoption level and impact of improved

cassava technology by men (74.6%), compared to women (25.4%). According to Katinka (2014), technologies need to be adapted for use by small scale farmers with minimal resources and little or no access to income. This is because they are normally excluded from technology transfer process for reasons such as poverty, gender, ethnicity and remote location. Developing agricultural value chains is an important approach to increasing incomes of small and medium producers as well as the economically active poor farmers (Agri-Pro Focus, 2012). However, gender relations remain central to discussions on value chains and their potential for economic empowerment.

Waithanji et al., (2013) argue that women have a lower access to resources than men and also experience other social economic and gender barriers. Consequently, their participation is limited to the nodes of the chains with lower profits. It is expected that empowerment of households is one possible way to reduce the power asymmetries along the chain, and possibly reduce the challenges that vulnerable farmers face in their participation (USAID, 2009). Over the past decade, beekeeping is emerging as a successful area of livestock production for rural people in less developed countries, mainly due to its economic benefits from the products (Kugonza, 2009).

According to Tabinda, Murad, Sajida, and Nadeem, (2013), bee technology projects in Pakistan are playing a major role in empowering small holder farmers through modern ways. Consequently, rural women are generating income from the enterprise. Gebey, Berhe, and Hoekstra, (2010) argue that in Africa, Ethiopia is a leading honey producer and one of the ten largest in the world. King (2013) shows that beekeeping and honey production in

Ethiopia has been a male occupation. However, over the last decade, improved hives have enabled participation of unmarried women and youth in Collective Action (CA). As a result, they are able to access and benefit from the enterprise. In contrast to Ethiopia findings, in Mali and Tanzania, it was notably older and married women who were participating in CA activities (King 2013). Nevertheless, women are still confined to their gender roles; that is feeding bees as well as washing and handling utensils.

Ironically, this is termed as participation which eventually increases their workload thereby burdening them further instead of uplifting their standards of living. According to Matanmi (2008), beekeeping technology in Nigeria can easily be embarked on by small holder farmers. Its investment is low; since it does not require large area of land and there is no need for daily care. Consequently, women and youth, who are constrained by access to land, as well as time due to triple roles of the former, can easily participate in the enterprise.

Mujuni and Kugonza (2012) indicates that small holder farmers in Uganda do generate some income from beekeeping. Nevertheless, it is estimated that Uganda produces only 1% of the national annual production potential estimated to be 500,000 tons. This could be due to the fact that, agricultural research has not given due emphasis to assessment and understanding of improved methods of the enterprise (Matanmi 2008). Consequently, this may impact negatively to the vulnerable due to the findings by Mujuni and Kugonza (2012), that the factors affecting adoption of improved bee keeping include lack of information and cost of technology which constraint women and youth more than men. Apiculture is one of the emerging divisions in the livestock sector in Kenya (GOK, 2008). Beekeeping is well

established and can be successfully carried out in about 80% of the country. The introduction of improved bee keeping has shown major development and is an important component in livestock production (GOK, 2009). According to Kiptarus, Asiko, Muriuki, and Biwott (2011), beekeeping is a valuable enterprise within Kenyan agricultural sector, contributing about Ksh.4.3 billion. From honey production alone, it is estimated at 25,000 MT annually. The industry harbours a great potential for increasing incomes and supportive sustainable development. Indirectly, it supports many persons in confectionery, Pharmaceutical, brewing, cosmetics, transporting, suppliers of packaging materials and other players along the value chain.

Beekeeping complements agriculture and contributes to National Policy objectives spelt out in strategic plan and Kenya vision 2030 with emphasis on food security, increased household incomes through value added hive products, employment creation especially youth, access to markets and conservation of the environment (Kiptarus et al., 2011). Gender issues are now mentioned in most national and regional agricultural policy plans. However, they are relegated to separate chapters on women rather than treated as an integral part of policy and programming.

This is despite the fact that Kenya is a signatory to most international mandates on gender mainstreaming, including the 2015 Sustainable Development Goals (SDGs) for instance, number five; achieving gender equality and empowering all women and girls, and ten; reduced inequalities. The government's commitment to mainstreaming gender is spelt out in the bill of rights in the constitution, and Vision 2030 under the social pillar. It is in this context that gender need to be seriously addressed especially during technology transfers. This will ensure equity in increased household incomes, employment creation and access to

markets (Kiptarus et al., 2011). An earlier study by Carroll (2002) shows that there is increase in demand for honey in Kenya. Informally, Carroll indicates that 75% which is sold in most supermarkets is imported from Australia. Similarly, GOK (2009) argues that despite the huge potential of honey and beeswax production, the country is unable to meet its current local market demand and the deficit is met through imports. As a result, despite numerous advantages that can be realized, the sector remains largely underdeveloped due to the fact that in many parts of the country, it is still carried out as an indigenous activity by men mostly passed down through generations irrespective of new technology in its production.

On the other hand, since the enterprise is a male domain, it is men who mostly inherit it. As a result, women continue to be vulnerable. For example, (GOK 2009) argues that cultural beliefs and taboos in some communities have caused bias as to who should keep honey bees. Consequently, women and youth are not allowed to practice bee keeping, leaving the industry with elderly men. However, this problem is slowly fading away through education and introduction of the improved enterprise. Nevertheless, GOK (2009) indicates that women and youth are disadvantaged in access to production resources such as land, credit and inputs. PACT Kenya (2011) in Mswambeni confirms that bee keeping is mainly dominated by men who are mostly involved in production, baiting and hanging hives with only a few women participating in processing.

According to Sitati and Bett (2012), the rapid development of bee technology in Kenya seems vital due to its popularity. However, many projects engage in it without undertaking an evaluation to determine its profitability. Sitati and Bett (2012) unveil that the poorly

planned and rapid expansion of these projects usually result in many un-colonised bee hives and or lack of market due to over production. This leaves new comers, majority who are women and youth often making losses. Such a move in turn impacts negatively on income generation and food security, and certainly has some adverse gender effects not only on women but also the whole community. In Trans Mara, majority of men and women farmers are mainly involved in livestock production with lower levels of crop agriculture. Over the last decade, bee keeping is gaining momentum as an alternative livelihood mechanism in Trans Mara especially with introduction of the improved enterprise.

Traditionally, the *Maasai* men and women were using different types of traditional hives such as hollowed logs and pots. They were normally hanged on tall trees and left to be occupied by wild swarms of honey bees. These hives' management is difficult as they are not easily accessible, combs are fixed and difficult to inspect. Harvesting was done by using smoke at night without protective clothing thereby exposing the beekeepers to the danger of being stung by bees or attacked by wild animals. It is also detrimental to bees. These constraints have made beekeeping appear unattractive economic venture especially for women and youth. Observably, women and youth in Trans Mara are participating in the improved enterprise albeit at very low levels largely due to their conservative nature. As a result they produce and sell crude honey hence, receiving minimal value from it.

The country's potential for apiculture development is estimated at over 100,000 tons of honey and 10,000 beeswax. Unfortunately, only a fifth of this is being exploited (GOK, 2010). This could be due to the findings by Sitati and Bett (2012) in Trans Mara on an

evaluation of Narok bee keeping project, that most apiaries are poorly managed and the local community lack capacity resulting to poor occupation hence, low honey production. This has impacted more on women and youth who are new in the business. Despite the drawbacks, beekeeping technology has many advantages hence, compatible with vulnerable farmers' needs. Consequently, it builds a case for promoting participation of men, women and youth. This study therefore sought to explore the gender gaps in transfer of improved bee keeping among the *Maasai* community in Trans Mara with an aim of making it gender responsive for meaningful development and food security.

1.2 Statement of the Problem

Over the last decade, improvement of bee keeping has broken gender barriers by incorporating women and youth (King, 2013). However, women's involvement confines them within bee-related conservative gender roles such as feeding bees, washing and handling utensils. As such, despite gains made in making bee-keeping gender responsive, the move has eventually increased women's workload and burdened them further. Due to their low participation levels, benefits are limited, a move that certainly continues to hinder the realization of their full potential in the enterprise. These factors are enhanced by the male-dominated culture of passing the activity to men throughout generations, thereby leaving out women.

On the other hand, the enterprise has attracted initiatives whose intention is to enhance resource poor farmers' livelihoods, a move that is gender blind. By so doing, they transfer the improved enterprise without undertaking gender inclusive needs' assessment. As a result, the initiatives ignore the prevailing gender challenges that dominate traditional communities;

access to capital, gender related factors (for instance, time, mobility, marital status), cultural perceptions and the fact that indigenous bee keeping is male dominated that is passed to men through inheritance. As such, though improved bee keeping has more potential compared to indigenous, its potential is not yet realized. Likewise there is lack of market due to overproduction. Most of these factors affect women and youth as new comers in the enterprise. This study therefore sought to explore the gender gaps in transfer of improved bee keeping among the *Maasai* communities.

1.3 Objectives of the Study

General Objective

To explore the gender gaps in the transfer of bee keeping technology among the Maasai community in Trans Mara

Specific Objectives of the Study

i. To examine the levels of participation of men and women in improved bee keeping value chain in Trans Mara Sub County
ii. To evaluate the decision making power among the bee keeping households in Trans Mara Sub County
iii. To find out the challenges faced by men and women in improved bee keeping value chain
iv. To identify effective strategies that can be employed to make improved bee keeping gender responsive

1.4 Study Questions

i. What are the levels of participation of men and women in improved bee keeping value chain in the study area

ii. What is the decision making power among bee keeping households in the study area

iii. What are the challenges faced by men and women in improved bee keeping value chain in the study area

iv. Are there effective strategies that can be employed to make bee technology gender responsive in the study area

1.5 Study Premises

i. That the levels of participation in improved bee keeping value chain are gender biased

ii. That decision making power among the bee keeping households in Trans Mara is gender biased

iii. That there are challenges faced by men and women in improved bee keeping value chain in the study area

iv. That there could be effective strategies that can make improved bee keeping gender responsive

1.6 Significance of the Study

Improved bee keeping can be gender responsive. The enterprise has durable and gender friendly equipment. It is also economical, needs less land and does not require excessive labour and time to manage, as bees do most of the work. These characteristics are highly

compatible with the needs and constraints of resource poor farmers, majority who are women and youth thereby building a case for promoting their participation. This is because it bridges the gap witnessed in crop agriculture in which women and youth are constrained by access to productive resources for instance, land and labour, yet, the role of women in household food production is known (FAO, 2011). Similarly, with improved bee keeping, farmers could enhance access to extra income as well as dietary diversity thus, lessen pressure from dependence on crop agriculture for instance, maize farming (IFAD, 2014), which is usually affected by climate change.

Conversely, compared to indigenous bee keeping, the improved has high yielding and high value products. Equally, honey and other bee products are in high demand due to their health and nutritional benefits including industrial purposes (candles and shoe polish) (Carroll, 2013). Traditionally, beading has been the main incoming generating activity for women in the study area. However, compared to improved bee keeping, the activity is labour intensive and in most times, women have to wait for tourists in order to buy their beaded items. Gender responsiveness in implementing improved bee keeping can minimize gaps along the bee value chain, which is a crucial avenue towards poverty reduction and enhancing the quality of life for all.

Since food security cannot be achieved without income security, improved beekeeping could be a useful tool for enhancing rural economies. Several studies have been done on improved bee keeping but so far none has considered exploring the gender gaps in transfer of improved bee keeping especially among traditional communities. Gender integration and inclusivity in improved enterprise will therefore promote socio-economic development of resource-poor men and women farmers through improving decision making power in households,

productivity, quality, and market access. Knowledge gained from this study will assist the bee sector and other stakeholders on how to transfer gender responsive technologies as well as establish appropriate partnerships. Likewise, knowledge gained will inform policy in order to employ gender responsive strategies in the implementation of improved bee keeping technologies among traditional communities. This will certainly benefit both men and women, and ultimately create positive impacts on individuals and households, which include income generation, equity in access and control of resources leading to empowerment, consequently, poverty reduction aimed by Kenya's Vision 2030.

1.7 Scope and Limitations

Scope

The study was conducted in Trans Mara, Narok County. It covered the period between 2009 and 2015. During this period, a project by name Pro-poor agro enterprises emanated from a three-month scoping study in Kenya after stakeholders met in KARI in 2009. They agreed that five agro-enterprises; banana, African leafy vegetables, passion fruits, beekeeping and indigenous chicken, were best placed to lead to increased incomes and food security among resource poor farmers, especially youth and women (KARI, 2009). It was also taken into consideration that agro-enterprise development is gender neutral and strategies that can be adapted to support the vulnerable especially women and youth are rare and thus, require special attention.

One of the goal was to understand mechanisms for development of gender responsive value chains (Miruka and Maina, 2009). To address these issues, sites based on the proposed value chains included Trans Mara, Imenti South and Naivasha. The improved bee keeping was

transferred to Trans Mara in 2010. The main aim of this study was to explore gender gaps in the transfer of the improved bee keeping technologies and practices among men and women in Trans Mara and suggest how to make it gender responsive. Respondents comprised of male and female bee farmers in improved bee keeping groups spread all over the Sub County. The target population included men, women, youth and the elderly as well as key officers in the area of study.

Limitations

Gender is a sensitive subject especially when it comes to sourcing important getting information on use of family income and ownership of property among household members in particular husband and wife. Likewise, men and women farmers involved in bee keeping do other activities in their farms hence are very busy people. The major limitations included strict cultural issues and the fact that majority of men and women are semi-nomads and very conservative. The study teamed up with key persons in the area who assisted in identifying young people who assisted in language interpretation, building confidence among respondents by explaining the main purpose of the study. Though initially it proved difficult to get men in their homes, the key persons assisted in planning for convenient timing of interviews especially where the study needed to speak to a husband and wife simultaneously.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter reviews literature on gender differentials in technology transfer. It is divided into the following sections: levels of participation of men and women in production, value addition and marketing in bee keeping, gender relations in decision making power in households, challenges faced in bee keeping, gender responsive strategies in small holder technologies, and the theoretical and conceptual frameworks. As a summary, the gaps in the literature reviewed are identified therein and how the study is to fill them.

2.2 Levels of Participation of Men and Women in Improved Bee Keeping

Earlier studies by FAO (1990) specify that in several places in East Africa, beekeeping was associated with witchcraft. Young men therefore did not participate, and beekeeping was considered to be an occupation of old people in the society. IFAD (2008) shows that in Rwanda, both women's and youth's participation is low; out of 30,293 beekeepers, 61% were men, 24% women and 15% youth. Although some of these studies were done more than two decades ago, the situation has not changed in the improved enterprise. For example in Uganda, a study by Mujuni and Kugonza (2012) in Bushenyi District showed that majority (95%) of bee keeping farmers were male and majority, (more than 75%), were 30 years and above.

Similar findings have been recorded in Kenya; (PACT Kenya, 2011); and in Ethiopia, (King, 2013). These studies show that gender and age is critical if beekeeping is expected to improve the economic livelihoods of a community. This study therefore sought to find out

if women and youth are participating in improved bee keeping and also benefiting from it, especially in access to income from bee products. This is because a similar study in Kenya on bee keeping value chain indicates that while elderly men are inclined to income, the young entrepreneurs and women would, with a little sensitization and training be more focused on "profits" rather than income. A profit oriented mind-set would thus seek to assess the level of input vis-à-vis the realized benefits which would trigger the members to develop the enterprise and make it worthwhile and economically viable (IFAD, 2008). Consequently, this is not attainable if participation of women and youth remains low in improved bee keeping and this is what this study explored and suggested the way forward.

Several studies have shown that improved bee keeping is an important enterprise that can be carried out by youth and women. For example, an earlier study by Mutai and Kedowa, (2006) in Kericho District, Kenya, reported that improved bee keeping is an ideal activity for youth as they don't require access to land to carry out the enterprise. This is because it productively occupies and teaches them a respect for, and an understanding of their local environment. According to Martin et al., (2012) improved bee keeping practices are being imparted to younger people by small holder farmers in various communities. In some instances bee farmers visit local schools and give practical demonstrations to students.

In Kenya, a study by Ndungo et al., (2011) shows that traditionally, honey was used in beer brewing and paying dowry, all which fall under male domain but after improvement of the enterprise, both genders are participating. Ndungo et al., (2011) did not explore women's, and men's participation levels and this is what the study sought to find out. According to

PACT Kenya (2011), bee keeping in Mombasa is mainly dominated by males who are mostly involved in production, baiting, hanging hives and a little bit of female participation in processing. Unlike men who practice it as individuals, women practice it in groups of mixed gender. This is because most activities are carried out by men hence, women do hire labor for most productive activities thus, incur production costs that are higher than men's. PACT Kenya (2011) states that women are expected to hire male labor for their apiaries yet, men control income both from bee keeping and other productive resources a fact that this study sought to validate in the study area. PACK Kenya (2010) did not assess why women's ownership of improved equipment is low a fact that this study sought to find out.

A study by King (2013) states that beekeeping in Ethiopia has been a male occupation partly because harvesting honey from traditional hives required climbing trees which is not socially acceptable for women. Over the last decade, however, improved hives have enabled participation of vulnerable persons in Collective Action (CA). As a result younger and unmarried women are involved and benefiting from CA. In contrast to Ethiopia, in Mali and Tanzania it was older and married women who were more able to participate in CA activities.

In Ethiopia, women's roles in improved beekeeping include feeding bees, washing utensils, handling smoke, harvesting and storing honey, caring for bee colonies and making honey products, such as *tej* (kind of local brew). Sometimes marketing honey is conducted by women because 'trading' activities are traditionally considered a woman's job, except when long distance travel is involved. This in turn has increased women's access to income and control over productive resources (King (2013). However, a critical gap in women's

participation decreases towards the higher levels of the chain where value is added significantly. King (2013) did not explore the reasons contributing to these gaps and this is what this study sought to find out and suggest the way forward. A study by Tabinda et al., (2013) indicates that in Pakistan, men's activities include colonies replacement, honey extraction and queen rearing while women's are supplement feeding, grading and packing.

According to Martin et al., (2012), in many countries, women bee keepers face cultural and social barriers that do not allow them to participate actively in commercialization of what they produce and in other instances, it is used for male–based recreational activities, such as brewing honey beer. This hampers all attempts to improve production skills, competencies and know-how as well as in marketing bee products. A study by PACT Kenya (2011) in Mombasa, shows that culture does not allow women in bee keeping due to their biological cycle and the fact that some men restrict their wives from joining beekeeping groups for fear that they will engage in infidelity. This indicates that women's participation in improved bee keeping is challenged by prevailing cultural perceptions a fact that this study sought to validate in the study area.

According to Mujuni and Kugonza (2012), majority of Ugandan men still hold onto tradition of keeping women out of most men's activities. There is need to blend culture to increase women's participation in beekeeping. However, Mujuni and Kugonza (2012) and PACT Kenya (2011) did not explore how cultural barriers affect men's and women's participation in improved bee keeping and this is what this study assessed. According to Mujuni and Kugonza (2012, the factors affecting adoption of beekeeping technology in Uganda includes

fear of bee stings, starting capital (to buy improved equipment), and lack of land on which to set the apiary for the safety of the neighbouring environment. Other factors include lack of information and cost of technology. However, Mujuni and Kugonza (2012) found most beekeepers were educated which can stimulate their acceptance of improved technologies. Mujuni and Kugonza (2012) indicates that education facilitates farmers' adoption of innovations. Mujuni and Kugonza (2012) findings are gender neutral. This is one of the reasons this study explored men's and women's participation, and how capital constraint impact to both genders.

2.3 Decision Making Power in Households

An earlier study by World Bank (2008) argues that a women's ability to increase the value of their contributions to livestock is important not only in terms of the value of the income they earn but the value that income has in changing gender roles and relations in the household, community, and elsewhere. A report on qualitative case studies collected from different countries reported various views on decision making power (Becker, 2012). For example in Guatemala, empowerment was viewed on "decision-making capability" and "equality" with men. In Bangladesh, the focus was in the family; the ability to work jointly as a male head and his spouses.

Becker (2012) concludes that participating in income-generating activities successfully empowers not just an individual but an entire household. This study intended to assess whether economic opportunities alone can lead to decision making power within households without rights of control to productive resources. Alkire et al (2010) indicate that women

should be able to make decisions in key areas of agricultural production, purchase or sale of assets in the household and control over income from productive labour. The scholars argue that agricultural innovations that greatly increase labour burdens may have a negative effect, even if income increases, whereas labour-saving technologies may benefit women even if they do not improve production or incomes. On the other hand, labour-saving technologies that reduce the time women need to spend on domestic work may also give them more freedom to choose among activities that are empowering if these options had not been available in the past.

This study sought to explore whether this is the case in the study area especially after the introduction of improved bee keeping. This is due to what Waithanji et al., (2013) reported that as livestock production become more commercialized, female smallholder farmers may not be able to compete with, and benefit like their male counterparts. According Waithanji et al., (2013), women have a lower access to resources than men, and they experience other social economic and gender barriers.

This study explored the consequences of these barriers in participation especially in transferring improved bee keeping in a conservative community. A study by Njuki et al. (2013) shows that in Kenya, Tanzania and Mozambique, women owned livestock because they had purchased them with their own generated income or had received them individually through grants from NGOs. This type of ownership, however, did not mean that they always had decision-making authority, or control over the livestock and this study explored this fact and suggested way forward.

Flintan (2008) stated that women tend to have far more rights to access and dispose livestock products than they do over live animals. This is mainly because for most of them, access to

cattle is by virtue of their relationships to men (husbands, fathers and sons) who control them. Consequently, in spite of the central roles they play in small-scale livestock systems, women are severely limited in their ability to make decisions regarding the enterprises. In addition, they receive little outside support to help them make better decisions concerning the animals. Earlier studies have also recorded similar findings. For example a study by Kimani and Ngethe (2007) indicated that among the *Maasai* pastoralists in Kenya, women's access to extension services are restricted by cultural as well as time constraints. In Zimbabwe, women complained that cattle are generally registered in their husband's names and the department of veterinary services excludes them from livestock initiatives (Chawatama et al. 2005).

A study in Peru found that women were generally not allowed to take part in training courses, although the women spent more time than did the men, with the animals and were thus in a better position to recognize animal health problems earlier (Rivière-Cinnamond 2005). On the other hand, Gotschi et al., (2009) found that women in Mozambique were restricted from participating in group activities thus limiting their access to livestock-related services and information. Grace (2007) argues that much of this division in gender roles in households is affected by the commercialization of livestock production.

Though these studies were conducted more than a decade ago, they confirm the assertion that decision making power in African households is gendered and this has not changed. Consequently, women's marginalisation especially in commercial agriculture increases yet, it is intended to increase income, raise community's living standards, for enhanced food security and poverty alleviation. These studies show that inequalities are intensified in

decisions concerning control of productive resources, a fact that this study sought to verify in Trans Mara and suggest how development interventions can employ gender responsive strategies for enhanced participation.

2.4 Challenges in Improved Bee Keeping Practices

According to IFAD (2008) the national cross-cutting approach to beekeeping is evidently more social than business oriented. For example the attitude of most beekeepers is such that they are "poor farmers with many problems". This has the direct effect of reducing creativity and independence. Republic of Tanzania (2004) specifies that bee keeping challenges at the village level includes lack of the following; mobilizing beekeepers into groups, access to capital, credit facilities, inadequate training, markets for bee products, inadequate skills in production and processing, facilities and equipment for transport, harvesting, processing, packaging and storage of bee products.

A study by Carroll (2002) indicates that the major challenges facing small holder producers in Kenya is the fact that majority are still using traditional hives and those who do use modern ones lack vital equipment such as bee suits and smokers. Likewise, the challenges facing processors and packers include low and inconsistent supplies of honey from disorganized producers. A study by Sitati and Bett (2012) on evaluation of bee keeping project in Narok Kenya, indicates that the main challenges are lack of skills especially on management techniques and insecurity.

Martin et al., (2012) shows that bee keepers in rural areas lack information especially between other members of bee products supply chain. They rely on what the local trader

offers and have little if any, idea of prices paid in larger markets found in towns, cities and export markets. Likewise, bee products that are transported inappropriately and require long travel times have higher risk of damage and losses quality. Limited resources of resource small scale farmers becomes a serious constraint when considering export markets in particular. Equally, honey bees are subject to many diseases and pests like any other livestock. The major problem in many countries is that honey bee diseases and pests that do not affect *Apis mellifera* (common bee type), are not fully understood and researched adequately (Martin et al., 2012).

At farm household level, basic processing of bee products may be traditionally managed. However, challenges arises when equipment is required. For example a manual honey extractor may not be available in the local area, and if accessible, its cost may be well above farm household possibilities. As value is added to bee products, training is required in improved processing methods for value addition including quality control and quality maintenance trainings (IFAD, 2008).

A study by FAO (2006) indicates that packaging is a major constraint to bee product marketing in rural areas where recycled drinking bottles and other packaging materials are sourced locally. These types of materials are not suitable for wider distribution of bee products to town, city and export markets. Improved packaging materials for honey, e.g. new glass jars with lids, are not commonly available in many areas and their cost can be high.

According to Martin et al., (2012), honey collection centres require not only some form of physical structure like a building and its related costs, but also good management and financial investments. Likewise, organizing widely dispersed small scale farmers in rural

and remote requires some initial funding, meetings to take place among producers, travel time and costs, and good communications among the farmers. FAO (2009) indicates that it is difficult to find extension staff that have been provided with up dated training in such aspects as improved production methods, treatments for diseases and parasites among others. Conducting trainings and distributing training materials in remote areas is a challenge as its costs are high as a result of dispersed small-scale farmers. Monga and Monocha (2011) reported that management of colonies during extreme weather conditions was a constraint experienced by 58.3% of respondents in a study in India. The reviewed constraints are gender neutral. This study sought to verify how they impact on both genders' participation.

2.5 Gender Responsive Strategies in Improved Enterprises

Strategies and investments to improve food production among small-scale farmers are needed to ensure food security and economic growth. This is especially true in sub-Saharan Africa where women play a pivotal role being responsible for nearly all food production, 60 per cent of marketing, and at least half the tasks involved in storing food and raising animals (FAO, 2011a).

For example, conservative communities in Southeast Asia who found it difficult to adapt to new technologies were assisted through technology transfer by Asian Action for Food Security Project to improve their domestic gardens and small-scale fishing. As a result, women learnt self-advocacy techniques and a group of local technicians were trained to provide support to farmers in their villages. They were encouraged to learn from each other to promote dissemination of ideas and good practice, not just technology (Katinka, 2014).

A study by Ndungo et al., (2011) in Kenya found that women are key actors in NALEP initiatives which was attributed to many factors which are gender based. For example unlike men, women hardly venture into new initiatives without a careful scrutiny of such projects. Nevertheless upon embracing it, they are always willing to support it as long as it does not contradict their gender roles. Likewise, their participation is higher in common interest groups (CIGs) as compared to men since the groups allow them to operate within their traditionally gender perceived spheres. This shows that through gender responsive strategies, technologies can have a considerably positive impact.

Ndungo et al., (2011) reports that despite efforts by NALEP to initiate new opportunities in agricultural value-chains, marketing poses the most serious challenge to women farmers. This is because they are unable to travel far and wide in search of better marketing opportunities compared to men who can access long distant markets without seeking their wives' consent and are not tied by gender roles at home. Wambugu et al., (2002) shows that tissue culture propagation project increase production as well as small holder farmers' income thereby, improving food security. However, according to Miriti (2011), resource poor farmers (majority women) in Meru, Kenya, are no longer growing the improved bananas due to the fact that they require more inputs, are labour intensive and the plantlets are expensive.

Similar results were recorded in Mount Kenya region (Muyanga, 2008). All these strategies, together with others not reviewed, are meant to increase income and raise the living standards among small scale farmers. To exploit the full potential of men and women

therefore, the transfer of improved bee keeping must be gender responsive, hence, this study sought to find out views of both genders on how participation can be enhanced.

2.6 Theoretical and Conceptual Frame Work

2.6.1 Gender Stratification Theory

The study used Blumberg (1984) gender stratification theory. The theory argues that gender inequalities are intertwined at various levels from households to local communities. According to Blumberg (1984), women's control of productive resources can be located at all these levels and the phase at which their decision making power is strongest, influences their command at other levels of social organization. The intertwined decision making power is marked by what Blumberg calls a "discount rate*"* in which women's economic power is reduced or enhanced depending on the level at which it is concentrated. If their relative economic power is at the micro level of the household (for example, reproductive roles and contribution to family income), they will not have household authority proportionate to their economic contribution if men control more power at macro level.

Male control at the more macro level "discounts" or reduces the power that women should have in the household. Conversely, if females possess decision making power at macro levels, then the discount rate turns positive and will enhance their power at the household level. What, then, determines when and how women gain both decision making and economic power? For Blumberg (1984), the key variable is the demand for labour performed by women in these levels. In simple societies without stratification, women's participation is a function of (1) the demand for their labour relative to what they supply and (2) the degree

of compatibility of productive work with the reproductive (especially breast feeding and household chores) that women must also perform. Blumberg (1984) argues that cultural issues such as inheritance rules influence women's capacity to gain both decision making and economic power especially the question as to whether they can decide to inherit and control that property. Similarly, the way resources are distributed influence economic power. In this case, men and women should equally share work and its benefits. Without economic power, women's decision making is limited over such basic matters as their fertility patterns (when and how many children to have), health, rights to their bodies, household activities, education, and freedom to move about and pursue diverse interests and opportunities.

Blumberg (1984) emphasizes that it is not just women's economic participation that matters but rather, that it should translate into control of one's own productive activities and the benefits accrued from them. With such decision making power and rights, the degree of gender inequality will decline. In objective one and three, as stated in sub-section 1.3, this study presumed that participation in bee value chain is gendered, and at the same time, are underlying challenges therein. As Blumberg theory argues, the level of participation in the chain will influence gender relations in households and community either negatively or positively. Positive influence will occur if there is gender equity especially at the levels where value is high.

In objective two as stated in sub-section 1.3, the study presumed that household economic opportunities alone may not necessarily lead to decision making power in the household without rights of control to productive resources. Blumberg theory emphasizes that it is not just women's economic participation that matters, but rather, it should translate into control

of one's productive activities and the benefits accrued from them. The fourth objective assumed that gender responsiveness in technology transfer can alleviate the negative impact usually experienced by resource poor farmers and as Blumberg concludes, the degree of gender inequality will decline. The study therefore sought to explore the gender differentials and the improved bee keeping transfer in Trans Mara to verify this fact, and suggest the way forward. This is conceptualised in figure 2.1.

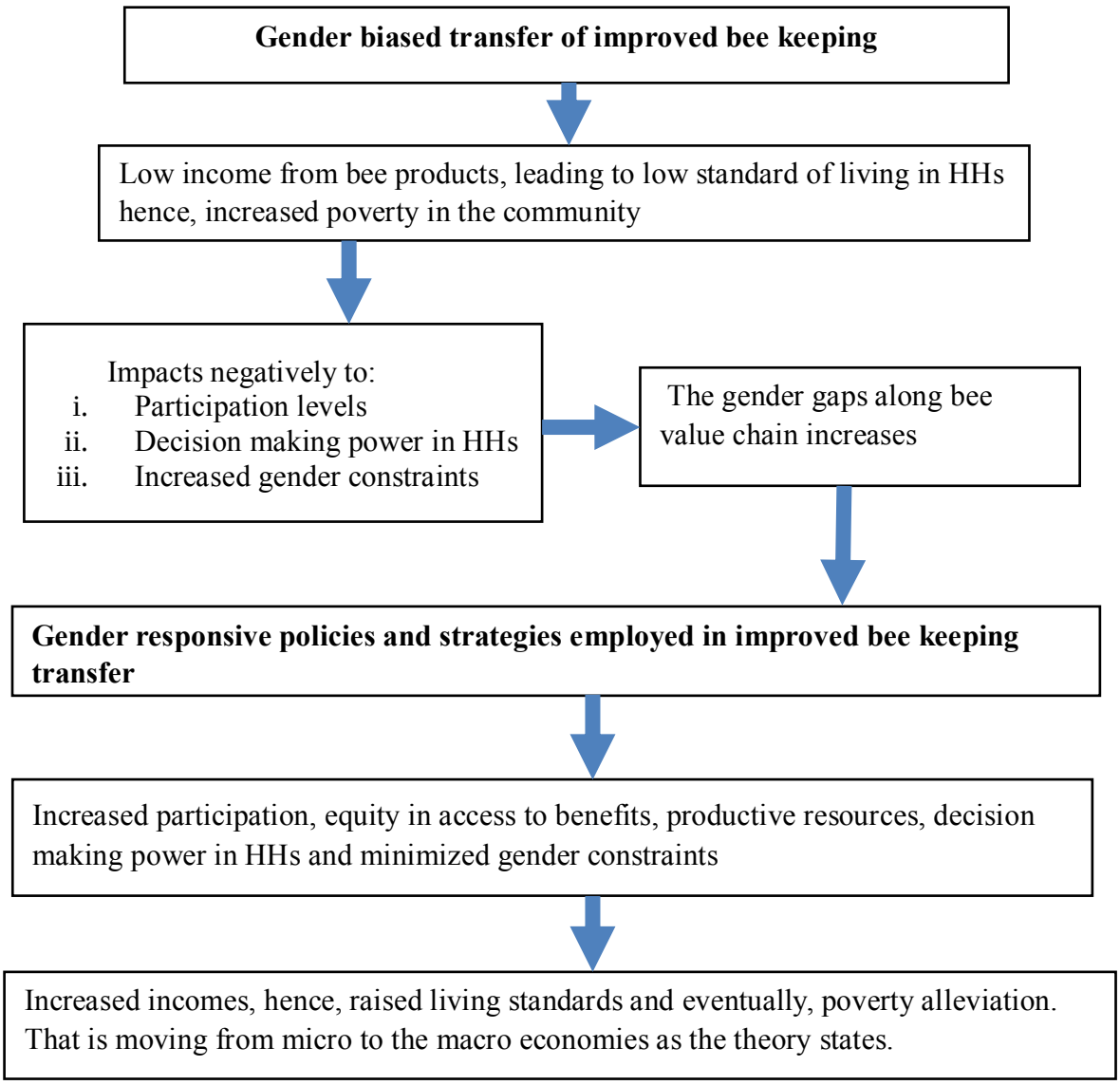


Figure 2.1: Conceptual Framework

2.6.2. Conceptual Framework

Figure 2.1 indicates that the independent variable is gender biased improved bee keeping transfer. All the other variables depend on it. As a result, this leads to gender imbalance in participation in bee keeping production, value addition and marketing of bee products, hence gender challenges. Accordingly, decision making power, especially concerning purchase, sale of, and ownership of productive assets, including benefits accrued from bee products, continue to have a negative influence in the household. Consequently, this leads to low standard of living in households hence, increased poverty in the community. Research shows that men and children, and therefore society at large, stand to benefit if women are brought more centrally into policy on economic development. For instance, female education leads to better nutrition, education for children and family welfare (World Bank, 2012). Blumberg's gender theory supports this fact.

Once policies and strategies employed in transfer of technologies are gender responsive, they will lead to increased participation, equitable access to benefits, productive resources, decision making power in households and minimize gender constraints. This will ultimately lead to increased incomes, hence, raised living standards among resource-poor men and women and eventually, poverty alleviation. Consequently, socio-economic development will be enhanced not only within the household, but also in the entire countries' economy; that is moving from micro to the macro economies.

CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

3.1 Introduction

This chapter starts with a brief description of the study design followed by site of the study, sampling technique and sample size, methods of data collection, validity and reliability of instruments and pretesting, data analysis and ethical consideration.

3.2 Study Design

The study used an investigative survey design. Creswell (2014) defines an investigative survey as one that provides a plan for a measureable description of trends, attitudes, or opinions of a population by studying a sample of that population. The population in this study was the Maasai community (both men and women), who are beneficiaries of the improved bee keeping project in Trans Mara, Narok County. To enrich the investigation, a mixed method approach was used. According to Johnson et al. (2007), this involves combining or integrating qualitative and quantitative research in a study. The strength of a mixed-method approach is its flexibility and it also allows depth into qualitative analysis.

This design allowed triangulation of information which further strengthened validity and reliability of the research findings. Creswell (2014) argues that early thoughts about the value of multiple methods (mixed methods) resided in the idea that all methods had bias and weaknesses, but quantitative and qualitative approach neutralized these. As a result, triangulation (a means for seeking convergence across qualitative and quantitative methods) was born in early 1990s. Procedures for expanding mixed methods included the fact that one database could; be used to check the accuracy (validity) of other, help explain, explore

different types of questions and lead to better instruments when they are not well-suited for a sample or population. A mixed method approach was most suitable for this study. It provided multiple data collection through in-depth interviews from key informants as well as focus group discussions. The study was both qualitative and quantitative in nature. Qualitative data have a tendency to being open-ended without predetermined responses while quantitative includes closed-ended responses found in questionnaires. The qualitative research is used in contemporary research as it provides in-depth data especially on sensitive issues.

It entails collecting data through interviews, analysing and interpreting it by observing what people do and say (Creswell, 2012). Qualitative approach focuses on gathering mainly verbal data rather than measurements. It enables provision of answers to questions and reveals how the study population sees the situation. Accordingly, it enhances the study interaction between the researcher and the respondents. Respondents are able to fully express their experiences, perceptions, and feelings in words (Denzin and Lincoln, 2011). In the study area, the use of mixed method approach made it possible to quote verbatim from respondents.

The quantitative research was also used in the study approach to help quantify variations of different phenomena (Creswell, 2014). It involves processes of collecting, analysing, interpreting, and writing the results of a study. Quantitative research questions are interrogative statements that raise questions about relationships among variables that the researcher seeks to answer. This approach generated numerical data and information that is convertible into numbers. As such, it focused more in classifying features and constructed statistical models and figures, which explained the data collected in the study area.

Information was collected at 2 different levels: 1. bee keeping households, 2. Key informants in the area of study.

3.3 Study Area

The study was conducted in Trans Mara, Narok County, Kenya. According to 2010 Population and Housing Census, Trans Mara had a total of 254,532 persons, 137, 168 males, 137,364 females and 50, 923 households. After the Kenyan Constitution of (2010), Trans Mara has been sub divided into two Sub Counties namely Trans Mara East and Trans Mara West. The former has two Divisions namely Kirdon and Emarti while the latter has five; Lolgorian, Keiyan, Angata, Pirian and Kilgoris. Majority of the Maasai community have settled in Lolgorian Division (GOK, 2010). This is due to the fact that the forest is not yet destroyed and majority of them largely depend on livestock hence, the need for grazing area. Mixed farming is largely practiced in Kilgoris and Angata Divisions where the *Kisii* and *Kipsigis* communities live. Some of the main economic activities in the area include beekeeping, livestock production, crop farming, and small business enterprises. According to GOK (2005), development in Trans Mara has been slowed by factors such as ethnic clashes and absolute poverty, leading to negative effects such as high rates of school dropout and early marriages.

The choice of Trans Mara was based on what emanated from a three month scoping study whose stakeholders had met in KARI in 2009. They agreed that bee keeping was one of the commodities among the five (Banana, African leafy vegetables, Passion fruits, and Indigenous chickens), that are best placed for increased incomes and food security among resource poor farmers, especially women. The aim was to understand the mechanisms for

the development of gender responsive value chains (KARI, 2009). Trans Mara was selected as the site to transfer the improved bee keeping in 2010. According to GOK (2005) bee keeping in Trans Mara has been practiced traditionally for a long time. The enterprise is also a male domain but after improvement women and youth started participating (Sitati and Bett, 2012). It was found to have a lot of unexploited potential and capacity to improve livelihoods. Therefore, these factors informed the selection of the study area. Figure 3.1 shows the area of study.

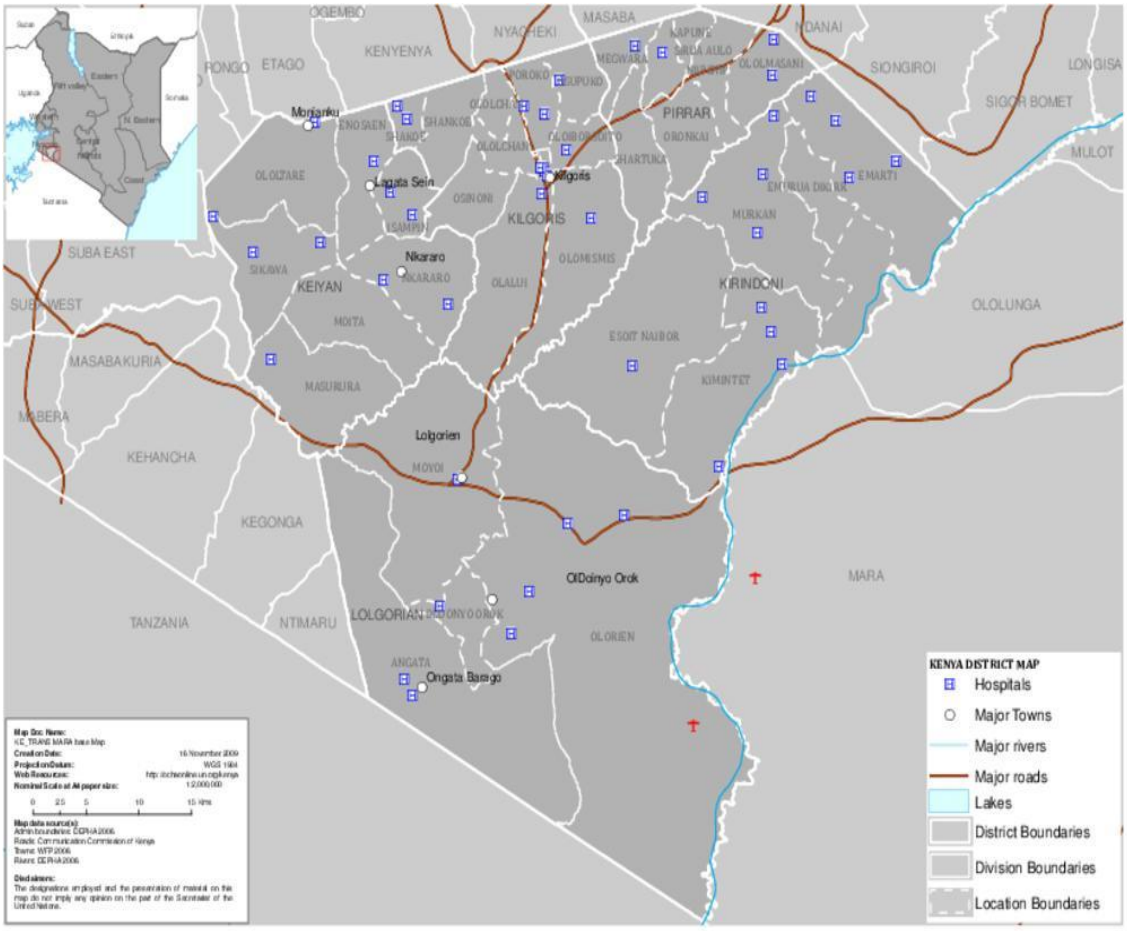


Figure 3.1: Map of Trans Mara, Narok County (Source: GOK, 2010)

The target population comprised of all men and women farmers who were members in the improved bee keeping groups in the study area between 2010 and 2015. The total population

was therefore 632 men and women comprising of those who were married, single, widowed and youth. Also targeted were men and women who were not members in the improved bee keeping groups but were keeping bees within this period. These were used as control.

3.4 Sampling Procedure for Study Objectives 1, 3 and 4

The study employed single stage sampling design. In this a researcher has access to names in the population and can sample the people directly (Babbie, 2007). The study used a list given by a KALRO Officer based in Trans Mara, who was involved in the initial implementation of improved bee keeping project, (O.I Stanley Bett, 2/12/2015). Respondents were sampled for household surveys. It also entailed sampling other key informants as well as participants in Focus Groups Discussions. Sample size was done as follows:

Stratified random sampling was used for the household surveys. According to Fowler (2009), stratification requires that certain characteristics of the population members be known so that the population can be stratified first before selecting the sample. This ensures specific characteristics of individuals such as gender and age are represented, and that the sample reflects the true proportion of the population. This being a gender study, it was the best suited procedure.

The list of all men and women in the improved bee keeping groups(632 men and women) distributed in all the four divisions in Trans Mara namely; Lolgorian, Angatia, Kirdon and Kilgoris, was obtained from O.Is. Kanda and Bett, (2/12/2015), who assisted in the selection of respondents. The study targeted all 632 bee keepers who were clustered into their

divisions. The list was used to identify names by gender and age while writing them in a separate paper. After writing names, stratified random sampling was used to select respondents ensuring gender and age was taken care of hence, going by the list, majority of bee keepers were in Lolgorian (275), Angata (200) and Kirdon (112). Kilgoris had the least number, approximately 45. In Lolgorian, out of 275, a total of 78 men and women were randomly selected. In Angata, 57 men and women were selected from a total of 200. Kirdon division had 112 from which 33 men and women were selected. Kilgoris had 45 bee keepers from which 12 were selected. A total of 180 men and women respondents were selected for the household survey translating into 28 % of the targeted population (632). The sample size is represented in the table 3.1 below.

Table 3.1: Sample Composition of Household Survey

	Female HH	Men in MHH	Women in MHH	Youths	Total	Target	% of target
Lolgorian	11	23	22	22	78	275	28
Angata	8	17	16	16	57	200	29
Kirdon	5	10	10	8	33	112	29
Kilgoris	1	3	4	4	12	45	27
Total	25	53	52	50	180	632	28

3.5 Sampling Procedure for Study Objective 2

The sample for objective two used a household as the unit of study. The aim was to assess the decision making power among bee keeping households in the study area. It was based on the premise that economic opportunities alone might not necessarily lead to decision making power within households without rights of control to productive resources (Alkire et al., 2012). This was achieved by using a tool that track changes in men and women's decision making power levels in a household as a result of a development initiative. In this

study, the development initiative was transfer of improved bee keeping. Five dimensions were analysed: production; resources; income, time and leadership.

The study had a control group for purposes of comparisons between households who were in improved bee keeping groups and those who were not. (Those in groups received various trainings as well as five improved hives while those who are not in improved bee keeping groups had no trainings at all as well as incentives). In this survey, the study used random and snowball sampling. The study had planned to use the list provided by O.Is. Bett and Kanda. However, since it entailed selecting a household (either male head and spouse or female head), it proved difficult due to the fact that it had individual membership and not as couples.

As a result, with the help of group leaders, the study decided to select from the members' list who were not included in interviews for objectives one, three and four. As such, a total of 225 men and women were sampled. With assistance from group leaders, the study made efforts to ensure that households sampled had received trainings. Stratified random sampling was then used to select fifty five (55) respondents. Their spouses were directly selected. Hence, out of the sampled fifty five (55), forty (40) were male headed while fifteen (15) were female headed translating into 24% of the target population (225). The sample size is represented in the table 3.2 below.

Table 3.2: Sample Composition of HH Empowerment Survey

Division	MHHs	FHHs	Total interviewed	Target	% of target
Lolgorian	18	4	22	92	24
Angata	16	4	20	80	25
Kirdon	4	6	10	40	25
Kilgoris	2	1	3	13	23
Total	40	15	55	225	24

For control group, snowball sampling was used. The group leaders knew their members thus, they acted as key persons in identifying households who did not belong to improved bee keeping groups and had at least two traditional hives in their apiaries. In every Division, three individuals were identified and data collected from them. The group leaders, together with the persons interviewed assisted in identifying other people in their locality who also became part of the sample. Information was collected from them and they also identified others until the required number in each division was reached. The study needed an equal number (55 respondents) of a control group. In Lolgorian, Angatia, Kirdon and Kilgoris, 24, 19, 9, and 3 were selected respectively totalling 55 (42 male headed and 13 female headed). The sample size is represented in the Table 3.3.

Table 3.3: Sample Composition of HH Empowerment Survey (Control)

Division	MHHs	FHHs	Total
Lolgorian	19	5	24
Angata	15	4	19
Kirdon	6	3	9
Kilgoris	2	1	3
Total	42	13	55

Sixteen (16) key informants were selected from improved bee keeping group leaders, bee products retailers, KARLO officers and County Agricultural officers. For group leaders, a list was obtained and through stratified random sampling, respondents were selected. Efforts were made to categorise the leaders into clusters of chairpersons, secretaries and treasurers. From each cluster, more efforts were made to include both men and women and 10 were selected. The study further randomly selected 2 County agricultural officers. Convenience sampling was then used to select 2 bee product retailers. The rationale for conducting key informant interviews was to get in-depth information women's and men's participation levels, in improved bee keeping, challenges they are facing and strategies that they are

certain can be employed to make the enterprise gender responsive. The sample size is represented in the Table 3.4 below.

Table 3.4: Sampled Composition of Key Informants

	Male	Female	Total
County agricultural officers	1	1	2
Bee keeping group leaders	5	5	10
Bee products retailers	1	1	2
KARLO officers	2	0	2
Total	9	7	16

Sample for Focus Group Discussions (FGDs)

Thirty six (36) men and women who were participating in improved bee keeping groups between 2009 and 2015 were sampled for FGDs. Participants were selected using stratified random sampling. This being a gender survey, efforts were made to ensure that gender and age was taken care of. The names of all the 32 improved bee keeping groups were clustered into categories of; mixed gender, same gender and youth. From each cluster, the groups were written on papers; each was given a number, cut and rolled, then four (4) were randomly selected, 1 mixed gender, 2 same gender and 1 youth group. This gave every group an equal and independent chance of selection. The same procedure was repeated to select the people to participate in FGDs; this time from the 4 sampled groups. The sample composition is shown in the Table 3.5 below.

Table 3.5 Sampled Composition of Focus Group Discussions

	Male	Female	Number of participants
Bidii Torch group	8	0	8
Kaptigei widows group	0	10	10
Naratisho women group	0	9	9
Oreteti youth group	7	2	9
Total participants	15	21	36

3.6 Data Collection Methods

To collect household data, fourteen (14) research assistants were utilised. Structured and Semi-structured interviews with closed and open ended questions were used to collect both qualitative and quantitative data based on research objectives. (Appendix A3). This was a guided interview which provided an opportunity for further probing which enabled collection of sufficient information on household characteristics and study objectives. A FGD guide (Appendix A4), was used to collect information from men and women who were selected as participants in group discussions. The guide had open ended questions on the study objectives which allowed in-depth discussions. The FGD was administered using *Maasai* language to enable participants understand and respond efficiently. An interpreter who understood both English/or Swahili and *Maasai* languages was utilised and the sessions were documented in notebooks.

Interview schedules were used for key informant interviews. The guides had open ended questions which slightly varied in content depending on the information represented. However, there were common questions for all informants which addressed perceptions on men's and women's participation in improved bee keeping, decision making powers in households and challenges encountered. Secondary data on bee keeping was also collected from the Ministry of Agriculture offices in the region and Kenya Agricultural and Livestock Research Organisation (KALRO) Trans Mara, which has a component that trains bee keeping farmers in the area.

3.7 Pre-testing of Instruments

The purpose of an initial pilot study was to pre-test the instruments for reliability and validity which, were tested as follows:

Household interviews were conducted with thirty (30) persons; twenty 20 (men) and ten (10) women who were keeping bees in Trans Mara County. With assistance from key persons in the area, the sample was selected randomly from among the bee keepers who owned at least an improved hive. The other instruments tested included interview schedules for KIIs as well as FGD guides. This assisted in testing the feasibility of the questions. After the pre-testing the study tools were restructured especially wording, any research bias, and ensured that all topic areas were addressed.

3.8 Validity and Reliability of Research Instruments

To ensure validity and reliability of instruments, pre-testing was done with a sample of twenty 20 (men), ten (10) women and a key informant. They were then refined before commencement of the actual data collection. This ensured that questions in the schedules were valid, appropriate and sufficient in content for ease of data collection based on study objectives. The time taken to complete the interviews was recorded during pretesting in order to match it with the one allocated for each interview. This ensured that instruments were formulated in such a manner that accurate information was collected. For example, in questions where husband and wife were supposed to be interviewed, efforts were made to interview them separately. This assisted in avoiding similar answers and ensuring their comfort when responding to the questions. This further ensured that the data collected was reliable.

3.9 Data Collection Procedures

In all interviews, prior arrangement was communicated. This was made possible through group leaders' assistance as well as key informants. It ensured availability of respondents and also avoided wasting time due to the fact that majority are busy people with other activities. The study made efforts to conduct most interviews during non- market days especially those that included both male head and a spouse. This is because men could not be found during market days. The study also decided that most interviews which involved women alone should be conducted between 2 to 4pm when majority were free from household chores

3.10 Data Processing and Analysis

Quantitative data collected was processed through manual cleaning and then edited. This involved scrutiny of research instruments in order to address any possible errors, and any information gaps that may have been obtained from the respondents. The data was then coded in a book. It was followed by data entry which was eventually analysed using descriptive statistics in SPSS computer software version 20. WEAI data was processed in CSPro 5.0 package and performed in Stata computer software version 10. Qualitative data was processed by cleaning it manually through identification of main themes from in-depth interviews. It was then classified as per the study objectives. Excel spreadsheet was used for further data interpretation especially inserting charts. Results were then presented in form of lists, means, frequency tables, percentages and charts.

3.11 Ethical Considerations

The researcher attained a letter to undertake research which was given by Kenyatta University Graduate School. Permission to carry out the study was sought from the National

Council for Science, Technology and Innovation. A paid study leave was also sought from KALRO which was granted on the basis that progress reports would be submitted to the Institution. Gender issues especially those to do with households are sensitive hence, need for confidentiality is paramount during the interviews. With assistance from key persons in the area, the study made effort to build confidence of all potential participants by explaining to them that the main purpose of the study was academic. Additionally, the study team ensured respondents were interviewed privately where necessary, especially in the case that required male head and a spouse responses. As such, the team ensured freedom of participation. Similarly, all the participants were assisted to read, understand and sign the consent forms appropriately. They all agreed to have either their photos taken and shared for academic purposes or not (Ethical form appendix 1).

This chapter has discussed the methodology used to collect information on gender gaps in transfer of improved bee keeping among the Maasai community in Trans Mara using the study objectives. The next chapter presents the results and discussions.

CHAPTER FOUR

FINDINGS AND DISCUSSIONS

4.1 Introduction

This chapter presents the study analysis, interpretations and discussions according to the objectives, research questions and premises. Focus is on the gender gaps in technology transfer among the Maasai communities in Tran Mara, Narok County. The presentation is guided by the study objectives under the following sub headings: levels of participation of men and women in bee keeping value chain; decision making power among bee keeping households; challenges faced by men and women in improved bee keeping; and effective strategies that can be employed to make the enterprise gender responsive. In addition, the demographic characteristics of men and women, which is perceived to have influenced participation in the value chain have been discussed.

4.2 Demographic Characteristics of Respondents

The demographic characteristics of men and women participating in bee keeping include gender, age, household type, household size and education. The study analyzed them as it relates to improved bee keeping value chain.

i) Gender

Gender is an important variable since, apart from exploring men's and women's level of participation in bee keeping value chain, the assumption was that their challenges are also unique. This is important because most of the literature in bee technology is gender neutral. The study interviewed 95 (53%) males and 85 (47) % females making a total of 180 respondents for objectives one, three, and four. In objective two, out of 192 respondents, 110 (57%) were females and 82 (43%) males. The total number of respondents was 372. This

shows that women are joining bee keeping, an enterprise traditionally perceived as male dominated, thereby showing a gender shift. This can be attributed to the fact that the improved enterprise has more advantages as indicated by various scholars; (King, 2013; Sitati and Bett, 2012) who assent that it is economical, needs less land and does not require excessive labour and time to manage, since bees do most work. These characteristics are highly compatible with women's needs and constraints who have been marginalised in crop agriculture especially in access to land, labour and time to perform triple roles. Thus, the strategies used to transfer improved bee keeping need to be gender responsive in order for women who are amateurs in the business, to benefit.

ii) Age of Respondents

The ages of men and women participating in bee value chain are important especially because for a long time, the enterprise has been considered an occupation of old people (FAO, 1990). Now that it has been improved, it is expected to increase income in the community, hence, participation of youth is paramount. This is due to the fact that most unemployed young men and women in rural areas can benefit largely from the enterprise since it does not require much land, a big challenge for youth in crop agriculture. Out of 180 respondents, majority 120 (51.7% men and 48.3% women) were below 37 years indicating that more youth have joined the enterprise. Further, the findings illustrate a shift from the belief that bee keeping is exclusively for the elderly. King (2013) affirms that over the last decade, improved hives have enabled participation of younger persons. This can be attributed to the fact that young persons are constrained by access to land and this has contributed largely to their lack of participation in crop agriculture. Improved bee keeping does not require much land. There is therefore need to include them in strategies developed

for the improved enterprise. The fact that they are participating in large numbers shows their enthusiasm not only in order to earn extra income, but also joining others in raising their community's living standards. The study noted that most of them are using extra income to educate themselves, a positive indication for the socio-economic development of the country as stipulated in vision 2030.

The fact that improved bee keeping is favourable to women and youth is illustrated in two case studies of a successful woman and a youth who is using it as a climate smart agricultural livelihood.

A Successful Case Study of a Woman in Bee Keeping Business in Kenya

Left: Leah with her beehives at Mau Narok, Nakuru. Right: Leah with an ABRC officer displaying her honey on sale from her shop (*Source: ABRC, 2015)* http://africanbeekeeping.org/category/case-studies/

Leah was identified as a very good beekeeper by the Bee keeping officer, Nakuru County, because she is consistent, and addresses problems when she finds them. Leah was trained in beekeeping at Baraka Agricultural College in Molo and received follow-up support from staff at the college. At the time of the interview in 2015, Leah had Kenya top bar hives (KTBH) and Langstroth hives. She had no traditional beehives. According to her, they do not do well. Out of her 26 beehives, 20 were occupied. She usually harvests about 20 hives and collects an average of 20 kg per hive/annum. Leah says the KTBH average is 20kg per hive, the Langstroth gives 10kg per hive while traditional log hives yield 5kgs. She prefers KTBH hives. Leah sites her hives in different parts of her small farm; they are not in one place. She says this makes it easier to harvest because other hives are not disturbed when she is working. (These bees are quite defensive, she says.) From the proceeds of her beekeeping enterprise, Leah has bought one and a half acres of land, a major achievement given that it has nearly doubled the size of her farm.

Leah cites the following opinions on what makes a good beekeeper;

- *Know how to set up an apiary site*

- *Know the best type of hive to use*
- *Open beehives every two weeks to check for pests (like spiders)*
- *Have flowers for bee forage*
- *Are always building their knowledge*
- *Harvest good quality honey and don't mix it with brood*
- *Know the right time to harvest honey. (She says the bees become more aggressive when thye have honey; and that honey is ripe when the flowers wither.)*
- *Have proper harvesting gear*
- *Know how to add value to honey*
- *Place top bars correctly/make them correctly to avoid problems at harvest such as more than one comb per bar or the bees not attaching the comb to the top bars correctly.*
- *Entrepreneurship*

She is an entrepreneur and finds many ways to make her business successful;

- *She charges Ksh.200 to remove bees from people's homes. (She takes the bees back to her apiary and puts them in a hive.)*
- *She filters, bottles and sells her honey from her small shop in the nearby local centre.*
- *She is a leader in her local beekeeping group. (The group has its own label for marketing honey, and encourages all their members to use it to improve marketing. It is called The Great Mau Honey.*
- *Honey is sold at the following prices: 250g for Ksh.200k, 500g sells for Ksh.300; and 1kg for Ksh.600k*.

Leah provides a number of lessons on what makes a woman a successful beekeeper:

- *She has overcome her fear of bees*
- *She thinks about beekeeping and her business, and is keen to build her knowledge*
- *She is systematic and thorough, regularly checking her hives and managing her bees*
- *she has experimented with all types of hives to find which suits her best*
- *she distributes hives around her farm to make harvesting easier*
- *She is a good networker*
- *She is enterprising; adding value to her bee products and selling from own shop*
- *She is a role model for other women in beekeeping*
- *She is successful, and has bought land to expand her farm from the proceeds of her beekeeping.*

Case of a Young Beekeeping Farmers' Venture to Shield Him from Climate Change (source; Farmbiz Africa, 2016).

Samuel Mbuvi (not his real name) began honey farming in the year 2000 with three KTBH. But three years later, he was linked to a Belgian Non-Governmental Organization, from which he was fully trained on bee keeping as a business, prompting him to buy Langstroth beehives. Samuel has become a role model to many people in his village and beyond who

visit his farm to learn about techniques one can use to remain productive despite the scorching drought. Samuel is a dedicated dry-land young farmer. He comes from the arid Matungulu area of Eastern Kenya. He is shielding himself from dry spells by embracing climate resilient farming like beekeeping and has become a model to others as thousands of customers flock to his farm for quality honey. From his five acre piece of land, the farmer has been able to pay school fees for his children to the university level.

"*At ten O'clock in the morning on this particular day, two motorists drive right into the compound in search of honey. Whenever am not around, my wife is always indoors waiting for clients like the ones who have just arrived. The fastest moving product is honey. But at times I receive buyers of indigenous chicken*," *said the farmer.*

Samuel has 22 Langstroth Beehives on his farm, some of them confined in a grass thatched apiary, while others are hanging on trees and shrubs on the farm. According to him, Langstroth Beehives are the most convenient especially if one has to practice beekeeping as a business. They have rectangular frames made of wire-mesh.

> "*The main advantage is that the bees build honeycomb into the wire-meshed frames, making it easy for the farmer to move the combs without trouble Unlike other beehives, it is easy to pull out one frame after the other from the Langstroth beehive to check whether there is honey without breaking the combs*," said the farmer.
>
> *"I usually harvest between 15 to 18 kilograms of honey from each beehive twice a year. I have a special machine for extracting honey without getting impurities into the final product, and without damaging the honey-combs, and this is what customers need pure honey*," he said.

iii) House Hold Type

Household type not only influences power relations in most African homes, but is also an important variable in understanding gender related factors such as marital status. The study used the variable to explore its influence in both men's and women's participation in bee keeping value chain. Similarly, it assisted in assessing the decision making power in bee keeping households. With this in mind, the study sought to find out and document the type of households participating in improved bee keeping. As expected in a rural setting, majority

of households were headed by men. Out of 290, 196 (67%) were male while 94 (33%) were female.

The type of household influenced participation especially in marketing bee products, and access to productive resources such as land. Similarly, the findings showed decision making power is centred on males. Consequently, women are vulnerable considering they are new in the enterprise, and the fact that the community is conservative with prevailing gender perceptions which, as Will (2015) argues, further widens gender gap while women continue to bear the consequence.

For example, GOK (2009) argues that cultural beliefs and taboos in some communities has caused discrimination of women and youth who are not allowed to keep bees, leaving the industry a domain for old men. However, this problem is slowly disappearing through education and introduction of improved technologies. The slow disappearance of such cultures can be short-term or long-term in different communities. Development interventions need to understand diverse traditions which calls for gender responsiveness before any transfer. It will enable them assess the tradition's' impact to both genders' participation, which can then assist on how to conduct the initial trainings.

iv) Household Size

Size of a family may influence the utilization of natural resources e.g. fuel consumption, food production etc. This in turn may lead to a substantial degradation of ecosystems. Consequently, this study sought to find out the number of children living in each household of participating respondents. Results are shown in Figure 4.1 below.

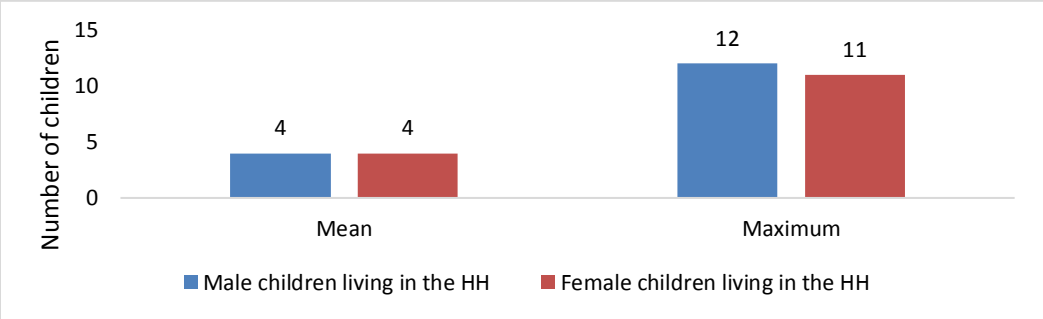


Figure 4.1: Number of Children Living in a Household

The findings show that on average, there was an equal number (4), of male and female children living within a household. The maximum number of the former and latter was 12 and 11 respectively. *Maasai* culture is predominantly polygamous, a practice that causes high increment in family size. Big sizes of families increase the need for food a fact which could have contributed to the intense destruction of forest in the study area to pave way for crop farming, thereby threatening sustainability of indigenous trees which is detrimental to bee-keeping. The study noted that most men and women are cutting trees, to pave way for maize farming. They can be sensitized on the importance of improved bee keeping as an avenue to earn more income in comparison to maize. Research has compared gross margins of maize and the improved bee keeping, and concluded that the latter has more profits (Carroll, 2006), among other benefits including using less land. This knowledge should be relayed during initial trainings as part of sensitization.

v) Levels of Education

Education plays a vital role in the socio-economic well-being of any community. In bee keeping, it is crucial as it shifts into a commercial enterprise. Men and women require basic knowledge in transacting business which is supported by Mujuni and Kugonza (2012) that education enhances acceptance of improved technologies since it facilitates farmers'

adoption of innovations. The study sought to find out the education levels of participating respondents. Results are shown in the Figure 4.2 below.

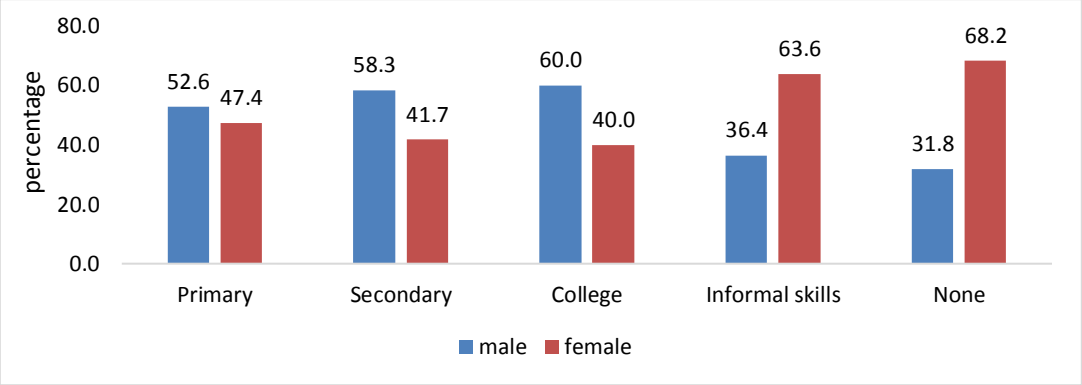


Figure 4.2: Education level by Gender

Results reveal that though majority could read and write, more women (68.2%) compared to men (31.8%) had no formal education. This indicates that in the study area, the former are generally less educated than the latter. Consequently, it has a negative impact on the socio-economic welfare of the area considering the fact that all genders are participating in the enterprise. The study noted that some women aged 18 lacked basic knowledge as little as writing their names.

This is attributed to the conservative culture of the *Maasai* community that equates women with wealth. As a result, many are married off as teenagers which further widens the gender gap since the knowledge of how to read and write is vital for any commercial undertaking including improved bee keeping. However, it was further noted that this custom is fading away since a number of men and women are embracing education by taking their children to school. For example, several bee keeping groups among the elderly had incorporated young people as their secretaries and treasurers who were also assisting with language barrier especially translating to visitors.

Thus, young people who can read and write are not just participating in bee keeping to earn income; they are giving back to the community by assisting the elderly achieve their goals in the enterprise. This confirms the value of education in any profit-making enterprise, a move which conservative *Maasai* people are starting to realize and embrace. County governments and other stakeholders in improved bee keeping need to consider engaging men and women not only in bee keeping trainings but also related seminars such as leadership abilities, book keeping and money management. For instance, they can start with group leaders who will pass the knowledge to members in a language they can understand. Further, adult classes can enlighten the young women who are illiterate since, as the African proverb says "*Educa*ting *a woman is investing in a community*". In support of this, Obama (2015) states that a woman is a power house of entrepreneurship and when she succeeds, she invests more in her family and community.

Demographic data influenced participation especially in access to improved equipment, trainings and marketing of bee products, the stages that adds more value especially in access to income. Consequently, women and youth are marginalised, and the fact that some young females are uneducated, continues to widen the gender gap since they are required to have basic knowledge on how to transact business. This is more elaborate in section 4.3 below.

4.3 Participation levels of Men and Women in Improved Bee Keeping value chain

The study was set with four objectives as earlier stated. The first objective was to identify the levels of participation of men and women in improved bee keeping value chain. This assisted on exploring further how demographic data influenced involvement in bee value chain, the gender gaps therein and how to fill them. This was achieved by assessing

percentages of men and women who had access to the improved equipment, and other productive resources associated with enhancement of bee keeping such as credit. The study sought to specify indicators as high; medium; and low. This was informed by the number of respondents for objectives one, three and four by indicating 70% and above as high; 50 to 69% as medium; 49% and below as low. This is distributed in Table 4.1.

Table 4.1: Levels of Participation Indicators

Number of respondents (180)	Percentage	Indicator
126 and above	70 and above	High
90 to 125	50 to 69	Medium
88 and below	49 and below	Low

Source: Study indicators

The study analysed participation in various stages of improved bee keeping (Table 4.2).

Table 4.2: Variables Analysed in Improved Bee Keeping

Stage	Access to:
Production	Contemporary Hives
Harvesting	Smoker, bee suit (harvesting gears)
Processing	Filter tank and perforated strainers,
Packaging	Packaging materials like plastic jars with lids
Value addition	Value added bee products

The study determined participation levels of men and women in improved bee keeping by analysing three main stages: 1. Access to contemporary bee equipment. 2. Access to value addition skills and marketing bee products: 3 Access to and control of productive resources in improved bee keeping. In number 3, the following variables were analysed; land, productive assets in household and credit for enhancing improved bee keeping. Engagement in activities in improved bee keeping were also analysed.

4.3. 1 Access to Improved Bee Keeping Equipment

i) A Brief Introduction of the Traditional Methods that were improved

Bee keeping technology was transferred in Trans Mara in 2010 (KARI, 2009). According to

O.Is Kanda and Bett (14/12/2015), during this period, bee keeping was being practiced traditionally. The *Maasai* men and women were using traditional log hives which were hanged on trees. To protect the wood from water damage especially during rainy season, different materials such as tree barks, polythene paper and iron sheets are used as shown in the photos.

a) A farmer with a hollowed trunk log hive

b) A young man with a Traditional log hive covered with iron sheet to protect from water

c) A Traditional log hive covered with polythene paper to protect from water

d) A bee farmer with a Traditional log hive covered with tree bark

Source: Trans Mara

Nonetheless, it was noted that long rains destroy most of the traditional hives despite the protection materials. As a result, predators such as insects invade them.

Further, the study observed that before the introduction of improved bee keeping, honey was harvested by use of smoke and without any protection apparatus. This method was not attractive to women which was attributed to fear of bee stings and the fact that customarily, bee keeping has been a male domain passed through inheritance. This is detrimental to bee

keepers as well as the bees. The hot smoke not only kills them but can also be harmful to the bee keeper as shown in the following photo.

A bee farmer harvesting honey from a traditional hive without protective materials and with smoke

Similarly, packaging equipment for both harvested and semi-refined honey were of low quality. Majority of men and women were using readily available materials. Most of these equipment were either damaged, with lids not fitting properly, or without lids. According to Carroll (2013, these materials lower honey quality. Some of the materials used as shown in the following photos.

a) Semi-refined honey in a locally available material

b) Harvested in a locally available containers without lids

Source: Trans Mara

Traditionally, refining was done by smashing crude honey by use of 'kitchen stick' then passing it through locally available materials such as mosquito nets in order to remove dirt and particles. Consequently, such materials are not usually hygienic and are certainly a threat

to the consumer. O.Is Kanda and Bett (15/12/2015) cited that at initial stages of implementing the enterprise, men and women in improved bee keeping groups were trained on good management practices which included; using improved hives such as KTBH and langstroth hives including harvesting using smokers and protection clothing (gears) as shown in the following photos.

*a) **Left:** Langstroth; **Right**: KTBH, both hanged on a tree branch*

b) A farmer harvesting honey from an improved hive using a smoker and wearing a gear

c) After Smoking women and girls can comfortably harvest honey

Source: Trans Mara

Similarly, the bee keeping group members were trained and sensitized on how to process honey using quality materials; (perforated strainers, filter tanks) and packaging using quality materials such as plastic containers with lids as shown in the following photos.

Source: Trans Mara

a) Necessary materials used for refining honey

b) Refined honey Packaged in plastic containers with lids

The members in the groups also received some household empowerment trainings on joint ownership of the improved equipment and value addition skills. The study measured the levels of participation in access to improved equipment and findings are recorded in the following section.

ii) Access to Contemporary (improved Hives)

Improved hives have many advantages compared to traditional ones. They yield higher and are long lasting due to their high quality materials. Also, while traditional hives are placed on trees, modern ones can be located at accessible positions to all, including women. These characteristics add value to modern hives in comparison to traditional ones. The study therefore sought to explore their access through evaluation of the total number owned by an individual. Findings are shown in Table 4.3 and Figure 4.3.

Table 4.3: Access to Improved Hives by Gender

Type of hives	No. of Farmers	Male	Female	Male	Female	
	Total	N	N	%	%	Total %
Traditional	164	100	64	61.0	39.0	100.0
KTBH	78	60	18	76.9	23.1	100.0
Langstroth	8	8	0	100.0	0.0	100.0
Total	250	168	82			

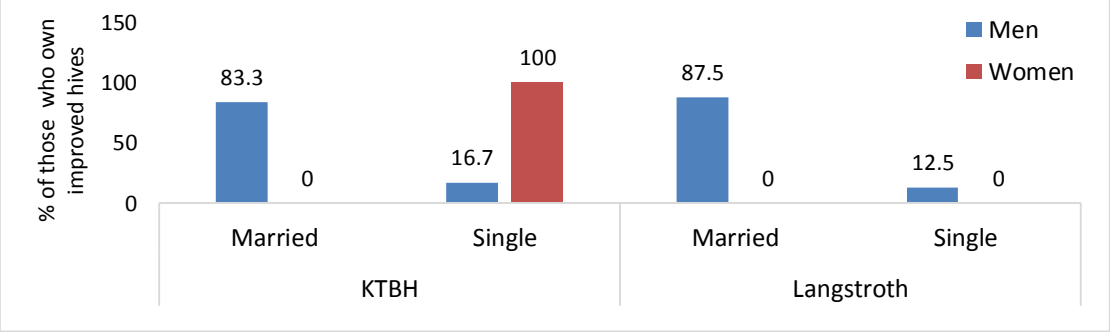


Figure 4.3: Access to Improved Hives by Marital Status

Findings reveal that out of 78 bee keepers who own KTBH, a high number 60 (76.9%), are men compared to women who are only 18 (23.1%) (Table 4.3 above). These results show

women's vulnerability at this point of the value chain despite the fact that they are amateurs in the business. Nevertheless, the fact that they are accessing improved hives shows a positive indication, and if challenges constraining them are resolved, many can participate.

In Figure 4.3, out of 60 men who owned KTBH, majority 50 (83.3%), are married while further analysis on age showed they are above 35years. Notably, the 6.7% single men are between 20 to 28 years. Interestingly, the 18 women who owned KTBH are all single (Figure 4.3), while further analysis showed that majority 15 (83.3%), are widows and 3 (16.7%) are separated with husbands.

Notably, no woman owned langstroth as all are possessed by men. These results show vulnerability at this stage of the chain especially on married women and young men. This could be due to constraints in capital and gender perceptions that put married women on a detrimental position in the society. For instance, while women in FHHs may own some productive resources, this autonomy belongs to men in MHHs. Further, most young persons who own improved hives are men which supports sentiments echoed by O.Is Kanda, Bett, Lelei, et al (14/12/2015). They said the following:

> *Traditionally, men pass property to sons hence, they are the ones who inherit their father's apiaries and hives. Girls are assumed they will own the enterprise, if they so wish, while in their husbands' homes.*

The sentiments above show the inequalities women, especially those in MHHs are facing as a result of cultural and gender perceptions, a fact that projects with bee keeping initiatives should not ignore. This is because access to improved equipment such as hives determine the value in latter stages because they yield more than traditional ones hence, extra income. This negates the intention of improved bee keeping which was to reduce the gender gap witnessed in crop agriculture thereby increasing household income and raising the standard

of living amongst both genders. As a result, instead of reducing the gender gap in access to productive resources, it widens further. Unfortunately, women in the study area were bearing the consequence. This is further confirmed by what the study noted. Improved hives are owned in groups while individual possession is very low. The study noted that the bee keeping intervention donated five improved hives to each participating group and they were expected to increase them. However, while men did increase, most women groups did not. Asked why this is the case: O.Is. Elizabeth Nalikungishu, Sainyo Maria, Ann Natuno et al. (22/12/2015) had this to say:

> *"We have realised that improved hives yield more honey in comparison to traditional ones and the fact that bees take a shorter time to occupy. However, access to capital to buy them is a challenge to majority of women. Men in this area own large herds of livestock. As such, income is not a problem so they are privileged in purchasing the improved equipment".*

The study noted that apart from capital challenges, women in the study area face other challenges such as cultural perceptions. For instance, while interviewing *all women* FGDs, men would sit nearby in order to listen to what women were saying. When probed further, O.I. Stanley Bett (28/12/2015) said:

> *Most conservative men in this community perceive women as "children" who may not have anything tangible to offer visitors hence, their presence required in the case where gender-specific female are present.*

This was noted in *gender-integrated* FGDs in which men and women would sit at separate positions due to strict cultural practices yet, gender integration is expected to minimize the impact of negative culture. This is shown in the following photo.

A gender-intergrated FGD during interview.

These results show persistence of inequalities in access to productive assets especially during transfer of development interventions among resource-poor men and women. This is mainly as a result of projects that fail to consider basic questions concerning gender differences in availability of resources, their roles, challenges, and how these differences might be relevant to proposed interventions. Consequently, it is often assumed that technologies have the same impacts on men and women, when in fact, they do not (Ruchi et al., 2012). This believe has resulted to negative impacts in interventions that are intended otherwise. For example, beadwork is a traditional way of earning income among *Maasai* women, which is more labour intensive and earn less in comparison to improved bee keeping, yet, according to O.Is Tolian, Nerein, Soila, and Kasaini, (28/12/2015), they still hold to it.

This is mainly as a result of cultural beliefs concerning men's and women's productive activities, a tradition prevalent in most communities, but rarely considered as a hindrance to participation and hence, low adoption by most development interventions. There is need for stakeholders in improved bee keeping to integrate gender in their programs in order to maximise participation of men and women. It is possible through awareness initiatives for instance, to sensitize *Maasai* women that they can earn income from improved bee keeping which is not labour intensive, and use extra time in beading.

The fact that they have embraced it by participating in initial trainings shows their willingness to adapt. Similar findings by Mujuni and Kugonza (2012) shows that majority of Ugandan men still hold onto tradition of keeping women out of most men's activities. This calls for the need to blend culture to increase women's participation in, and definitely, it will increase income and raise the standard of living as intended.

ii) Access to Harvesting Gears and Smokers

The study noted that traditionally, honey was harvested by using smoke and without any protective apparatus. This is detrimental both to men and women farmers, and also bees due to the fact that smoking not only kills them but also can be harmful to the bee keeper. Owning improved equipment not only increases yield but also income. It prolongs honey production through protecting bees from fire, and at the same time enhancing men's and women's participation especially those who fear bee stings. To understand the levels of participation in access to gears and smokers, the study sought to document the number owned by both men and women. Findings are shown in the Tables 4.4 and 4.5.

Table 4.4: Access to Harvesting gears and Smokers

	Total Frequency		Male		Female		
	N	%	N	%	N	%	Total
Harvesting gears	36	20	35	97.2	1	2.8	100
Smokers	24	13.3	24	100	0	0	100

Table 4.5: Access to Harvesting gears and Smokers by Age

Equipment	Gears			Smokers		
Age range	18 -29	30- 39	40-60	18-29	30-39	40-60
Men	28.6	60.0	11.4	37.5	50	12.5
women	0	100	0	0	0	0

Results reveal that most of those who owned gears were men 35 (97.2%), while only one woman had it (Table 4.4). Furthermore, no woman possessed a smoker since all the 24 owners were men. Analysis by age shows that most men who owned gears and smokers, including the woman who owned the former, are within 18 to 39 years (Table 4.5). This confirmed that improved enterprise is favourable to the youth. Conversely, access to harvesting equipment is low for both genders though women are vulnerable thus, just like in access to hives, women's participation levels are decreasing further in nodes of the chain

with high value. These results further show the willingness of young men and women to participate in bee keeping. Their low participation can be attributed to capital constraint. On the other hand, elderly men own large herds of cattle, and they also control most productive resources thus, they have no excuse of not purchasing the improved equipment. They are probably reluctant to buy them since they still hold to traditional methods which majority have used for decades.

Consequently, though women are participating, it is minimal in comparison to men's, a gender discrepancy that militates against the transfer. This is despite the fact that the aim of improving bee keeping equipment was, among other reasons, to make them favourable to vulnerable farmers, especially women yet, they remain marginalised. This can be improved through awareness initiatives targeting both genders. First; those who are holding to their culture hence, taking time to adapt to change, secondly; commitment to gender equality during transfer which will ensure equity along the chain for enhanced participation, particularly for women who are amateurs in bee keeping.

These findings corroborates King (2013) that though improved bee keeping has increased access to income among women, their participation decreases towards the higher levels of the chain where value is added significantly. This shows that as the agricultural sector is becoming commercially oriented, women continue to experience additional barriers that are limiting their ability to adapt to, and benefit from this change. Consequently, if technology developers and stakeholders with development interventions continue to ignore gender issues in livestock and agricultural production, it will take a longer period to achieve the

goals envisioned both in national and international programs, for instance, vision 2030 and the governments' agendas four initiative, among which is achieving food security by 2022.

iii) Access to Quality Refining Equipment and Processing Skills

According to Sitati and Bett (2012), compared to crude honey, the refined fetches more income. Crude is a mixture of honey that is ready for harvesting (ripe) and that which is not (unripe). During harvesting, wax, comb, and brood are all mixed into one container hence, many consumers do not like it. On the other hand, the refined is clean since it is strained to remove all particles of beeswax and other material. However, it is unchanged since nothing else is added. It is still the pure honey which the bees made in the hive. The study noted that refined honey is preferred by most consumers. In order to understand whether men and women in the study area were refining, the study assessed the types of honey sold. Access to quality machines was also explored.

Types of Honey Sold by Bee Keepers

Given that agriculture is knowledge intensive, limited education levels among men and women farmers contribute to low adoption of technologies and innovations (KALRO, 2017). The knowledge needed to process products is a crucial element in bee keeping as a commercial enterprise. This is especially so since the main product is honey. Studies have shown that refined, compared to crude, fetches higher income (Sitati and Bett, 2012). With this in mind, this study sought to explore men's and women's role in refining by posing a question that required them to rank various forms that harvested honey is in, when sold. Results are presented in Table 4.6.

Table 4.6: Types of Honey Sold by Men and Women

Forms of selling honey	Total N	% of total	Male		Female	
			N	%	N	%
Crude	134	74.4	57	42.5	77	57.5
Semi-refined	107	59.4	66	61.7	41	38.3
Refined	75	41.7	47	62.7	28	37.3
Chunk	57	31.7	32	56.1	25	43.9
Comb	42	23.3	23	54.8	19	45.2

Findings reveal that out of 180 respondents, refined honey is sold by only 75 (41.7%), that is 47 (62.7%) men, and 28 (37.3%) women. Majority were selling it as raw (crude) and semi-refined. However, though refining is limited for both genders, women were more handicapped. The study sought to find out factors that are hindering it. Results are recorded in the Figure 4.4.

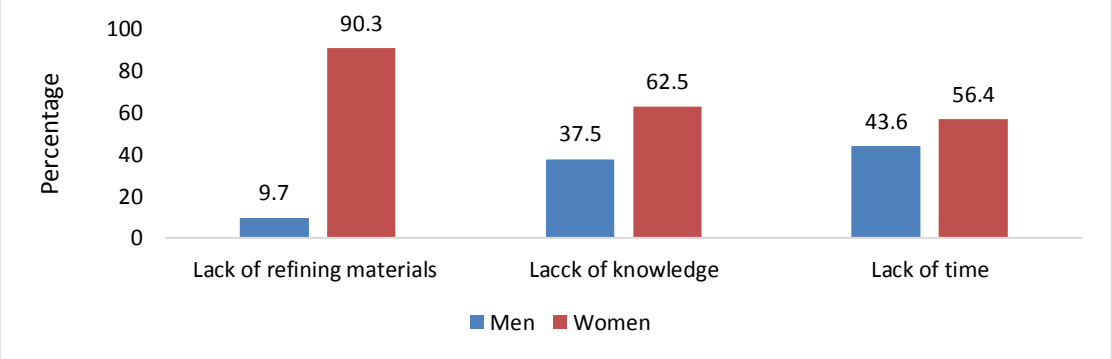


Figure 4.4: Factors that are Hindering Refining Honey.

Majority of women (90.3%), indicated lack of refining materials compared to only 9.7% men. Most women (62.5%) compared to men (37.5%) also cited lack of knowledge. On the other hand, more women 56.4%), compared to men (43.6%), mentioned lack of time. To understand further the factors behind lack of refining honey by women, the study sought to analyse those who were not refining by HH (Figure 4.5).

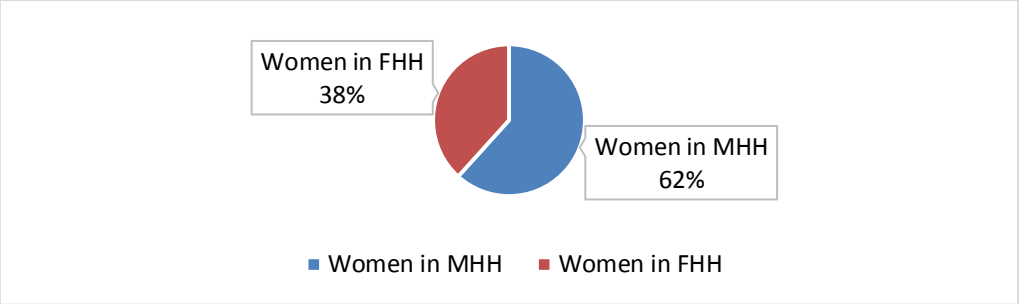


Figure 4.5: Women who were not refining Honey by Household.

Analysis by HH showed out of 162 women who were selling honey in other forms other than refined (Table 4.4), most of them were in MHHs (62%). This explains Figure 4.4; majority of women mentioned lack of refining materials, lack of knowledge and time as a factor hindering processing of honey. The study noted that women's responsibilities include construction of traditional houses (*manyattas)*, by fetching materials in the forest and this burdens them further. However, while those in FHHs have autonomy to hire labour, the ones in MHHs cannot due to strict cultural rules surrounding them. For instance, O.I. Nareiyu Koin (18/12/2015) had a semi-permanent house and not a *manyatta*. Asked if she made the decision to construct it, she said the following:

> *I hired labour to construct my semi-permanent house. I have freedom to make decisions without offending anyone. I can also hire someone to fetch water and firewood which is a taboo in MHHs where women are supposed to do all the chores with assistance from their daughters. The men make decisions whether to educate children or not without considering their spouses views.*

When asked whether her sons can assist in household chores, O.I Nereiyu Koin (had this to say:

> *My sons assist me in fetching water when they are not in school. Boys in MHHs follow their father's advice and that is why they cannot assist their mothers. However, I would not like them to fetch firewood since it is a very strong taboo in our community. All the same, I have freedom to change many other traditions which a woman in a MHH cannot be able to achieve.*

***Left** O.I. Nareiyu Koin (female head**, **standing** in front of her semi-permanent house and **Right**: O.I Elizabeth Nalikungishu (MHH) standing in front of her manyatta.*

The above scenario suggests that though women from both type of households face similar constraints, the ones in MHHs are more constrained by cultural perceptions. This further indicates unique and specific needs exist for women in both households that development interventions should integrate. Further, while participation in refining honey is low for both genders, women, especially in MHHs are vulnerable.

This can be attributed to the prevailing gender inequalities common in many households in Africa and witnessed in the study area. Among these, there is unequal gender balance in resource allocation and utilization, which, due to patriarchy, constrain women, especially in access to capital, mobility and time. For instance, the study noted that group members who never received any training were expected to acquire the same by traveling to KALRO Trans Mara. As a result, women who live far from the demonstration plot could not be trained due to gender related factors, for instance, lack of transportation fee, mobility and time.

This scenario can be attributed to the development interventions' failure to acknowledge women's unpaid work, for instance, household chores, yet, it is a key contributing factor to their unique challenges in commercial farming. Consequently, it negates the goal of bridging

the gender gap experienced in crop agriculture hence, increase income and raise the living standards of men and women. Certainly, this study recognizes government and development interventions have signed major commitments aimed at alleviating poverty in rural areas. However, this effort will yield positive results if they maximize the productive potential of women and youth by promoting gender equality.

iv) Access to Quality Processing Equipment

Refined honey fetches higher returns compared to raw or semi-refined thus, ownership of quality materials adds more value at this stage. For the few men and women refining, the study explored access to quality processing equipment (Table 4.7).

Table 4.7: Access to Quality Refining Equipment

	N	%	% Male	% Female
Honey press	69	79	73.3	79
Perforated plastic strainer	12	14	14.3	20
Filter tank	5	6	12.4	0
Others (e.g. boiling)	1	1	0	1
Total	87	100	100	100

Findings reveal that out of 87 respondents, majority (73.3 % men and 79% women), were using honey press (smashing crude honey by use of 'kitchen stick') then passing it through locally available materials like mosquito nets to remove dirt and particles. This shows that few men and women have access to quality refining equipment. There were more women (20%), compared to men (14.3%), who had access to perforated plastic strainers while only the latter (12.4%), had access to filter tanks.

These results indicate that though access to quality refining equipment is low for both genders, women have not been left out. The fact they have accessed plastic strainers more than men is an indication of enthusiasm in refining honey despite gender specific challenges

such as access to capital. However, their vulnerability in accessing the only filter tank in KALRO Tran Mara is a factor that has an effect on production. This can be attributed to the fact that men are neither constrained by income nor time, both factors that facilitate traveling to KALRO Trans Mara. Considering the importance of such parameters in production process, there is need for a gender responsive strategy that includes both men and women especially during planning on how to use quality processing equipment that are limited. This would ensure that both genders benefit equally from such initiatives.

Filter Tank situated at KALRO Trans Mara

ii) Access to Quality Packaging Materials

Improper packaging of bees products' can lead to quality deterioration. This can further limit proceeds which result to low income due to customer preferences. Consequently, the study sought to find out levels of participation of men and women in accessing quality packaging materials. Findings are here presented in Figure 4.6.

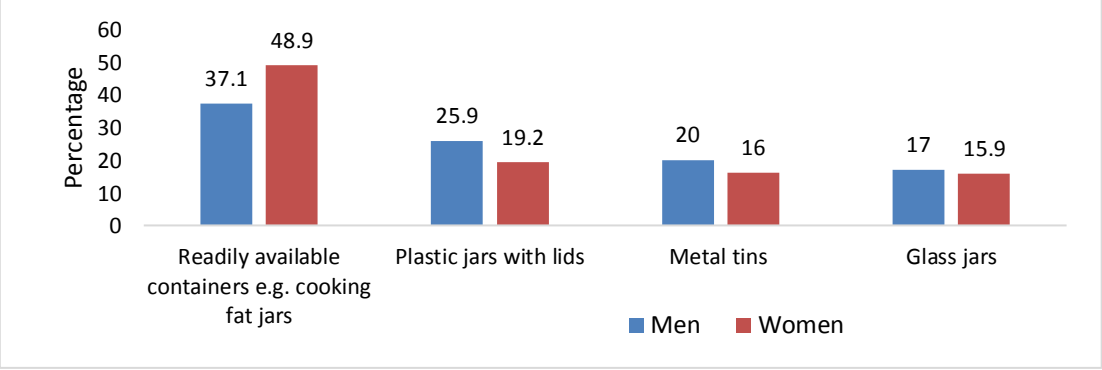


Figure 4.6: Materials used to Package Honey

Results show majority of men (37.1%), and women (48.9%), are using readily available containers such as cooking fat jars though there were more women compared to men.

Conversely, more men (25.9%) compared to women (19.2%) had access to quality plastic jars with lids. As noted by the County Agricultural Officer (CAO) (24/12/2015), majority of men and women in Trans Mara are resource-poor, hence, cannot afford to buy the high quality jars. According to O.Is Stanley and Kanda (24/12/2015), honey processing takes three major stages, which require time and capital. These are:

- *Stage1: crude honey is crushed inside a container until it becomes liquid, then sieved (semi-refined).*
- *Stage 2: semi-refined honey is mixed again then re-sieved using a perforated strainer (sieve with smaller holes than the first one).*
- *Stage 3: it is packaged in plastic containers, sealed and labelled.*

a) Crude honey used in stage 1.

***b)** Necessary materials used for reefing honey*

Source: KALRO Trans Mara

These stages show that for a bee keeper to refine and package quality honey, he/she needs to purchase several equipment besides quality time, factors that constrain resource poor men and women. This suggest that though a few are refining honey, purchasing necessary and quality materials constrain women more than men due to gender related challenges, key among them, income as indicated by O.Is. Elizabeth Nalikungishu, Sainyo Maria, Ann Natuno et al. (22/12/2015). Observably, proper planning during transfer is essential if they are to reap maximum benefits. With this in mind, there is need for associations that can assist

the bee keepers to collectively use simple but quality methods that are not expensive as shown in this photo.

A simple honey refining method for the small scale beekeeper (Source: Carroll, 2006).

4.3.2 Participation in Value Addition and Marketing of Bee Products

Adding value to hive products play an important role in enterprise development and employment creation. It reduces competition at market level and increases men's and women's selling power. It also alleviates middle men since it addresses the challenges of overproduction. The study assessed this stage by analysing access to value addition skills and channels used in marketing bee products. At the same time, knowledge on customer taste and preferences and access to income from bee products was analysed.

i) Participation in Value Addition

Hive value-added products are used in pharmaceutical industries, food preservation, brewing and confectionary, candles, beauty products, soap, textiles, polishes, and paper. Research has shown that value added products procure more income in comparison to raw materials. For example, candles from the same amount of wax can fetch twice extra revenue, compared to the value of selling it raw or throwing it away as most bee keepers do. The study therefore sought to understand the levels of engagement of men and women in adding value to honey bee products. The findings revealed that out of 180 respondents, only 30 (16.6%) women and 20 (11.1%) men were using bee products to make local brew. This indicates that

participation in adding value using bee products was low for both genders. Unfortunately, though adding value by making brew is meant to increase profit, it was creating new challenges among community members. O.Is. Bett and Kanda (14/12/2015) had this to say concerning the local brew:

> *"The local brew made from honey has added more problems in this area. Some men and women, both young and old, are usually perpetually drunk most part of the day. However, the local leaders are making plans on how to sensitize people, especially the youth so that they can minimize this challenge".*

The scenario above indicates a human resource challenge. This is because men and women engaging in excessive uptake of local brew do not benefit positively despite the commercial shifting of bee keeping. Not only do they possibly drink the income earned from the enterprise, but also deviate from increased income and raised standard of living. Awareness initiatives are important especially to educate men and women on value addition that is beneficial to the community. This can possibly include making candles using bees' wax which the study established is either thrown away or sold with honey as shown in Table 4.8 below.

Table 4.8: Uses of Bees Wax by Gender (%)

	N	%	Females	Males
Thrown away	86	39.6	33.9	50.0
Sold with honey	85	39.2	35.5	35.3
Left in the hive	21	9.7	12.9	7.4
Used as bee attraction	19	8.8	14.5	1.5
Sold to processors	4	1.8	0.0	5.9
Brewing	2	.9	3.2	0.0
Total	217	100.0	100	100

Analysis suggest that majority of men (50% and 35.3%), and women (33.9 and 35.5%) respectively, either throw wax away or sell it with honey hence, indicating that access on knowledge on beeswax production is low for both genders. These results corroborate other

studies; Carroll (2006); IFAD 2008, that in Kenya most wax combs are thrown away on harvesting or after honey extraction because beekeepers do not know its value. In Uganda, a study by Mujuni et al., (2012) stated that there was little knowledge of bee products' value other than honey since majority (98.8%), were either throwing wax away or leaving it in the hive. When asked if they sell other bee product apart from wax and honey, all of them (100%), said they do not. This is in spite of the fact that a kilogram of beeswax is more valuable than that of honey. There is need to sensitize men and women bee keepers on ways of adding value to bee products which will increase their income generation in the enterprise. Nonetheless, the study noted a bee keeping group with plans to start value addition. When probed further, the group leaders had this to say:

> *We started as a youth group in 2003. 10 men and 6 women. Our name is "Bidii Torch". We integrated an elderly man who advises us, and also serves as our chairman. Presently, we are 8 males and one female, all married. We came together to earn extra income through bee keeping and hence, improve our living standards. Currently, we have 17 traditional hives, 24 KTBH and 13 langstroth. We are expecting 20 more KTBH from KARLO Trans Mara. Our future plans include refining honey and value addition such as making candles. Income from bee keeping has enabled us educate our children and engage in other income generating activities such as fish farming as shown in the following photos.*

a) Bidii Torch officials displaying their certificate of registration during the interview

b) Fish pod for Bidii Torch group.

Source: Trans Mara

The study however noted glaring gender disparities in *Bidii Torch* group's composition. Out of 9 members, majority were men 8 (89%), and only one woman (11%). However, the study

noted that initially, women were six but five got married. When asked what happened to other women, *Bidii Torch* group officials said the following:

> *"When we started the group, the 6 women were not married. When they got married, one was allowed to continue with her membership by her husband while 5 were denied the same".*

***Left**: Secretary and **Right:** Chairman of Bidii Torch group in their apiary*

When the woman in *Bidiii Torch* group was asked to state any advantage over her female counterparts who are either in *gender-specific female* group or not in any bee keeping group, she had this to say:

> *"My husband does not assist in activities such as smoke handling, honey extraction, and general management of my apiary. However, men in this group assist me for free. Most gender-specific female groups hire male labour to manage their apiaries".*

The scenario above shows control of decision making power solely lies with male heads which affects women negatively, for example, freedom to choose whether or not to join a *gender-integrated* group that is beneficial. As a result, women in MHHs continue to be marginalised in patriarchal households where autonomy to choose is denied, including freedom to join community groups. Further, the study noted that *Bidii Torch* group has diversified other ways such as keeping improved hives in an iron sheet house and on top of water tanks as shown in these photos.

Source: Trans Mara

a) Group officials inside the iron sheet house

b) Group chairman and 2 study team members on top of a water tank

The group members stated that they have started imparting skills such as honey extraction mainly to women and youth. The case above indicates that it is possible for an improved enterprise to have a positive impact in a community. Not only does it increase income but it also raises the standard of living.

ii) Participation in Accessing Marketing Channels of Bee Products

Marketing channels play an important role in any commercial enterprise. An individuals' choice, including availability of better outlets, can influence access to extra income either negatively or positively. Research has shown that some marketing channels offer better prices than others thus, preferable to various individuals depending on factors such as distance and accessibility. The sectors' performance also highly depends on the type of outlets available to bee keepers. With this in mind, the study sought to find out the levels of participation of men and women in accessing channels that offer better prices. Results are shown in the Table 4.9.

Table 4.9: Marketing Channels of Bee Products (%)

	N	%	Women in MHHs	Men	Women in FHHs
Middle men	133	31.8	25.4	15.4	14.3
Local Consumers	127	30.4	31.9	20	12.7
Local retail shops	76	18.2	30.7	21.1	20.1
Open air market	43	10.3	9.8	11.1	31.5
Wholesale/cooperative	39	9.3	2.2	32.4	21.4
Total	418	100	100	100	100

Analysis show that more married women (31.9%), in comparison to those in FHHs (12.7%) and men (20%), are selling to local consumers. Likewise, many women in FHHs (31.5%), compared to men (11.1%), and those in MHHs (9.8%), are using open air markets. The study found that wholesale and cooperative channels offer better prices compared to local retail shops and open air markets. On the other hand, middle men and local consumers offer the

lowest because they buy on-farm. It is observable that majority of those who have access to wholesale and cooperative channels which are offering better prices are men and women in FHHs hence, a positive impact for women who are equally engaging at this stage of value chain. The study noted that married women's autonomy, especially to travel to source for better markets is a challenge hence, can only depend on channels that are near home. Since the local markets offer lower profits, stakeholders can invest in these channels in order to embrace women in MHHs. This is because despite being more actively involved in bee keeping, it impacts negatively on them. They do not reap the maximum benefits.

Conversely, women in FHHs and men control their time and income, including freedom to source for markets outside home. Nevertheless, women in both type of households are constrained by reproductive roles, a fact that development interventions should take note as corroborated by World Bank (2012); it is important for women to be able to negotiate terms and prices with powerful buyers but due to complex requirements within value chains, they are disadvantaged in obtaining access to new and well-paying markets. They tend to have limited experience, lower levels of education and mobility. As a result, although they may engage in marketing at varying degrees, and in many different ways, gender dynamics at household level restrict their access to more lucrative markets.

Similarly, Ndungo et al, (2011), confirm these results that marketing poses a most serious challenge to women farmers. One of the gender dynamics is that they are unable to source for better marketing opportunities. Men, on the contrary, can access long distant markets without seeking their wives' consent and are not tied at home by gender roles. World Bank

(2008) argues that policies and interventions that assume commercial production is a men's domain will miss many opportunities to tap into women's tremendous productive potential. Addressing women's unique constraints can facilitate their participation in better markets hence, influence intra-household income management and resource allocation in their favor. Nevertheless, the study noted that, in general, majority of men and women are not getting the value for their honey because they are selling it raw (as crude), which fetches low prices as pointed out by O.Is Lelei, Nalikungishu, Kipas, and Tolian (11/12/2015):

> *Middlemen have mastered the harvesting seasons in this area. They purchase crude honey at low prices and prefer buying from producer groups who sell to them in bulk. They usually process, or sell to other middlemen who refine it.*

Earlier findings in the study have shown that middlemen offer the lowest prices compared to other marketing channels. Consequently, it impacts more on women who are new in the enterprise, a fact that causes negative effects on realisation of their potential in honey production. Middle men have been a problem not only in bee keeping but in most farming systems. The government and other development partners should therefore develop a long-term solution to this challenge, otherwise, small-scale men's and women's labour continues to benefit players in value chains who put minimal effort in production. Such initiatives can include gender inclusive associations where men and women can source for markets, and also sell collectively. Partnership with private developers, NGOs and other stakeholders who have shown interest in particular commodities is vital.

iii) Honey as an Income Generation

Results have shown that in the study area, the bee product that is readily sold is honey. It is crucial to note its ranking among other commodities, as an income generation. This assisted

in understanding levels of participation in access to, and control of income. Improved bee keeping was meant to increase income and raise the living standards in the community. It is important therefore to explore whether both genders are earning from the enterprise. This was achieved by asking a question that required respondents to rank their source of income from among six commodities, starting from the highest to the lowest. Results are shown in the Figures 4.7 and 4.8 below.

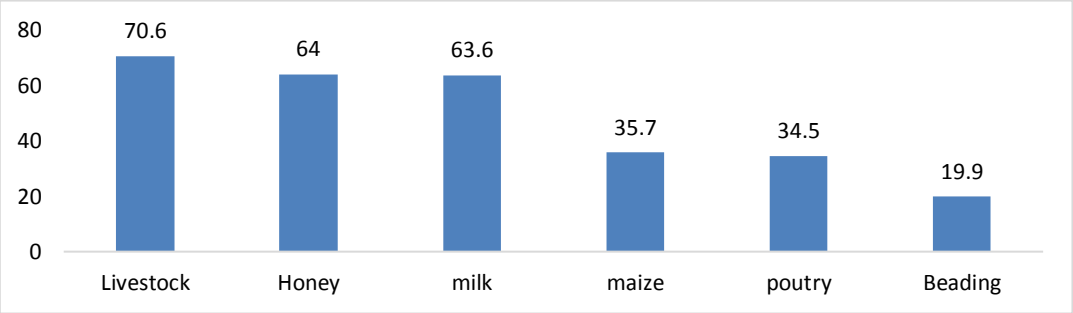


Figure 4.7: Sources of Income by Rank by Men

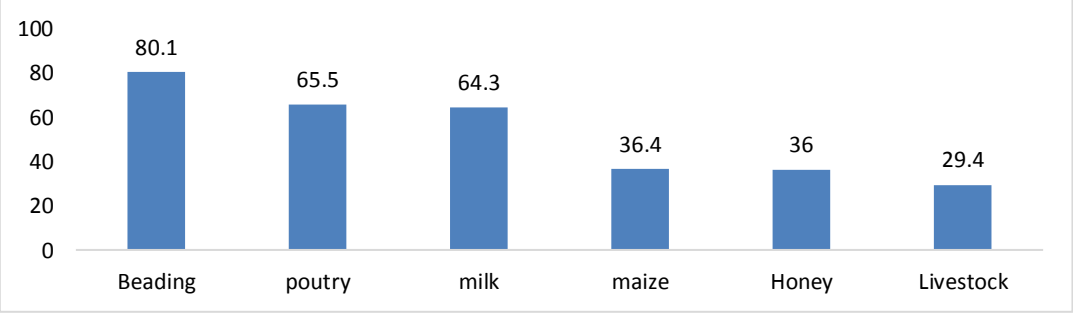


Figure 4.8: Sources of Income by Rank by Women

Figure 4.7 (above) reveals that majority of men (70.6%), ranked livestock first as an income generation commodity followed by honey (64%), while milk came a close third (63.6%). On the other hand, most women (80.1%), ranked beading first, poultry second (65.5%), and maize a close third (64.3%), (Figure 4.8). Notably, few women (36.4%), indicated they earn income from honey compared to the high percentage of men (64%). Consequently, while men ranked honey second, it was the fourth source of income for women. These results

indicate that, in comparison to men, women's participation in accessing income from honey is low affirming their marginalisation, especially at stages of the chain where value is high. This is despite the fact, the intention of transferring improved enterprise was to increase income among participating men and women. Several studies have shown that the improved enterprise increases household income, which is also spelt out in bee keeping policy, GOK (2009). However, most of these findings are gender neutral, and this has mislead many development projects who do not take it as central.

It is a fact that in any community, women's and men's roles, including needs, are diverse and this should be considered at planning stage of a project, failure to which can bring negative impact after transfer. For example, it is noted that in Trans Mara, beadwork and honey related activities are gendered, and this could possibly be the reason men ranked beading last, while it was women's number one. This can be attributed to internalisation in most African cultures concerning men's and women's commodities.

Interventions that fail to recognise the importance of such cultures have most often, impacted negatively. Women are a critical component of agriculture comprising about 43 per cent labour force contributing to food security and nutrition. Due to their specific roles in food production, processing, and preservation of nutritious and locally adapted commodities and crop varieties, given the right possibilities, such knowledge can allow them to be innovation leaders in sustainable agriculture (Ruchi et al., 2012). For instance, GOK (2009) argues that women were not allowed to participate in bee keeping in some communities but this problem is fading away through education and introduction of improved technologies. This is an

indication that gender roles can change. Appropriate policies can foster gender equality even as agriculture itself is changing by becoming more commercially oriented, as is the case in bee keeping. With this in mind, there is need for gender integration in programs in order that men's and women's issues are taken as key. This can minimize cultural perceptions and inequality factors in order to create conditions for both genders' as agents of development. Promotion of decision-making at household level can be employed by sensitizing men to accept women as equal partners in improved bee keeping. This can not only enhance participation but also ensure equity in access to the benefits accrued from bee products.

4.3.3 Access to and Control of Land as a Collateral for Credit

Land tenure and utilization is crucial since most rural men and women farmers use it as collateral. As beekeeping shifts into commercial, there is need to access loans to improve it. The study analysed land sizes by household as well as access to title deeds.

i) Access to Land by Household

The size of a farm allows diversification of various commodities and the bigger it is, the better. This is especially so for bee keeping because apiaries need to be distant from other human activities due to nature of bees. The study sought to assess land sizes accessed by bee keeping households. Results are shown in the Table 4.10 below.

Table 4.10: Access to Land by Household Head

Land in acres			MHHs	FHHs
	Frequency	%	%	%
0.5 to 1	11	6.2	2	0
1.1 to 2.4	43	24.2	17	22
2.5 to 5	17	9.6	9	11
5 and above	106	60	72	67
Total	177	100	100	100

Findings reveal that out of 177 men and women who responded, majority 106 (60%), had access to land varying from 5 acres and above; 72% in MHHs and 67% in FHHs. It can be argued that land sizes in the study area are big and both type of households have access. However, this may not necessarily mean that they all have control of the vast farms, reason why the study sought to find out the control status. This was achieved by looking at the title deeds.

ii) Control of Land Title Deeds

In order to assess the control of land, the study categorized respondents into two groups; 1.husband/ father/son, and 2. Wife/ mother/ daughter. It was achieved by asking who is registered with land title deed in the household. Results are recorded in the Figure 4.9.

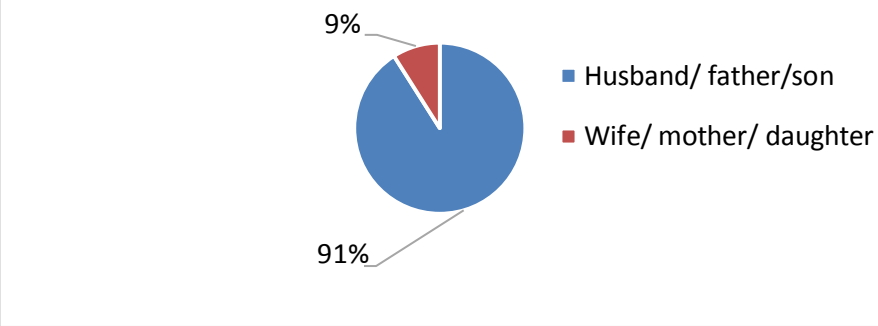


Figure 4.9: Control of Land Title Deeds

Findings reveal that 91% of title deeds were possessed by men and 9% by women. This indicates that despite women in FHHs accessing big pieces of land, it also occurs that they are marginalized due to the fact that land titles and tenure tend to be vested in men. For example, the study noted that majority of widows have big farms but they have no control since title deeds are in their husband's names.

Further, they expressed willingness to enhance bee keeping with assistance of low interest loans. However, this was not possible due to challenges in security yet majority have big pieces of land whose tenure is in their late husband's names. This limits their control of using

it as a collateral. When asked if they have tried to change title deeds to their names, O.Is Nerein, Soila, Kasaini et al. (29/12/2015) had this to say:

> "*We have tried to change title deeds to our names all in vain. The processes entailed are very expensive and draining especially emotionally. Most of us have resulted to lending the land which enables us educated our children"*

These sentiments show that though women have no title deeds, they are using their land positively hence, progress in decision making concerning land utilization to educate children; education is key to poverty alleviation in society. Nevertheless, decisions to sell or use land as collateral are equally vital to women who may use the money to buy the improved bee keeping equipment which majority do not have as individuals, or acquire loans for the same. Gender issues are mentioned in most national and regional strategic plans for instance, agriculture, food-security and land. However, they are relegated to separate chapters on women, rather than treated as an integral part of policy and programming.

Kenya is a signatory to Sustainable Development Goals (SDGs), for example, number 5; achieving gender equality and empowering women and girls, and number 10; reduced inequalities, also spelt out in 2000 Millennium Development Goal (MDGs) number 3. Years later, rural women in agriculture are still marginalised in land ownership. This is despite government's commitment to mainstreaming gender which is also spelt out in the bill of rights in 2010 constitution, and envisioned in 2030's vision under social pillar.

It is in this context that gender issues need to be seriously addressed for women to realise their potential and benefit in commercial agriculture. This scenario has continued to have negative effects in realisation of poverty eradication not only in the study area, but in many

parts of the Country. For example, a current study in Kandara sub county, Kenya, found that to be a member in avocado contract groups, one is expected to own avocado trees, a criteria that is discriminating women and youth since majority do not own land. As a result, their participation in high value marketing is limited, yet, contract farming is intended to alleviate middle men who pay low prices in order to increase income and raise the community's living standards (Miriti et al., 2017). Similar findings were recorded in Kirinyaga County, Kenya, in a study on dynamics in adoption of tissue culture bananas (Murigi et al., 2018).

Ruchi et al. (2012) argue that in several African countries, national laws dealing with women's right to own land coexist with contradictory and a parallel set of customary laws. This impacts negatively on majority of divorced women such that when they return to their villages (birthplaces), they may only use land through their male members of the family, or be allocated a piece of land by the chief or clan members. In many cases, however, widows are chased away from their villages, a familiar scenario to most Kenyan cases. Both national and regional laws on land tenure should be changed to integrate gender in order to enhance agricultural production for poverty alleviation.

The process can be all inclusive, with participation of rural men and women in decision making forums. This has worked in Malawai as noted by Ruchi et.al (2012) that as part of Women's Land Rights (WOLAR) Project, women, men and traditional leaders in villages were sensitized on rights and national land policies. By 2010, a total of over 2,000 landless women were allocated land through this project. As a result, most chiefs have changed their

mind-sets and attitudes towards land ownership as captured in the following sentiments from women in Malawi, 2010:

> *"For decades, land ownership, including its proceeds were men's issues. We could grow farm produce but everything was controlled by men. Through the WOLAR project, we realized that the state of being landless was a serious human rights issue that needed urgent solutions. We now have control of land, the produce and income. A man manages his own piece of land and a woman does likewise. We now have control over the sale of farm produce and the income. As a result, there are less household conflicts concerning proceeds. We appreciate this change because we feel liberated now since we are able to decide what to do with what we have and when we want" (Ruchi et al., 2012).*

This scenario shows it is possible to empower men and women in rural areas on human rights. Research has shown that if women have equal access to land and other productive assets as men, they can increase farm yields by 20-30 per cent (FAO, 2011). Both genders acquire and use assets in different ways and in diverse contexts, thus, a full understanding of these differences is therefore essential in formulating gender-sensitive interventions for the resource-poor men and women.

This need is greater in conservative communities in which, apart from gender-specific challenges, cultural perceptions also impede development. Women need secure and stable access to productive resources in order to invest in, and improve their production systems, improved bee keeping included. If such initiatives have borne results in Malawi, they can also work in Kenya especially with the will power of key stakeholders. This will not only increase women's realisation of their potential in commercial agriculture, but also the government in poverty alleviation by 2030. With practical gender sensitive strategies, it is doable.

It can be concluded that challenges in access to capital, gender related factors such as mobility and time, and cultural perceptions, have negatively impacted on participation in access to improved equipment, trainings, land, labour and income. Consequently, these factors have impacted more on women yet, they are new in bee keeping. Their need for capital, including moral support, is greater in comparison to that of men. Productive resources' control enhances access to low interest credits which most women, especially widows with big farms and no title deeds, cited a desire to obtain. This is because with loans, it is possible to enhance keeping.

Men in the study area own large herds of cattle and the fact that they control productive resources, have no challenge in purchasing the improved equipment. There is need for empowerment initiatives to encourage sharing of resources not only in households but also within neighbourhoods. This will ensure gradual transition from those with traditional equipment in order to purchase their own. Sharing labour can also be encouraged. With this in mind, the study sought to assess decision making power in households which is important as it also influences control of productive assets both individually and also jointly**.** Results are more elaborated in the following section.

4.4 Decision Making Power in Bee Keeping Households

The second objective was to assess access to and control of decision making power in bee keeping households. Power control, just like productive assets, influences the ability to earn extra income. Decision making on how to use revenue impacts either negatively or positively in household's development. For instance, women can have access to farm produce but the decision on how the income is utilised can solely be men's. Research has shown that in some

cases, men use the income earned by women on local brews without the consent of the latter. Both genders should be in a position to make informed decisions in areas such as purchase and sale of productive assets, control over income from bee products and other productive resources. Participating in income-generating activities and having control of benefits, empowers not just an individual but a household.

This study therefore intended to assess whether economic opportunities leads to decision making power without rights of control to productive resources. It was based on the key premise that economic opportunities alone might not necessarily lead to decision making power in the household without rights of control to productive resources. It was achieved by using a tool that track changes in men's and women's decision making power levels in a household as a result of a development initiative. In this study, the initiative was the transfer of improved bee keeping. Three dimensions analysed were: resources; income, and leadership. A summary of indicators, profile of households as well as case studies in FHHs are also documented.

Summary of Domains and Related Indicators

One was considered to have decision making power in the domains if they had an input into most, or all domains as shown in the Table 4.11 below.

Table 4.11: Summary of Domains and Related Indicators

Domain	Indicators: Input in Decision Making in:
Resources	Ownership of assets, Purchase, sale, or transfer
Income	Control over use of income
Leadership	Group membership

Two major questions were asked. 1. Who normally makes decisions on (production, resources, income, or leadership)? 2. To what extent do you feel you can make your own

personal decisions regarding (domains in 1above)? The choices were based on the following variables:

Question 1:
1. Household head only
2. Spouse (wife only)
3. Household head and spouse jointly
4. Household jointly
5. Household head and other household member
6. Spouse and other household member
7. Household head and other outside people
8. Spouse and other people

Question 2:
1. Not at all
2. Small extent
3. Medium extent
4. To a high extent

FHHs were excluded from further analysis since majority of them were the sole decision makers in their homes. The focus was on male headed households. The analysis was undertaken by use of two categories; membership and non-membership to the improved bee keeping groups. This is because bee keeping groups received various skills as well as improved hives for free (five per group), during the transfer of the improved enterprise as opposed to non-members.

4.4.1 Dimension 1: Resources

The resources dimension comprised of three indicators namely; (a). Ownership of assets, (b). Purchase or sale or transfer of assets and, (c). Access to and decision on credit. The respondents were asked three main questions? (i). Who mostly decided to sell or purchase various household assets? (ii) Who would keep various household assets in case of dissolution of marriage? (iii) Who in the household would make the decision to take a loan, how the loan would be used and who would repay it?

Decision making power over resources was attained by having the highest input into most or all decisions regarding purchase and sale of productive assets as recorded in Tables 4.12 and 4.13 below.

Table 4.12: Key Decision Makers on Purchase of Household and Farm Assets

Personal items e.g. cell phone, household, and farm assets	Category (group member)?	Who makes decision to buy HH and farm assets? (%)				
		HHH alone	Wife alone	HHH & wife	HH Jointly	Total
Agric. land (pieces/plots	GM	20.5	0	77.2	2.3	100
Large livestock e.g. Cows, donkeys,	GM	20	2.5	72.5	5	100
Small livestock e.g. goats, sheep,	GM	14.7	2.9	82.4	0	100
Chickens, ducks, turkeys	GM	8.9	40	48.9	2.2	100
Farm equipment (non-mechanized)	GM	22.6	3.2	71	3.2	100
Farm equipment (mechanized)	GM	27.8	5.6	66.6	0	100
Nonfarm business equipment	GM	16.7	11.5	55.2	16.6	100
House and other structures e.g. sheds, storage huts	GM	10.8	0	83.8	5.4	100
Large consumer durables (fridge, TV, sofa seats)	GM	36.8	5.3	57.9	0	100
Small consumer durables (radio, cookware)	GM	29.6	7.4	59.3	3.7	100
Cell phone	GM	18.2	36.4	42.4	3	100
Other land not for agric. (residential or commercial)	GM	33.3	0	66.7	0	100
Transportation means (bicycle, cart, motorcycle, car)	GM	33.3	0	50	16.7	100
Agric. land (pieces/plots)	NGM	48	0	42	10	100
Large livestock e.g. cows, donkeys, oxen	NGM	43.5	2.2	41.3	13	100
Small livestock e.g. goats, sheep	NGM	34.1	4.9	41.5	19.5	100
Chickens, ducks, turkeys	NGM	20	24.4	33.3	22.3	100
Farm equipment (non-mechanized)	NGM	38.4	5.1	46.2	10.3	100
Farm equipment (mechanized)	NGM	34.8	0	52.2	13	100
Nonfarm business equipment	NGM	50	0	40	10	100
House (and other structures)	NGM	48.8	0	41.9	9.3	100
Large consumer durables (fridge, TV, sofa seats)	NGM	43.8	6.3	31.3	18.6	100
Small consumer durables (radio, cookware)	NGM	50	0	36.1	13.9	100
Cell phone	NGM	26.5	32.4	17.6	23.5	100
Land not for agric. (residential or commercial)	NGM	57.9	0	36.8	5.3	100
Transportation means (bicycle, cart, motorcycle, car)	NGM	40	0	20	40	100

Key: GM-Group Member; NGM-Non Group Member (Control), HH-House Hold

Table 4.13: Key Decision Makers on Sale of Household and Farm Assets

Personal items e.g. cell phone, household, and farm assets	Category (group member)?	Who makes decision to sell HH & farm assets?					
		HHH alone	Wife alone	HHH & wife	HH Jointly	other HH M	Total
Agricultural land (pieces/plots	GM	15.9	0	77.3	2.3	4.5	100
Large livestock (oxen, buffalo)	GM	27.5	2.5	70	0	0	100
Small livestock (goats, sheep,)	GM	26.5	0	73.5	0	0	100
Chickens, Ducks, Turkeys,	GM	15.6	44.4	40	0	0	100
Farm equipment (non-mechanized)	GM	32.3	6.5	61.2	0	0	100
Farm equipment (mechanized)	GM	16.7	5.6	77.7	0	0	100
Nonfarm business equipment	GM	16.7	20.3	56.3	0	6.7	100
House (and other structures)	GM	10.8	2.7	81.1	0	5.4	100
Large consumer durables (fridge, TV, sofa seats)	GM	31.6	0	63.2	0	5.2	100
Small consumer durables (radio, cookware)	GM	37	7.4	55.6	0	0	100
Cell phone	GM	21.2	60.6	18.2	0	0	100
land not for agric.(residential or commercial land)	GM	30.8	7.7	61.5	0	0	100
transportation means (bicycle, cart, motor car)	GM	30.3	0	56	11.1	2.6	100
Agricultural land (pieces/plots	NGM	40	0	42	12	6	100
Large livestock (oxen, buffalo)	NGM	45.7	2.2	37	10.9	4.2	100
Small livestock (goats, sheep,)	NGM	43.9	4.9	34.1	12.2	4.9	100
Chickens, Ducks, Turkeys,	NGM	28.9	42.2	13.3	8.9	6.7	100
Farm equipment (non-mechanized)	NGM	51.3	7.7	33.3	5.1	2.6	100
Farm equipment (mechanized)	NGM	39.1	8.7	34.8	8.7	8.7	100
Nonfarm business equipment	NGM	60	20	10	10	0	100
House (and other structures)	NGM	37.2	2.3	44.2	4.7	11.6	100
Large consumer durables (fridge, TV, sofa seats)	NGM	31.3	0	37.5	18.8	12.4	100
Small consumer durables (radio, cookware)	NGM	52.8	0	30.6	11.1	5.5	100
Cell phone	NGM	29.4	35.3	8.8	20.6	5.9	100
land not for agric.(residential or commercial land)	NGM	52.6	5.3	31.6	10.5	0	100
transportation means (bicycle, cart, motor car)	NGM	40.3	25.3	21.4	11.6	1.4	100

Key: GM-Group Member; NGM-Non Group Member (Control), HH-House Hold, M-Member

Findings indicate that majority of improved bee keeping households (70% and above), had joint consensus concerning purchase and sale of land, livestock, farm equipment and houses. This is in comparison to non-members whose decisions are distributed between men and joint consensus. Observably, men's decision making input in purchase and disposal of assets is higher in comparison to their spouses which is either very little, or none at all. The only

autonomy women had was decision to purchase or sell poultry and their cell phones**.** Apparently, joint decisions were made in sale of assets by the whole household including children and other members living within it. The above results alludes therefore that there is empowerment among members in improved bee keeping groups, attributed to sensitization during trainings concerning importance of joint decisions, a key factor that bridges gender gap in households. Further, the fact that joint decisions are being made on high value assets such as land and large livestock show a positive indication that culture can change even among conservative communities.

Similar findings are recorded by other studies focusing on livestock sector. Flintan (2008) argues that in some pastoral communities, men cannot buy or sell household assets without approval from women and sometimes, children. Men and women may differ in types of rights they have to cattle, which can be divided into; user, resource access and decision-making such as purchase or sale of resources in households (Meinzen-Dick et al, 2004). Valdivia (2001) states that usually, women control milk that is for home consumption; however, they have little or no input at all in deciding whether to sell it or not, and if they do, they cannot keep the income.

These studies support the inequalities found in many African households where men control productive resources, a scenario that marginalizes women from engaging in a meaningful participation in agricultural value chains, bee keeping included. However, findings in this study show culture can change since men are embracing joint decisions after empowerment initiatives. For instance, women's access to improved equipment is low mainly due to lack

of capital, a limitation that should not be ignored during transfer. It can be supported through awareness initiatives, for instance, importance of sharing productive resources in households and within neighbourhoods, and this can enhance equity in control of productive asserts and increase participation in value chains. For example, McPeak and Doss (2006) found that among mobile pastoralists in Northern Kenya, women have the right to sell milk; however, men are responsible for the overall herd and the right to decide on use of income. A key factor to achieving gender equity is household empowerment, in particular in decision-making power.

Gender-specific programs which strategically change inequality factors and create conditions for women to become agents of their own development are important. For instance, building women's awareness of their rights, promoting their decision-making input in households, and sensitizing men to accept women as equal partners (e.g. in sharing productive activities and benefits accrued from them). Such initiatives have been effective in some cases. For instance, Murigi et al., (2018) show that joint ownership of resources including decisions on use of income, have enhanced adoption of tissue culture bananas among households who underwent trainings on empowerment, suggesting such initiatives can work, and should therefore be employed during technology transfer. This can increase participation, ensure equity in access to benefits, eventually, minimizing marginalisation.

Agriculture is the backbone of Kenya's economy and if Vision 2030 is to be realized, gender sensitive programs should be upheld. According to Blumberg's (1984) theory, control of productive resources influences decision making power in households. She emphasizes that women's participation in value chains should not only enable them earn extra income, but

also control what they produce and the benefits accrued from them. That is what empowerment is all about.

4.4.2 Ownership of Household Assets

Ownership may imply legality where the person has a title to an asset or property which is mainly applicable to resources such as land. For livestock, however, there is no legal title or document to show possession except the means of acquisition such as purchase, hence, the study sought to find out who owned household assets in MHHs. Results are recorded in the Table 4.14 below.

Table 4.14: Ownership of Productive Capital Asset

Personal assets (cell phone), Household asset types and Farm assets	Category Group member?	Who has control of the following assets?				
		HH Head alone	Wife alone	HH Head & Wife	HH Jointly	Total
Agricultural land (pieces/plots	GM	54.5	0	38.6	6.9	100
Large livestock (cows, oxen,)	GM	60	0	37.5	2.5	100
Small livestock (goats, sheep)	GM	47.1	2.9	50	0	100
Chickens, Ducks, Turkeys, Pigeons	GM	13.3	64.4	20	2.3	100
Farm equipment (non-mechanized)	GM	41.9	9.7	41.9	6.5	100
Farm equipment (mechanized)	GM	66.7	5.6	22.2	5.5	100
Nonfarm business equipment	GM	33.3	33.3	16.7	16.7	100
House (and other structures)	GM	37.8	2.7	51.4	8.1	100
Large consumer durables (TV, sofa seat, fridge,	GM	21.1	15.8	57.9	5.2	100
Small consumer durables (radio, cookware	GM	70.4	11.1	14.8	3.7	100
Cell phone	GM	17.6	61.8	17.6	3	100
land not for agric. residential/commercial	GM	30.8	15.4	53.8	0	100
transportation (bicycle, cart, motorcycle,	GM	66.7	0	16.7	16.6	100
Agricultural land (pieces/plots	NGM	64	0	18	100	100
Large livestock (oxen, buffalo)	NGM	71.8	0	19.6	8.6	100
Small livestock (goats, sheep)	NGM	56.1	9.8	24.4	9.7	100
Chickens, Ducks, Turkeys, Pigeons	NGM	8.9	71.1	6.7	13.3	100
Farm equipment (non-mechanized)	NGM	46.2	15.4	30.8	7.6	100
Farm equipment (mechanized)	NGM	60.9	8.7	13	17.4	100
Nonfarm business equipment	NGM	70	20	10	0	100
House (and other structures)	NGM	32.6	4.7	53.5	9.2	100
Large consumer durables (TV, sofa seat, fridge,	NGM	37.5	0	37.5	25	100
Small consumer durables (radio, cookware	NGM	63.9	0	22.2	13.9	100
land not for agric. residential/commercial	NGM	57.9	10.5	26.3	5.3	100
transportation (bicycle, cart, motorcycle,)	NGM	40	20	20	20	100

Key: GM-Group Member; NGM-Non Group Member (Control), HH-House Hold

Results indicate that ownership of household assets is dominated by men while women control chicken. Observably, no woman owns cattle or land. Likewise, a few have control

of sheep and goats which are either jointly owned or possessed by household head. This corroborates earlier results in the study that even though women had access to big pieces of land, title deeds were vested in their husband's names. Further, though women are having some input in decisions on whether to sell or buy land (joint decisions), it occurs ownership rights belong to the husbands. Similar to land, ownership of cattle increases income control due to decision making power to sell the same. By not owning such, women are at a disadvantage; it limits their participation in improved bee keeping enterprise, despite being actively involved.

The study noted that men control huge herds of cattle. This indicates that women's access to income is limited. Starting any business requires capital and lack of access to the same marginalizes women yet, they are expected to take part in raising the living standards in the community. Consequently, other than access to productive resources, women also continue to bear the consequences of gender perceptions dominating in many African households; it is perceived decision making power on productive resources belong to men. Changing these perceptions usually result into gender based conflicts. In the study area, though some women own hives, decision making power on how to use the income from honey is either made jointly, or solely by the husband.

Gender roles can change because they are not static. This is possible through a change of mind-set by the government and development interventions who need to appreciate that gender issues are a serious threat, not only in adoption of technologies, but also in any development initiative. Similarly, taking into consideration that gender and development (GAD), and not women in development (WIN), is what should be taken as key. With this in

mind, interventions such as improved be keeping will be an integral part in raising income in the community, not only in the study area, but also in other parts of the Country. This will be a major step in the realization of Vision 2030.

Further, the study sought to find out and understand ownership of productive assets in case of dissolution of marriage. This assisted in understanding both genders' decision making input is such circumstances especially due to the fact that matrimonial properties Bill 2007 stipulates equity in sharing of resources. Results are shown in the Table 4.15 below.

Table 4.15: Ownership of Productive Capital Asset at Dissolution of Marriage

Personal (Mobile phone), Household and Farm assets	Category	Who would keep majority assets in case a marriage is dissolved due to divorce or separation?					
		HH head	Wife(s	HHH &wife	HH Jointly	Other (child)	Total
Agricultural land (pieces/plots	GM	46	7	45	0	2	100
Large livestock (oxen, buffalo)	GM	50	5	40	2.5	2.5	100
Small livestock (goats, sheep)	GM	51.2	45		0.9	2.9	100
Chickens, Ducks, Turkeys, Pigeons	GM	40	42	17.8	0.2	0	100
Farm equipment (non-mechanized)	GM	44.2	36.5	12.9	3.2	3.2	100
Farm equipment (mechanized)	GM	55.5	33.3	0	5.6	5.6	100
Nonfarm business equipment	GM	50	33.3	0	16.7	0	100
House (and other structures)	GM	73	2.7	18.9	2.7	2.7	100
Large consumer durables (fridge, TV, sofa seat)	GM	63.1	0	31.6	0	5.3	100
Small consumer durables (radio, cookware)	GM	77.8	11.1	7.4	3.7	0	100
Cell phone	GM	42.4	51.5	6.1	0	0	100
land not for agricultural purposes	GM	61.5	7.7	30.8	0	0	100
transportation (bicycle, cart, motorcycle,	GM	66.7	0	33.3	0	0	100
Agricultural land (pieces/plots	NGM	60	8	22	4	6	100
Large livestock (oxen, buffalo)	NGM	60	14	17.4	4.3	4.3	100
Small livestock (goats, sheep)	NGM	56.5	17.1	17.2	4.3	4.9	100
Chickens, Ducks, Turkeys, Pigeons	NGM	44.5	31.1	13.3	4.4	6.7	100
Farm equipment (non-mechanized)	NGM	43.6	33.4	17.9	5.1	0	100
Farm equipment (mechanized)	NGM	60.9	21.7	8.7	8.7	0	100
Nonfarm business equipment	NGM	40	30	20	10	0	100
House (and other structures)	NGM	72.2	11.6	11.6	2.3	2.3	100
Large consumer durables (fridge, TV, sofa seat)	NGM	56.2	25	6.3	12.5	0	100
Small consumer durables (radio, cookware)	NGM	69.4	13.9	8.3	5.6	2.8	100
Cell phone	NGM	44.1	47.1	2.9	5.9	0	100
land not for agricultural purposes	NGM	57.9	10.5	31.6	0	0	100
transportation (bicycle, cart, motorcycle,	NGM	60	20	20	0	0	100

Results reveal that in case of dissolution of marriage various resources such as non-farm and farm equipment, goats, sheep, and chicken are equitably distributed between men and their spouses. However, productive resources with high value such as land and cattle would revert to men. Although a few women indicate they would have control of some possessions, it should be noted that this is limited to non-productive resources where chicken, sheep and goats would revert to women. Observably, men would possess more of these assets, a culture that makes a community lag behind especially in terms of socio-economic development. This further verifies that economic empowerment alone is not enough without rights of control.

As Ruchi et al. (2012) argues, women are often not recognized as productive farmers, and rarely benefit from new agricultural research and technologies, and this has contributed greatly to the persistence of the underlying gender inequalities prevalent in both traditional and modern agricultural value chains, a bias that should be alleviated. This is because cultural stereotypes concerning men's and women's work govern the role women play in commercial agriculture. In modern value chains for example, men are concentrated in well-paying and permanent positions mainly because they control land, labour, and other productive resources in the household, while women predominate as temporary casual labourers. In improved bee keeping, it is not different. Women's low participation is largely due to lack of access to productive assets.

With this in mind, household empowerment should be accompanied by initiatives which address power imbalances, cultural stereotypes and gender perceptions that deter socio-economic development. For instance, activities which promote mutual understanding and

discussions among household members such as gender roles, unequal workload, rights and responsibilities are important, not only to raise awareness, but for informing projects, policies, and ultimately, addressing gender inequalities. The results in the study area corroborates other studies. Rubin et al. (2010) note that in mixed crop-livestock systems, men and women own cattle, goats and sheep, though the former, always own more. In pastoral societies women frequently own fewer animals than men; however, livestock are generally more equitably distributed between them than resources such as land (Flintan, 2008). This gender variation in ownership of livestock and land is due to the fact that the latter is more durable than the former. These studies concur that in spite of the central roles women play in small-scale livestock systems, they are limited in their ability to make decisions regarding livestock relating enterprises which can be minimized if gender sensitive strategies are upheld.

Concerning decision making on credit, respondents were asked the following questions; who in the household made the decision to take a loan, how the loan would be used and who would repay it. Results are shown in the Tables 4.16 and 4.17.

Table 4.16: Decision Making Power on Credit (Where Men accessed it)

Financial sources	Category	Decision on who to borrow	Decision on how to use	Decision on who to repay
Banks	GM	Household head	Household head	Household head
AFC	GM	Household head	Household head	Household head
Merry-go-round	GM	Household head	Household head	Household head
Banks	NGM	Household head	Household head	Household head
AFC	NGM	Household head	Household head	Household head
Merry-go-round	NGM	Household head	Household head	Household head

Table 4.17: Decision Making Power on Credit (Where Women accessed it in MHH)

Financial sources	Category	Decision on who to borrow	Decision on how to use	Decision on who to repay
Banks	GM	Joint	Joint	Joint
AFC	GM	Joint	Joint	Joint
Merry-go-round	GM	Spouse	Spouse	Spouse
Banks	NGM	Joint	Joint	Joint
AFC	NGM	Joint	Joint	Joint
Merry-go-round	NGM	Spouse	Spouse	Spouse

Results reveal that in situations where men had taken credit, they made all decisions concerning its use as well as payment. On the other hand, where women had accessed loans from formal lenders (banks and AFC), the decision on use and repayment was made jointly while they made all decisions concerning credit from informal sources (merry-go-rounds). This shows that in MHHs, men's input into decisions concerning loans is dominant whereas women's is limited to informal sources. Further, while men have an input in deciding how their spouses can use credit, women have no input at all in their husbands' decisions. Thus, despite the fact that few women indicated they had accessed formal loans, it occurs the decision on how to use could have been solely the husbands'.

Accordingly, although disparities in decision making power are common in most African households, they impact negatively on the socio-economic welfare of a community as is the case in the study area. Women have no control of collateral such as land title deeds. Basically, many acquire loans through sources that do not require such, hence, the more amorphous "merry go round" which give just limited amounts of cash. Consequently, though they would be willing to enhance improved bee keeping, the income they get is insufficient.

The study found out that majority of women were constrained by capital which resulted to low participation in accessing improved equipment. Accordingly, they would greatly benefit from credit yet they have limited input into decisions concerning the same. Power to acquire credit is essential for them especially since they are venturing a man's domain. They can use it to improve the business which will further increase their participation in the value chain. Other studies have supported this fact.

Shicai and Jie (2009) show that women are poorer in terms of resources and rights than men and this explains the gender gap in access to formal financial services which often require collateral. Similarly, according to Rubin et al., (2010), women have less access to formal financial services because of cultural barriers and collateral requirements and removing these constraints, for example, through low interest credit, more women can participate in value chains, bee keeping included.

4.4.3 Dimension 3: Income

The income dimension comprised of a single indicator namely the level of input into decision making over income from productive resources. Earlier results have shown that men control productive resources including income from bee products. Therefore the study has documented the input made by their spouses. One was considered empowered if they had an input into most or all decisions regarding use of income generated from these productive activities. Results are recorded in the Table 4.18.

Table 4.18: Decision making on use of Income from Productive Activities in MHH

Income Source	Category	Level of input in decisions on use of income generated from different sources (%)					
		No input at all	Input into a few	Input into some decisions	Input into most	Input into all	Total
Food crop farming: crops grown for HH consumption	NGM	2.4	31	31	26.2	9.4	100
Cash crop farming: crops that are grown for sale	GM	6.4	16.1	45.2	32.3	0	100
Dairy cattle rearing	GM	5	27.5	35	20	12.5	100
Poultry keeping	GM	4.5	4.4	4.4	31.1	55.6	100
Bee keeping	GM	34.2	26.3	15.8	21.1	2.6	100
Non-farm economic activities: small business, self-employment,	GM	0	4.8	33.3	28.6	33.3	100
Wage and salary employment: opportunity to engage in paid work	GM	8.3	20	30	25	16.7	100
Food crop farming: crops grown for HH consumption	NGM	8.2	51	26.5	8.2	6.1	100
Cash crop farming: crops that are grown for sale	NGM	46.2	33.3	12.8	7.7	0	100
Dairy cattle rearing	NGM	19.5	34.8	26.1	17.4	2.2	100
Poultry keeping	NGM	4.5	20.5	18.2	36.4	20.4	100
Bee keeping	NGM	42.3	41.2	2.9	11.8	1.8	100
Non-farm economic activities: small business, self-employment,	NGM	6.1	22.2	33.3	5.1	33.3	100
Wage and salary employment: opportunity to engage in paid work	NGM	15	20	20	30	15	100

Majority of women had no input at all in decision making concerning use of income from bee keeping. The highest level of input is recorded in decisions made concerning revenue from poultry and non-farm activities such as small businesses and self-employment. This supports earlier results in the study that women control income from poultry and other small businesses such as beading while few (35%), were making money from honey in comparison to 64% men.

Notably, women in groups, in comparison to non-members, had most decisions in income from bee keeping and other productive resources. This can be attributed to trainings offered at initial stages on decision making power, which further indicates hope in household empowerment. Nevertheless, men's input is recorded in most or all decisions pertaining use of revenue generated from production activities yet income control is key in exercising choice, and reflects whether persons are able or not, to benefit from their effort. Women in

agricultural production usually face many specific barriers preventing them from fulfilling their potential as entrepreneurs thus, undermining their access to income. It is intensified by gender-blind agricultural policies and development projects despite their worthy focus to increase income and food security at community and/or household level. Consequently, they usually overlook the intra-household gender dynamics yet, research from a number of countries indicates that women are more likely to channel income that they control to nutrition, health and education of their children (FAO 2011a). Improving their status can deliver significant impact in realisation of both national and international goals. In this way, cases of women whose agricultural products from their labour are marketed by men, who then keep most income, will be few.

There is evidence that as agricultural production becomes commercialized, women have often lost control and management of income derived from it (Njuki et al 2011). In the study area, women are participating in improved bee keeping but very few are controlling income from honey. Empowerment initiatives can change the situation, evidenced by the findings that the trainings offered before transfer have increased joint decisions, a factor that bridges gender gap. However, in conservative communities, such trainings should be conducted with clear understanding of the gender perceptions that deter most men and women adapt to change.

Alkire et al., (2012) argue that women in empowered households are able to negotiate for their rights and freedoms and as a result; in a better position to bargain on resource availability, accessibility and control. Trainings that consider the unique challenges of women will enable them be in a position to negotiate their own rights especially in control

of income from bee products. Bearing in mind the community is also very conservative, overcoming inequalities associated with gender perceptions will have powerful social-economic impacts.

4.4.4 Dimension 4: Leadership

Leadership captures the key aspects of inclusion, participation and local organizational capacity. It has three indicators namely: group membership, ability to speak in public and ownership of a national identity card. This study analysed the ability to participate in community groups. Results are recorded in the Table 4.19 below.

Table 4.19: Group Membership in the Community (%)

Community groups	Category	Women	Men	Total
Religious groups	GM	90.9	9.1	100
Merry-go-rounds	GM	96.8	3.2	100
Agric./ livestock (producer/marketing groups)	GM	70.6	29.4	100
Credit or microfinance group	GM	70	30	100
Civic /charitable group	GM	63.6	36.4	100
Mutual help or insurance group	GM	54.5	45.5	100
Water users' group	GM	50	50	100
Trade and business association	GM	45.5	54.5	100
Forest users' group	GM	34	66	100
Religious groups	NGM	89.7	10.3	100
Merry-go-rounds	NGM	80	20	100
Agriculture/ livestock (producer/marketing groups)	NGM	66.7	33.3	100
Credit or microfinance group	NGM	61.1	38.9	100
Civic /charitable group	NGM	20	80	100
Mutual help or insurance group	NGM	38.5	61.5	100
Water users' group	NGM	36.4	63.6	100
Trade and business association	NGM	41.7	58.3	100
Forest users' group	NGM	33.3	66.7	100

Findings specify that majority of women were in religious groups and merry-go-rounds. Observably, women in improved bee keeping groups are more, in comparison to non-members. It can be argued that the former had a higher decision making power to belong to community groups than the latter, hence, a positive impact for improved bee keeping project. Consequently, their participation in the enterprise has increased opportunities in decision-

making both at home and community. As O.I. Nareiyu Koin (28/12/2015) observes, an empowered woman has got the ability to make decisions to join community groups of her choice. When asked what denotes an empowered woman O.Is Nareiyu Koin, Elizabeth Nalikungishu, Sainyo Maria, Ann Natuno (28/12/2015) noted the following;

An empowered woman has power to make decisions on the following:

- *Use her income in any development of her choice*
- *Lease her productive resources she is not using to attain more income e.g. land*
- *Educate her children instead of using them as cheap labour*
- *Travel to places of her choice*
- *Joins groups of her choice especially which add value to her*
- *Has freedom of speech in mixed groups*

On the other hand, most men were in groups concerning water, forest, trade, and business associations. In contrast, men who were in groups are fewer compared to non-members and this can be attributed to earlier findings. Notably, men and boys exclusively perform all bee keeping activities in the study area. Results showed that apart from their individual apiaries, they were managing their respective groups', as well as women's apiaries who were hiring male labour. This requires availability and commitment. Consequently, they are more burdened in comparison to non-members hence, lack of time to join community groups. However, through awareness and empowerment initiatives, women in the study area are likely to start managing their own apiaries since as King (2013) states, bees do most of the work.

In conclusion, decision making power among bee keeping households has influenced access to productive resources and it corroborates earlier findings in the study. Women's participation is low in parts of the chain where value is high while men's continue to rise. The power to control income enhances access to improved bee keeping equipment. With men controlling high value assets, for instance, cattle and land, women's marginalisation

continues yet, they are equal partners in the business that is meant to raise the standard of living among participants. Consequently, development actors need to recognise and value women's unpaid work (both farm and household chores). In doing so, female farmers will be able to make informed choices regarding labour, income, and reproductive roles. Failure to realise this potential hinders achievement of regional, national and international food security goals.

Furthermore, despite clear evidence that tackling the gender gap can lead to food security and raised standard of living, development interventions still debate on whether to invest in gender-sensitive programs. For example, according to FAO (2011a), gender issues in developing countries are incorporated into less than 10 per cent of official development assistance (ODA) which is directed towards agriculture; and meagre financial resources for, and time allocated to gender mainstreaming. This practice should definitely change in Kenya, if poverty alleviation is to be realised. The fact that improved bee keeping has a potential to employ the vulnerable, majority who are women and youth who have been marginalised in crops agriculture, is key in employing gender inclusive programs.

4.5 Challenges in Bee Value Chain

The third objective was to identify challenges men and women face in improved bee keeping. The study was based on the premise that both genders face diverse challenges hence, solutions need to be gender responsive. Most studies in the sector have recorded gender neutral constraints yet, improved bee keeping is favourable to both genders. As earlier concluded in this study, the enterprise can comfortably employ the resource poor who mainly comprise of youth and women. It is therefore important to explore the unique challenges that

men and women are facing. It will not only assist the government on policy, but also advise on how to employ gender responsive strategies. For example, according to KALRO (2017), youths' engagement in agriculture remains low despite the growing number of well-educated young persons who are taking up agriculture as a business. There is need to find ways to encourage their participation and a cognizance of needs of those already engaged, and how to address them. With this in mind, the following variables were analyzed; access to information; production; marketing and value addition constraints.

4.5.1 Access to Information

Similar to productive resources, access to agricultural information has been gendered for decades and women continue to be marginalized. Given that agriculture is knowledge intensive (KALRO, 2017), lack of skills contributes to low technology adoption. Access to information therefore influences participation in improved enterprises, bee keeping included. The study sought to explore who has access to information by analyzing; access to training; extension services; knowledge concerning migration of bees; knowledge on pests and diseases control.

4.5.2 Access to Training (management skills)

Gender disparities have existed for decades in access to training especially in resource-poor households. Consequently, many women are usually vulnerable due to the gender related factors that constraint them such as mobility and lack of capital. The study sought to investigate if this is the case in Tran Mara especially after the introduction of improved bee keeping. This is because in commercial enterprises, management skills are important for their success if the adopters have to earn extra income. Results are shown in Figure 4.10.

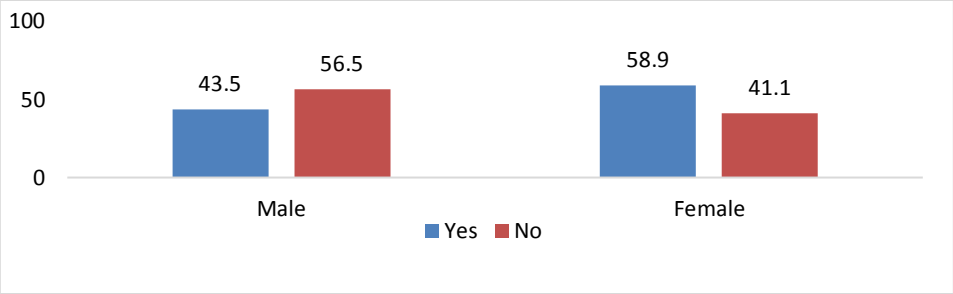


Figure 4.10: Access to Bee Keeping Training since year 2010

Analysis revealed that more women (58.9%), compared to men (41.1%), had received bee keeping trainings. This can be attributed to what the study noted earlier, that at the initial stages of improved bee keeping transfer, management trainings were being held on-farm. This further indicates that taking gender central, for instance, understanding the unique and specific needs of men and women, give positive impacts. It enables the latter to attend trainings if they are offered near their localities, first; due to gender perceptions which deny them freedom and two; due to workload in households which they also have to perform.

This is in contrast to most studies who have found otherwise due to interventions' failure to consider these factors. However, further findings showed challenges experienced by women who lived far from the demonstration plot in KALRO Trans Mara where groups who never received trainings were expected to receive the skills. The study noted that while most men who lived far were trained, majority of *gender-specific* women groups were not. They cited constrains in transportation fee and time to travel.

To maximize the benefit of women's collective action, it is important to understand what strategies are most effective in *gender-specific* or *gender-integrated* groups. In some context, *gender-specific* groups provide spaces where marginalized women can gain self-esteem, confidence and skills through identification of their needs, understating rights and

how to articulate their demands. Developers should therefore use *gender-specific* groups to raise awareness, for instance, demystify the common notion that women are helpers and their labour is of less value than men's, and also discuss the diverse types of inequalities suffered by women farmers and how to alleviate them such as the one experienced in the study area. For example, the study noted that apart from gender related factors, some gender perceptions also play a key factor in the study area. Observably, men could not believe that a *gender-specific* women FGDs has anything tangible to offer visitors without their interjection, a factor that shows how the former trivialise women's knowledge. This was noted during interviews where sitting positions were also cultural like in the following photos.

***Left**: gender-integrated VS **Right:** gender-specific women group FGD during interview (Note the sitting positions)*

Notably, in all *gender-specific* FGDs, women were clustered in one position and vibrant in giving ideas. However before the start of interviews men would insist on listening to what women were discussing. In *gender-integrated* FGDs, men had to sit away from women yet close enough to hear what the latter were talking about. When probed further concerning the sitting positions and men intervening in *gender-specific* female FGDs, O.Is Nareiyu Koin, Elizabeth Nalikungishu, Sainyo Maria, Ann Natuno (28/12/2015) said the following:

> *"Most men in this community perceive women as "children" with nothing tangible to offer to visitors. When we are gender-specific female,their belief is that they need to sit around and hear what we are discussing".*

Observably, while women could talk freely in *gender-specific* FGDs, men dominated the talking in *gender-integrated* ones. Women could only talk with a lot of probing though not freely. Thus, it is such traditions that development interventions need to understand during implementations of technologies. Women in improved bee keeping need autonomy to access information without challenges of gender perceptions. Research has shown that in most African countries, women are constrained by freedom of speech especially in *gender-integrated* groups; FAO, 2011a; Quisumbing and Pandolfelli, 2010). This is attributed to the patriarchal nature that dominates African households and passed through generations thus, apart from factors such as mobility, marital status, and time, women are also facing socio-cultural barriers and gender perceptions.

According to Martin et al., (2012), women's participation in commercial agriculture in most developing countries remains low due to cultural and social barriers which do not allow them to benefit from what they produce, and this hampers all attempts to improve production skills and competencies. Bravo-Baumann (2000) asserts that compared to women, men have easier access to technology and training mainly due to their strong position as heads of households and greater access to off-farm mobility.

In more than a decade later, the status quo persists, not only in Trans Mara, but in most other parts of the Country. Bearing in mind that agriculture is the backbone of Kenyan economy, women's participation in commercial value chains is key for socio-economic development. Bee keeping interventions should aim to understand community's unique needs and social cultural issues constraining each gender before transfer. This will assist in planning various

trainings that should be given to participating men and women, for enhanced involvement and equity in access to benefits hence, minimize gender gaps.

4.5.3 Access to Extension Services in Improved Bee Keeping

Challenges in provision of extension services to resource-poor men and women famers have persisted for decades, with the latter bearing the consequence. According to GOK (2009), bee keeping extension services are not effectively reaching the intended end users due to inadequacy in technical personnel and skills, extension materials, funding and lack of transport in the government extension system. Consequently, despite the importance of agricultural knowledge in modern value chains, these problems are still persisting yet, extension agents are needed in commercial agriculture more than in traditional value chains. Management skills in agri-business is important especially for the resource-poor men and women who have been practicing subsistence farming. With this in mind, the study sought to find out the situation in the study area thus, suggest the way forward.

Findings revealed that out of 178 who responded, more men 110 (62.3%), in comparison to women 68 (37.7%), had received the services. Nevertheless, though more than 30% women had access, men are more yet, the former are new in the enterprise hence, their need for information is crucial. Results revealed that women are challenged in access to trainings especially those who reside far from the demonstration plot where they were to receive skills, suggesting the need for extension services that are conducted on-farm. However, when these services are provided on-farm, they are often directed to men on the erroneous assumption that info will trickle “down” to women. In fact, agricultural knowledge is transferred

inefficiently, or not at all from husband to wife. Communication tend to ignore unique workload, responsibilities, and constraints facing female farmers. The challenge is enhanced in communities where socio cultural issues and gender perceptions act as limiting factors which impacts more on women. For instance, in the study area, women are amateurs in bee keeping, a man's domain, and also passed through generations, factors that need considerations before any transfer. NALEP (2009) noted that while awareness of extension services was high among farmers, interaction with agents was low especially among women.

Equally, Kimani and Ngethe (2007) indicated that among the *Maasai* pastoralists in Kenya, women's access to extension services are restricted by cultural as well as time constraint. Budaka et al. (2005) found that in Turkey, most women farmers had limited access to information concerning animal production through public extension services. Similar findings were recorded in the 90s in Pakistan (Teufel et al., 1998); in Tanzania; (Due et al., 1997); in Kenya, (Mullins et al., 1996); and India, (Rangnekar, 1998). Consequently, gender disparities have persisted for decades not only in Kenya, but in other developing world, and women farmers continue to bear the consequence.

According to Mburu et al (2013), addressing challenges in livestock sector depends increasingly on effective and efficient flow of information. If women's access to agricultural knowledge is more limited or costly than that of men of similar backgrounds, the former may either have less access to economic opportunities or limited engagement in optimal use of resources they control. A recent study in Kirinyag, Kenya, found that extension agents are disoriented in the devolved government hence, taking longer than expected to adjust (Murigi et al., (2018). Consequently, men and women farmers are suffering yet, their need

for agricultural information in modern value chains is more in comparison to traditional ones. The inadequacy in technical personnel, skills, extension materials, funding and lack of transport in government extension system is also a major setback (GOK, 2007), and to address these problems, the government need to review its strategic plans and policies so as to allocate funds to promote one; sensitisation on improved methods of bee keeping among existing agents and two; capacity building through development of trainings in beekeeping for instance, in technical institutions. Short courses can also be accorded to TOTS in various villages who can assist men and women bee keepers and such an initiative can increase both the number of agents, as well as knowledge. It should apply not only in bee keeping, but also in other pro-poor agro enterprises.

4.5.4 Access to Knowledge on Absconding and Migration of Bees

Absconding is the situation where bees leave the hive completely, a frustrating scenario to the farmer who has done so much to get the hive colonised. A bee keeper should have information concerning reasons behind migration and prevention strategies. The study sought to find out if men and women have this knowledge, including the control methods. Results are shown in the Table 4.20 below.

Table 4.20: Control of Absconding and Migration of Bees

	N	%	Male (%)	Female (%)
Hive hygiene (keeping it clean)	60	43.5	42	45
Feeding bees in dry season	29	21.0	15	28
Provision of water	23	16.7	17	16
Hanging hives	18	13.0	16	10
Plant necessary trees for nectar	8	5.8	10	1
Total	138	100	100	100

Findings indicate that out of 138 men and women who responded, most men and women were maintaining cleanliness in hives to prevent bees' migration, (42% men and 45% women) respectively. Notably, more women (28%), in comparison to men (15%) were

feeding bees as a method of prevention. Conversely, other means included; providing water in dry seasons, (17% men and 16% women), hanging hives (16% men and 10% women) and planting necessary trees for nectar (10% men and only 1% women). These results show management skills to prevent bees' migration have been embraced by both genders, a positive impact to the improved bee keeping intervention. Thus, women are enthusiastic in embracing skills despite them being amateurs in the business. This further indicates that if they were in similar situations with men, for instance, control of decision making power, productive resources, and lack of gender perceptions, women would be at par, or even beyond, in realisation of their potential in the enterprise.

There is need therefore to factor in their specific needs and unique challenges at the planning stage of the transfer. This can go a long way in ensuring the realization of their potential in participation and access to benefits. In contrast, a study in Pakistan by Tabinda et al. (2013) found absconding of bees as a major constraint that required time management which affected women's participation. It is therefore inspiring that though women's participation in the study area was lower in comparison to men's, they are not left out in acquiring information on how to control migration of bees, an indication that they are ready to embrace the commercial bee keeping. Gender inclusive interventions can therefore greatly increase participation of men, women, and youth.

4.5.5 Access to information on Pests' Infestation and Control

Honey bees are prone to pests' infestation just like other animals. Information on this matter is crucial which should include knowledge on type of pests, reasons they invade bees and

how to control them. The rate at which bees are attacked can affect honey production. The study sought to explore men's and women's knowledge on the rate of infestation and control methods. Results are recorded in the table 4.21 below.

Table 4.21: Rated Pests' Problem of Honey Bees

Responses			Gender	
	N	%	Women	Men
Minor	62	35.9	30	40
Moderate	59	34.1	25	36
Serious	21	12.1	16	8
Very serious	19	11	18	16
No problem	12	6.9	11	0
Total	173	100	100	100

Out of 173 who responded, most men (40%), and women (30%) said pests' problem was minor. Remarkably, those with no pests' problem are all women (11%). Findings showed good management skills such as hive hygiene controls pest's infestation. As noted earlier, more women, in comparison to men, were keeping hives clean, and this can explain why some of them (11%), had no challenge with pest infestation. Notably, both genders have adopted pests' management skills, and similar to migration, it suggests a positive impact, accredited to improved bee keeping intervention. Further, though women's participation is lower than men's in high value stages, empowerment initiatives targeting households can greatly improve their involvement. Further, the study sought to find out if men and women have the information on the most widespread pest infestation season which is expected to guide on preventive measures for maximised yields. Results are recorded in the Table 4.22.

Table 4.22: The Most Widespread Pest Infestation Season

Seasons	N	%	Males	Females
Long rains	55	37.4	40	43
Dry	39	26.5	21	20
All seasons	31	21.1	22	21
Short rains	22	15	17	16
Total	147	100	100	100

According to most bee keepers (40% men and 43% women), pest infestation is extensive in long rains. Notably, traditional hives are destroyed by water during this period and as a result, more prone to predators, as further findings reveal; majority of men (68%) and women (77%), stated traditional hives are more predisposed to pests infestation, 23% men and 17% women mentioned KTBH, while few stated langstroth (9% men and 6% women). According to O.Is Lelei, Nkilapus, and Tolian, (22/12/2015), compared to improved, traditional hives are constructed with materials that are damaged more easily, as shown in this photo. They are made from hollowed out tree trunks.

O.I. Lelei with a hollowed tree trunk traditional hive

As noted earlier, most women own traditional hives. As a result, they are constrained by this problem and this continues to widen the gender gap in maximizing yield. One of the reasons to improve bee keeping equipment was to avert the calamities associated with traditional hives such as damages during wet seasons. For this reason, ownership of modern ones maximizes production in terms of yield, increased incomes, and hence, raising community's living standards. Though most women have embraced pests' control skills, they may not be in a position to realise their potential in income generation in comparison to those who own modern hives.

This is because as noted earlier, protective materials used in traditional hives do not prevent water damage, creating an environment for pests' infestation. Consequently, this impedes women's participation despite their enthusiasm to acquire knowledge on the business, a fact that calls for inclusive strategy that will enhance both genders' potential in access to

improved equipment. Initiatives that encourage sharing resources within households and neighbourhood can assist women's gradual transition from traditional to improved hives. A number of them have acquired knowledge and putting it into practice will only require a little bit of coaching by those who have been in the business longer. Through empowerment programs, this can be achieved.

Further the study sought to identify the methods used by men and women to control pests, knowledge that influences honey production. Lack of this know-how decreases yields since failure to control pests will definitely have devastating effects on honey bees and certainly, a decrease in intended income. Results are recorded in the table 4.23 below.

Table 4.23: Methods used by Bee Farmers to Control Pests

	Male	Female	Total %
Hanging of hives	53.1	46.9	100
Hive hygiene (e.g. Cleanliness)	51.5	48.5	100
Greasing	47.7	52.3	100

Findings reveal that while more than half of the men interviewed (53.1%), were hanging hives in order to control pests, a similar number of women (52.3%), were greasing them. The other method used was maintaining hive hygiene (51.5% men and 48.5% women). These results show that similar to bee migration, both genders have embraced knowledge on pests' control methods.

The study noted that some men and women received trainings during initial stages of improved bee keeping intervention which were being offered on-farm and this ultimately motivated women's attendance. It assisted them to acquire management skills on various issues, credited to the intervention for upholding a gender strategy that ensures equity in participation. The findings further show women's willingness to adopt the business so long as their unique and specific needs are met. Development interventions that will therefore

address them in modern value chains will not only reap a positive impact for the community, but also the sector. Likewise, it was noted that cultural perceptions and traditional beliefs of inheritance also increases the gender gap which needs urgent consideration. For instance, bee keeping has been passed through inheritance to men which widens the gender gap in participation and if unrestrained, will deter development in most communities, the study area included. Therefore, time has come for government, development projects and key stakeholders to change the notion of transferring gender neutral technologies to resource-poor men and women. The change will not only increase women's participation but also the socio-economic welfare of the Country.

4.5.6 Production Constraints

Production stage is key in any value chain especially modern ones. This is because failure in this part influences other stages negatively, especially in yields and benefits. The study sought to understand and document the challenges facing men and women in production stage of improved bee keeping. This was achieved by asking them to rank the problems starting with the most serious to the least. Results are shown in the Table 4.24.

Table 4.24: Production Challenges by Gender (percentages)

	Responses		Percentages		Total %
	Men	Women	Men	Women	
Costly labour/ equipment	39	80	32.8	67.2	100
Poor weather conditions	66	48	57.9	42.1	100
Poor hive maintenance	40	73	35.4	64.6	100
Pests and diseases	59	53	52.7	47.3	100
Wild animals/theft	58	42	58.0	42.0	100
Slow colonisation	40	58	40.8	59.2	100
Lack of Pollen	49	49	50.0	50.0	100
Low yield	40	21	65.6	34.4	100
Deforestation	33	20	62.3	37.7	100
Air pollution	32	20	61.5	38.5	100
Land shortage	0	30	0.0	100.0	100

Findings illustrate that majority of women, 80 (67.2%), compared to men, 39 (32.8%), were constrained by capital for buying improved equipment as well as hiring labour. Poor hive maintenance was second with 73 (64.6%) women in comparison to 40 (35.4%) men, while third was slow colonisation with 58 (59.2%) women compared to 40 (40.8%) men. Observably, no man was challenged by land; all are women 30 (100%). These results can be attributed to earlier findings.

Participation of women in access to improved equipment was lower than that of men due to lack of capital. Similarly, income from bee products, including productive assets such as land, were highly controlled by the latter who were also performing most bee keeping activities. As a result, women were forced to higher male labour which majority could not afford. This resulted to poor hive maintenance and slow colonisation which most *gender-specific* female groups complained about.

Consequently, neglecting gender related factors that constrain resource-poor women, in most times, negates the intended impact, a fact corroborated by Sitati and Bett (2012); the poorly planned and rapid expansion of improved bee keeping projects usually result in many un-colonised bee hives due to poor maintenance, and this leaves women and youth who are new in the business often making huge losses. Such a move in turn impacts negatively on income generation, and certainly some adverse gender effects not only on women, but whole community. Notably, women's challenges are related to capital, while men's are poor weather conditions, pests, theft, deforestation and air pollution.

Although these disasters are also challenging, capital plays a crucial role in any business. For instance, the study noted that improved hives were given to groups with an aim of increasing the equipment later. However, while *gender-integrated and gender-specific* men

groups increased theirs, most *gender-specific* female groups did not. With prevalence of poverty (GOK, 2010), such an initiative (issuing free equipment), cannot have impact among resource-poor men and women. This is because majority will use any extra income to meet their immediate needs, leaving no room for improvement. However, through empowerment initiatives that target sharing of existing resources, this can change. For example in the study area, men can be sensitised to sell some livestock, after which income is shared jointly in HH, or borrowed as low-interest loans by neighbours. They can use it to enhance improved bee keeping. With such awareness, labour can be shared too which will not only minimize women's challenges, but increase their participation for the benefit of the whole community.

PACT Kenya (2011) confirms these results that unlike men who practice bee keeping as individuals, women practice it in groups of mixed gender. This is because most activities are carried out by men which disadvantages their participation since they have to hire labor for most of the bee keeping activities. As a result, women incur average production costs that are higher than that of men. According to Waithanje et al. (2013), as agriculture and livestock production become more commercialized, women farmers may not be able to compete with, and benefit like their men counterparts. The former have lower access to resources, including capital, than the latter, and they experience other social cultural and economic barriers. According to PACT Kenya (2011) the following are limitations of traditional hives:

- *It is impossible to identify the precise condition of the bee colony. By building the stable combs at the top, beekeepers cannot pick up each comb to see if there are any problems like a disease.*
- *It is almost impossible to introduce new techniques into the management of the colony like building new comb using wax foundation. Bees build stable combs at the top hence, access to the colony is difficult. As a result there is little opportunity for the beekeeper to improve his/her skills.*

- *It is impossible to move the colony. The beekeeper needs to be able to move them for unification in order to improve honey yield and to treat diseases.*
- *There is low honey yield as well as destruction of combs. When collecting honey, the beekeeper takes the entire comb including the brood part which means the next generations are destroyed. In the end, the colony is seriously damaged by the harvesting process and needs a long time to recover. In fact, many colonies abscond after being harvested.*

Findings have shown majority of women do not possess improved hives as individuals. They have access to traditional ones with no new equipment. This means that the above limitations affect them more yet they are new in the enterprise and need to practice and understand the management skills. Gender responsive strategies such as empowerment to share resources will therefore enhance participation in access to improved equipment and thus, positive impact experienced by both the community and bee keeping sector.

4.4.7 Harvesting, Processing, Packaging and Value Addition Constraints

These stages play a crucial rule in achieving the goal of increasing income and raising the standard of living in the study area. For example, findings revealed that processing and value addition was limited for both genders yet, processed and value added products earn more income in comparison to selling raw honey. The study sought to find out and document the challenges faced by men and women in these stages. Results are recorded in the Table 4.25.

Table 4. 25: Harvesting, Processing, Packaging and Value addition Challenges (%)

	Male	Female	Total %
Costly packaging materials	40.1	59.9	100
Costly processing equipment	55.7	44.3	100
Poor harvesting equipment	68.7	31.3	100
Lack of processing/value addition skills	29.7	70.3	100
Poor storage of honey	60.8	39.2	100
Contamination during harvesting	50	50	100
Costly harvesting labour	0	100	100
Customer preferences	49.3	50.7	100
Lack packaging skills	0	100	100

Findings show that majority of women (70.3%) in comparison to men (29.7%), were challenged by processing as well as value addition skills. Conversely, most men (68.7%), compared to women (31.3%), cited poor harvesting equipment while others mentioned poor honey storage; 60.8% men compared to 39.2% women. Notably, only women had challenges with costly labour and lack of packaging skills. These findings validate earlier results. Most women's constraints were related to capital and trainings. Men, on the other hand, earn extra income from cattle and not affected by gender, including cultural related factors.

Lack of capital can be attributed to high poverty levels prevailing in the area as stated by GOK (2010). In Trans Mara, poor households are more (53.7%), compared to non-poor (46.3%), and on average, the former have big families compared to the latter. The forms of poverty experienced are absolute and hard-core with a major effect of high rate of school dropouts as parents cannot meet education costs. While both genders are affected by this scenario, given the option of not educating children, girls are more vulnerable due to gender and cultural stereotypes in the study area. Culture dictates that girls marry and hence, young ones are forced into early marriages which denies them access to education. Knowledge is key not only in business transactions, but also in assisting their school going youngsters.

The county government can introduce initiatives to educate illiterate men and women who are already embracing education through taking their children to school. This can improve conservative nature of the community and impacts positively on socio-economic development. Research has shown that empowered women not only impact in their families, but also in their communities (FAO, 2011). Other studies have shown similar results though

they are gender blind. For example, in Uganda, Mujuni and Kugonza (2012) shows that harvesting labour cost was ranked high by majority of beekeepers yet, it is considered one of the least labour intensive farming activities. IFAD (2008) affirms that though processing bee products may be traditionally managed, challenges arise when quality equipment is required, and if accessible, its cost is above farm household possibilities. FAO (2006) indicates bee products in rural areas are packaged with unsuitable materials because quality equipment's cost is high hence, not accessible by farmers. Notably, all these challenges are capital related. Consequently, it is affecting women more, in comparison to men.

Accordingly, some studies conducted more than a decade earlier are showing similar challenges which are persisting in the improved enterprise. This is the result of ignoring gender and development during transfer. If stakeholders will continue to ignore this fact, bee keeping challenges will not only prevail for long, but also the vision to increase income and raise the living standards in these communities will not be realised.

4.4.8 Marketing Constraints

In a commercial enterprise, marketing outlets play an important role. Their availability and accessibility influences individual's access to income from the business. Research has shown that some channels offer better prices than others thus, preferred by most men and women depending on factors such as proximity and profitability. The performance of the sector therefore depend on marketing channels that are available to bee keepers. With this in mind, the study sought to identify and document challenges faced by men and women in marketing bee products. Results are shown in the Table 4.26.

Table 4.26: Marketing Challenges by Age and Gender

	Male	Female	Total %
Lack of ready market	49.4	50.6	100
Price fluctuations	59.9	40.1	100
Middle men	35.5	64.5	100
Poor rural infrastructure	55.2	44.8	100
Lack of advertisement skills	55.6	44.4	100
Low market demand	44.1	55.9	100
Bad roads in rainy season	42.1	57.9	100

Findings illustrate that both genders are facing similar marketing constrains. However, more women (64.5%), compared to men (35.5%), are challenged by middlemen. Other constrains mentioned were; lack of ready markets including product advertisement, price fluctuations and poor infrastructure especially bad roads in rainy seasons. This suggest that marketing problems are a major setback in the study area. The improved enterprise is meant to earn income among the participating men and women. Notably, middlemen were buying crude form of honey on-farm, a factor that made them more accessible to women despite the fact that, in comparison to other channels, they were offering the lowest prices.

Consequently, while majority of men were privileged to source for outlets which offer better returns, most women were not due to challenges in mobility, time and gender perceptions. As earlier noted, a gender strategy is important before transfer of the improved enterprise. It can include analysis of existing outlets, accessibility, and their effects to both genders. Ordinarily, most development interventions introduce technologies without considering a marketing strategy. This eventually impacts negatively to both genders due to either overproduction, or unreliable markets. Such situations are preventable if development projects will uphold gender responsiveness before transfer. This can minimize enormous losses incurred by resource-poor men and women farmers by technologies that promise huge

benefits, only for them to realise there are no markets. For example, a current study on evaluation of greenhouse farming among small-scale farmers in Kenya established that in most parts of the country, majority have abandoned the practice while others are in the process abandoning, majority who are women and youth. The intervention that introduced the program promised much profits. However, markets are unavailable (Ndegwa, 2018).

The scenario above suggests that in Kenya, poverty alleviation can take decades to be realised if the current trend continues. Consequently, the resource-poor, majority who are women and youth continues to suffer yet it can be avoided through careful planning by employing gender inclusive strategies. According to Martin et al., (2012), bee keepers in rural areas rely on what the local trader offers and have little information if any, on the idea of prices paid in larger markets found in smaller towns or cities. Quisumbing and Pandolfelli, (2010) argue that women face many gender-specific challenges in access to markets. So, market-oriented interventions need to address gender norms that place women at a disadvantage when seeking new market opportunities.

In conclusion, most men's challenges are catastrophes such as poor weather conditions, pests and diseases, theft, deforestation and air pollution. Conversely, women's constrains are related to capital, for instance, lack of access to equipment, trainings and labour. Similarly, whereas most women are challenged by middlemen, men's constrains include unreliable markets and lack of product advertisement. Bad roads is a problem to both genders. This suggests that both genders' challenges are diverse, and the solutions should focus on their unique needs. The government of Kenya realises that agriculture is the backbone of the

economy in its four main agendas, among which is food security by 2022. Bearing in mind that women's labour in small holder agriculture is more, in comparison to men's, food security will be realised if gender is recognised as key in production and productivity. The development interventions should therefore ensure premeditated gender responsive programs in value chains, from production to marketing, including value addition. This is especially so for pro-poor agro-enterprises, bee keeping included. With this in mind, not only will the country be food secure sooner than expected, but the standard of living will rise in rural areas.

4.6 Strategies to Make Improved Bee Keeping Gender Responsive

The fourth objective was to suggest effective strategies that can be employed to make improved bee keeping gender responsive. In the study conclusions, gender responsive strategies have been suggested for instance, programs that consider the unique needs and challenges faced by men and women, including gender perceptions which in most times, hinder participation. In bee keeping, both genders are facing varied problems which are discussed throughout the study. In order to document men's and women's solutions to the prevailing challenges, they were asked to rank them from the most important to the least.

4.6.1 Solutions to the prevailing production challenges

Results are presented in Figures 4.11 and 4.12.

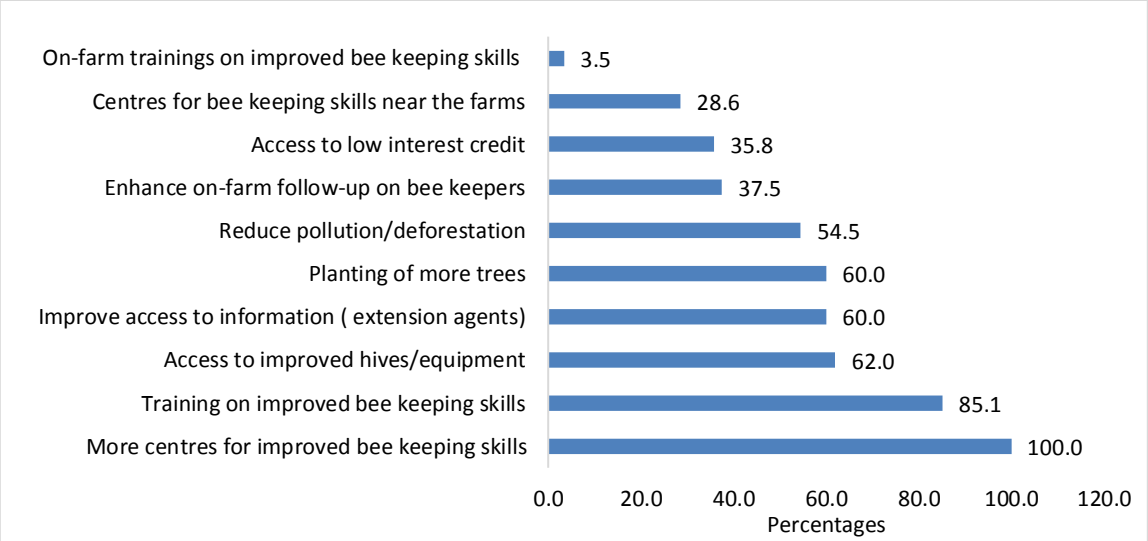


Figure 4.11: Solutions to Prevailing Production Challenges for Men

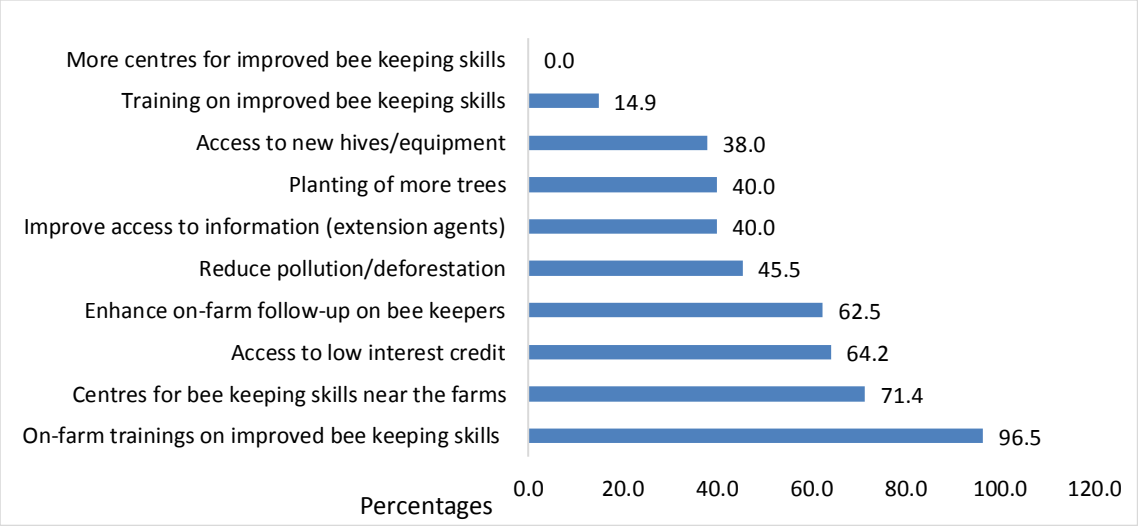


Figure 4.12: Solutions to Prevailing Production Challenges for Women

Figure 4.11 reveals that men (100%), mentioned provision of training centres, and while they ranked it first, it was second for women (71.4%). However, the latter added that the centres should be within their vicinity (Figure 4.12). These results indicate that while men do not mind the centres' locality, women state that they should be located near the farms. This further suggests why women's number one solution was access to on-farm trainings (96.5%), which is actually viewed as a last option by men (3.5%). Notably, men do not mind

the venue for the improved bee keeping trainings and this shows diversity in factors that constrain both genders. Development interventions are thus expected to understand these unique factors to enable them plan successful transfers. For example, women's participation is low due to factors like mobility and time which actually do not challenge men. Further, both genders have focused their solutions on access to improved bee keeping skills which is a crucial avenue to realize their potential in the enterprise. However, while women prefer the information to be provided on-farm, men do not mind the locality. Likewise, whereas men based their views on provision of extension services, and planting trees, women's were mainly on access to low interest loans including on-farm follow-ups.

It can be argued that both genders were focusing on solutions which can enhance their participation confirming the fact that the factors constraining them are diverse. The solutions suggested by men and women are therefore crucial for informing stakeholders in order to ensure gender responsive transfers. According to Katinka (2014, communities in Southeast Asia who found it difficult to adapt to new technologies were assisted through transfer by an Asian based Project. As a result, women learnt self-advocacy techniques through a group of local technicians who were trained to provide support to them in their villages. They were encouraged to learn from each other so as to promote dissemination of ideas and good practice, not just technology. Adapting to such initiatives in improved bee keeping can greatly benefit the *Maasai* community.

A study by Ndungo et al., (2011) in Kenya found that women are key actors in NALEP initiatives and it was attributed to gender related factors. For example unlike men, women

hardly venture into new initiatives without careful scrutiny of such projects. Nevertheless upon embracing it, they are always willing to support it as long as it does not contradict gender roles. Likewise, their participation in common interest groups (CIGs) is higher than men's, since the CIGs allow them operate within their traditionally gender perceived spheres. This shows that through gender responsive strategies, technology transfers can have positive impacts in communities.

Other solutions suggested are; reduction of pollution and planting of trees. The study noted that bees migrate due to lack of food and water which is as a result of deforestation and air pollution. Awareness initiatives are needed in mixed farming areas of Trans Mara especially the importance to plant trees that are favourable to bees. Likewise, they should be sensitised on the need to burn charcoal, if they have to, away from apiaries to avoid air pollution which is detrimental to their survival.

4.6.2 Solutions to the Prevailing Marketing Challenges

Results are shown in the Figures 4.13 and 4.14.

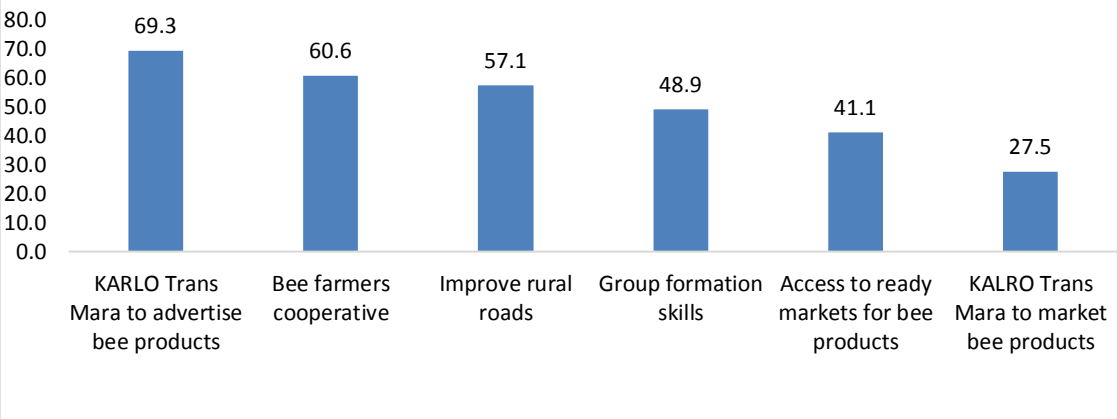


Figure 4.13: Solutions to Prevailing Marketing Challenges for Men (%)

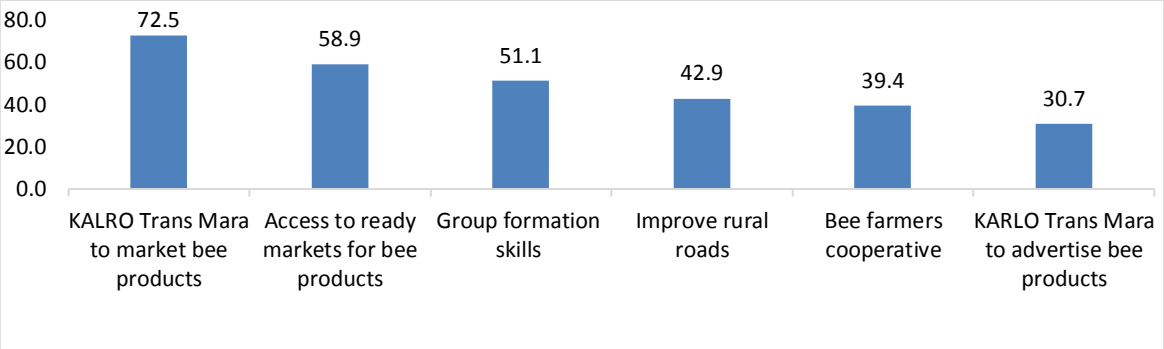


Figure 4.14: Solutions to Prevailing Marketing Challenges for Women (%)

More men (69.3%), compared to women (30.7%), stated that KALRO Trans Mara should advertise bee products. Observably, the former ranked it first while it was actually last for the latter. In contrast, majority of women (72.5%), compared to men (27.5%), were of the view that KALRO Trans Mara should market the bee products, reason why they ranked it first while men cited it as a last option. This can be attributed to earlier findings in the study.

Men had no problem in accessing marketing channels that offer better prices. However, most women could only access those buying on-farm despite the fact that these outlets were offering lower prices. This is why the need for better markets is crucial for them hence, assistance by KALRO Trans Mara in marketing the products. Men are able to source for buyers away from home and what they need is assistance in advertising their products. These results show the diversity of both genders' unique needs. The study noted that KALRO Trans Mara has plans to assist men and women bee keepers to advertise, market their products, and form marketing associations, an idea that stakeholders should adapt. It will not only alleviate middle men, but solve other marketing challenges such as access to ready markets and enhance collective marketing.

The other solution mentioned is improvement of infrastructure especially rural roads. Most men and women were using either hired motorbikes or personally carrying their bee products to the market as shown in Table4.27 below.

Table 4. 27: Modes of Transporting Bee Products to the Market

	Male	Female
Hired motorbike	47.3	48.0
Carry by myself	37.6	47.0
Hired bicycle	5.4	1.0
Own bicycle	2.2	2.0
Own motorbike	4.3	0.0
Public vehicle	3.3	2.0
Total	100.0	100.0

The study noted that bad roads, especially during rainy seasons, are a key problem when marketing bee products. This suggests that when it rains, both channels; hired motorbikes and carrying individually, are affected. It is crucial to have all-weather roads especially now that bee keeping is commercialised in the area.

In conclusion, factors constraining men and women are varied hence, diverse solutions. Most women were constrained by capital thus, access to low interest loans is viewed as a solution to improve participation. Women's solutions are focused on capital and gender related factors such as mobility and time, while men's are mainly on improved services for instance, infrastructure, farmers associations, and extension agents. Improved bee keeping, in comparison to other farming systems such as crop and livestock, is favourable to women yet, they are still facing unique challenges that are hindering their participation. Generally, women face a lot of barriers in agricultural production which calls for urgent address, not only in bee keeping, but also in other pro-poor agro-enterprises value chains. For example, a study by Miriti (2011) in Meru, Kenya, established that despite tissue culture bananas' aim

to increase income through collective marketing, women could not join organised markets due to capital and gender perceptions constraints. Nevertheless, since bananas were their domain, they were able to earn extra income by hiring their own farms and opening bank accounts thus, changing gender roles that eventually caused intra-household conflicts in homes.

As a result, there was little impact since most women who needed to secure their homes eventually stopped the banana business, a situation that could be happening with transfer of many technologies in rural areas. For example, bee keeping has been a domain for men passed through inheritance in many communities, the study area included. Bearing in mind that men control most productive resources, they will continue to dominate bee keeping value chain hence, negating the intended impact which in most times, is minimal.

With this in mind, for both genders to benefit, gender integration should be endorsed both by government and private interventions. For instance, empowerment programs that target joint ownership and sharing of productive resources in households, neighbours and community can be employed. Prior knowledge of a community is also important, for example, concerning men's or women's domains, information that is usually ignored yet it is key in realising both genders' potential to adopt an enterprise. This can alleviate dominance in participation and also household conflicts arising from change of gender roles.

Research has shown that if women are empowered, their participation increases in high value stages, and the impact is usually positive. Equally, if they have extra income, they not only use it to develop households, but also educate children thus, impacting the community's

welfare. In bee keeping, men are dominating while women's involvement remains low yet it is expected to enhance both genders' participation. For government to realise its four agendas, stakeholders, not only in bee keeping but also other agricultural value chains, should employ gender strategies in development programs. Food security (nutritious food) means good health, and a healthy nation enhances men's and women's productivity.

Poverty alleviation by year 2030 will be achieved if the use of traditional methods, where agricultural information is passed to men with erroneous assumption that it will trickle down to women, will come to an end. Likewise, the belief that development projects and technologies that use gender neutral strategies can automatically increase income, raise the living standards and ensure food security among resource-poor men and women, is a fallacy. For decades, numerous interventions intended to change situations in rural areas have either left most communities unchanged, or worse (Muyanga, 2008; Miriti, 2011; Ndegwa, 2018), and at times, middle-income men and women are the ones who benefit and yet, in most tomes, technologies target the resource-poor who are the majority.

Results in this study corroborates Ndungo et al., (2011) that despite NALEP's efforts to initiate new opportunities in value chains, marketing is the most serious challenge. Listed among major constraints are; "poor infrastructure, distance to markets, exploitation by middlemen, packaging, lack of knowledge in marketing, and over-production of similar commodities in a region, and the worst hit by this scenario are women. They are unable to travel far and wide in search of better marketing opportunities compared to men who accesses long distant markets without seeking their wives' consent and are not tied by gender

roles at home. Quisumbing and Pandolfelli, (2010) state that in addition to typical market risks like theft and inadequate information concerning current prices, female farmers face many gender-specific barriers in accessing markets. Market-oriented interventions should address gender norms that place women at disadvantageous situation when seeking new market opportunities. With this in mind, poverty will be a thing of the past and stakeholders in development interventions will be happy with the results.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents summary of findings, emerging implications and conclusions. In addition, recommendations based on the study conclusions and areas for further research are documented.

5.2 Summary of Findings

The aim of this study was to investigate gender gaps in transfer of improved bee keeping among the *Maasai* communities. This was based on four objectives namely; levels of participation of men and women in bee keeping value chain; decision making power among bee keeping households; challenges faced by men and women; and effective strategies that can be employed to make bee keeping gender responsive. The research was undertaken in Trans Mara Sub County, Narok County, Kenya.

The first objective was to examine the levels of participation of men and women in bee keeping value chain. The study noted that in access to improved hives, a big percentage of men possessed KTBH compared to women, while no woman owned langstroth yet they increase value in the latter stages. Further, most young persons who owned the improved hives are men which is due to cultural issues of inheritance. Nevertheless, the fact that a few women are accessing improved hives shows a positive indication, and if challenges constraining them are resolved, many can participate. Findings show that for both genders, access to improved harvesting equipment, refining machines and quality packaging materials is low. However, all smokers were possessed by men and no woman respondent

had any. Consequently, their participation decreases further in nodes of the chain where value is high, a scenario attributed to gender related factors such as access to capital, mobility and time including gender perceptions that constrain them. Results indicate that the main marketing channels used in the study area are middle men, local consumers, retail shops, open air and cooperatives.

The study noted that wholesale and cooperative outlets offer better prices compared to local shops while middle men and local consumers offer the lowest because they buy crude (raw) honey on-farm. Notably, most men and single women had access to channels which offer better prices. They both control time and income thus, can source outside markets. Married women are not only constrained by mobility and time, but also gender perceptions thus, they can only depend on outlets near home.

This impacts negatively on them, yet they are active participants in the improved enterprise. The activities in bee keeping, from hive cleaning to marketing bee products are highly performed by men, women therefore have to hire male labour which further increases their vulnerability as they are capital deficient. The study found that very few women earn income from honey in comparison to men. As a result, it jeopardises their potential yet they are new in the business.

Further, it affirms what was noted earlier that improved bee keeping is becoming an important enterprise which elevates men, as it impacts negatively on women especially at stages of high value. Consequently, it is a challenge for them to enhance bee keeping. These findings confirm the first premise of this study that levels of participation in bee keeping is gender biased. Blumberg theory affirms that women's participation in any value chain is a function of (1) the demand for their labour relative to what they supply and (2) the degree of

compatibility of productive work with the reproductive (especially breast feeding) that women must perform.

The second objective was to evaluate the decision making power among beekeeping households. Findings indicate that while men have a high decision making input in all agricultural activities, women have some input in own employment and minor household expenditures. Observably, there is higher consensus among group members' households compared to non-members. It can be argued that trainings in improved bee keeping have enhanced joint decisions, a factor that reduces gender gaps. Further, the study noted that men have a higher decision making power in purchase and sale of all household assets while women's is minimal or none at all. Observably, women have no input either in purchase or sale of agricultural land. Their high input is in decisions concerning poultry and non-farm activities such as self-employment. Further, men have input to most or all decisions pertaining income generated from productive activities.

Results further indicate that ownership of household assets including land and cattle, is highly controlled by men while women control chicken, and a small percentage own non-farm equipment. Consequently, men highly control most productive assets yet resources such as cattle increases income control due to decision making power over the animals. As such, men are advantaged than women in accessing capital to enhance improved bee keeping. Notably, some resources such as goats, sheep, farm and non-farm equipment, are equitably distributed between joint ownership and that of household head. These are less productive in comparison to land and large cattle, yet women have minimal control. Decisions have to be jointly made concerning them. Findings reveal that in case of

dissolution of marriage, most assets would revert to men. However, various assets such as non-farm and farm equipment, small livestock (goats and sheep) and chicken are equitably distributed between men and their spouses. It can be argued that women have access to both non-productive and productive assets but control is exclusively by men. Though a few women indicated that some assets would revert to them, it also occurs that these resources are non-productive.

The study noted that men had input to most or all decisions pertaining use of income generated from production activities. Further findings reveal that women in improved bee keeping groups had a higher decision making power to join community groups in comparison to non-members. It can be argued that participation in trainings during transfer has increased their decision-making power to join societal groups. According to Blumberg's theory, women's participation in value chains should translate into control of productive activities and the benefits that are accrued from them. This confirm the second premise that economic opportunities alone might not necessarily lead to decision making power within the household without rights of control to productive resources.

The third objective was to identify challenges in improved bee keeping value chain. Analysis suggest that more women, in comparison to men, had received management trainings in improved bee keeping due to the fact that initially, they were being held on-farm which enabled many to attend. Further findings revealed that bee keeping groups who did not receive initial trainings were expected to travel to the demonstration plot in KALRO Trans Mara in order to obtain skills. However, while most all-men and gender-integrated groups were trained, almost gender-specific female groups who lived far could not travel due to

lack of transportation fee and time, factors that continues to widen the gender gap not only in access to information, but participation in improved bee keeping value chain. Findings reveal that in production stage, all genders have embraced management skills and the major challenges are access to capital and catastrophes such as theft, poor weather conditions, pests and diseases. Women and youth are more constrained by capital to buy improved equipment and hiring labour.

In the study area, older men control income from large herds of livestock hence, money is not a major problem. In value addition, the issue is lack of awareness on honey products since majority of men and women received the skills. In marketing, the major constrains were middle men, transportation cost, lack of ready markets and price fluctuations. Consequently, women were challenged by these factors more than men. These findings affirm the third premise that men and women in bee keeping face varied challenges.

The fourth objective was to identify strategies that can make improved bee keeping gender responsive. Concerning production challenges, both genders were of the view that training centres will improve access to bee keeping skills. However, while men did not mind their locality women indicated they should be on-farm. Further, women's solutions are geared towards capital and gender related factors that constrain them while men's are on improvement of the services offered. The stakeholders should therefore consider the unique needs of men and women so as to enhance both genders' participation in the value chain. For example, compared to women, men are less constrained by mobility and time. Likewise, men exclusively control productive resources like land, a collateral to access loans, while most women own big farms with no title deeds hence, marginalised in access to capital.

In marketing challenges, men's views were centred on advertising bee products, while women's were on marketing them, a factor attributed to middle men challenge. Notably, KALRO Trans Mara has plans to assist men and women to advertise and market their products through associations. Such strategies should be encouraged in institutions partnering with improved bee keeping interventions. It will not only alleviate middle men, but also solve other marketing challenges such as lack of access to ready markets. Improvement of bad roads was also among the solutions mentioned.

It is fundamental to ensure they are accessible especially with bee keeping turning commercial. Stakeholders should consider the solutions suggested by both genders which can assist to mainstream gender in the sector. This will increase participation and at the same time, enhance equity in access to productive resources and benefits accrued from bee products. It will not only increase both genders' potential, but also ensure a positive impact in the community.

5.3 Conclusions

The findings revealed that demographic data influenced participation in improved bee keeping especially in access to hives and marketing of bee products, stages of the chain with high value. As a result, women and youth are marginalised. The fact that women as old as 18 years are illiterate, also widens the gender gap. They are required to have basic knowledge on how to transact the business. Results also indicate that challenges in access to capital, gender related factors such as mobility, time, and cultural perceptions, have impacted negatively on participation levels especially in access to improved equipment, trainings, and also control of income from bee products. Consequently, these factors have affected women

more than men, yet the former are new in bee keeping thus, their need for capital, including moral support, is greater than men's. Further, the fact that men control high value assets such as livestock and land, continues to widen the gender gap in improved bee keeping value chain whose intention is to increase income and raise the community's living standards.

The study found that in production stage, the main challenges mentioned by men were catastrophes such as poor weather conditions, pests, deforestation and air pollution, while women's are linked to capital and gender related factors such as mobility and time. In marketing, more women, in comparison to men are challenged by middlemen since the latter are able to source for better outlets. Further, both genders are constrained by lack of ready markets, price fluctuations and bad roads. The factors constraining men and women are therefore varied hence, diverse resolves are required.

The solutions suggested by women are focused more on capital and gender related factors, for instance, access to low interest loans and on-farm follow-ups, while men's are mainly on the improvement of services such as infrastructure, farmers associations, and extension agents. Blumberg theory asserts that women's participation is a function of (1) the demand for their labour relative to what they supply and (2) the degree of compatibility of productive work with the reproductive (especially household chores) that women must also perform. The fourth premise was gender responsive strategies can alleviates the negative impact usually experienced by transfer of technology among conservative communities and as Blumberg theory concludes, the degree of gender inequality can decline.

5.4 Recommendations

Based on the findings, recommendations are suggested for enhanced men's and women's participation in improved bee keeping, equity in decision making power in households and solutions to the prevailing challenges for a gender inclusive strategy in the sector.

i) In objective one, the study found that women's participation in access to improved equipment and trainings was low in comparison to that of men due to capital constrains, gender related factors such as mobility, and gender perceptions. Further, majority of men and women were illiterate including young women as old as 18 years. The study suggest the following recommendations:

To increase both genders' access to improved equipment, the bee keeping interventions should partner with KALRO, MOA and county governments in order to raise awareness and initiate household empowerment among the participating men and women. Gender responsive forums within their localities can be used. To start with, sharing of productive resources in households and neighbourhood can be instigated by encouraging men and women who own improved equipment to share with those without. This can motivate the vulnerable, majority who are women, to transit gradually from traditional equipment into modern ones. At the same time, such forums can be used to understand the underlying cultures, e.g. men's and women's domains, gender perceptions and other traditions that hinder participation especially in access to trainings, hence discuss and initiate solutions.

In land ownership, the county government should introduce sensitization programs on human rights which should be all inclusive; village elders, women, men and youth.

As a marketing strategy, the county government and bee keeping interventions should initiate gender responsive associations in order to enhance men's and women's collective action in the following; purchase quality processing machines, source for better markets to minimize middle men and advertise products. In such associations, stakeholders such as the relevant private developers and NGOs can raise awareness on value addition and uses of bees wax. At the same time, they can also be used for empowerment purposes for instance, introduction of adult classes that can enhance knowledge for the illiterate men and women.

ii) In objective two, the study noted that men have a higher decision making power in purchase and sale of productive assets and at the same time, have inputs to most or all decisions pertaining the use of income generated from productive activities including bee keeping. The study suggests that beekeeping interventions, in partnership with county government, local leaders e.g. religious and village elders, and extension agents should initiate awareness and household empowerment targeting power imbalances and cultural stereotypes, especially those that deter socio-economic development. In such forums, trainings and discussions should be promoted on gender roles, unequal workload, rights and responsibilities especially importance of individual and joint decision making power. This will address both household and community inequalities, and minimize the gender gap for enhanced participation and access to benefits in agricultural value chains.

iii) In objective three, the major challenges were capital and gender related factors for instance, mobility that constrained access to trainings, lack of ready markets, middlemen and

price fluctuations. Others were weather conditions, hence bad roads including pests' infestation. The study recommends that before transfer, the bee keeping interventions should aim to understand the specific challenges and social cultural factors that constrain both genders in communities. For example, the needs of *gender-specific female* groups are different from *gender-intergrated*, especially if travelling is entailed. Therefore, considering the unique factors that constrain both genders will increase participation and enable them to negotiate their own rights especially equity in access to benefits from bee products. Improved bee keeping has a potential to employ the vulnerable who have been marginalised in crops agriculture, majority who are women and youth, a key factor to take gender seriously.

In extension services, the government should allocate funds to promote one; to sensitise existing agents on gender responsive methods of improved bee keeping and two; gender responsive capacity building through trainings e.g. technical colleges can have short courses on bee keeping to train TOTS and long-term ones to increase the extension agents who are currently very few in the system.

To enhance access to trainings, bee keeping interventions in corroboration with MOA and county government should construct demonstration trials within the localities where extension officers and TOTs can rely information to men and women bee keepers.

In access to capital, bee keeping initiative, in partnership with county government and local leaders should have forums to empower both genders on importance of joint sharing of productive assets. For instance, in the study area, men can be encouraged to sell cattle after which profits can either be shared in the household, or as informal low-interest loans among

neighbours, who should then enhance bee keeping. With such awareness, labour can be shared freely, and this will minimize women's challenges in capital constraints. Low interest loans can also be introduced through the marketing associations.

In marketing, the bee keeping initiative in corroboration with county government should improve roads, construct on-farm resource centres, both for trainings and collecting bee products, and at the same time, conduct deforestation and air pollution awareness such as "cut a tree, plant two".

iv) In objective four, the study found women's solutions to production challenges were geared towards access to capital and gender related factors that constrain them, while men were concerned with improvement of the services offered.

The study suggests that projects with bee interventions should plan for gender responsive forums where all key players, including men and women farmers, can come together in order to strengthen production and marketing depending on the prevailing challenges. As a starting point, farmers' representatives can include men and women group leaders from areas where the intervention has been transferred, and they must be encouraged to discuss their challenges freely. Such forums should, in most times, be conducted within localities to maximize involvement of women. This will enhance both genders' participation in the value chain, increase the realisation of their potential and eventually a positive impact in the community.

The study also recommends that the government should revise agricultural policies and strategic plans so that they can include gender and development, not just relegated to particular paragraphs, but spelt out as key in achieving food security, including poverty alleviation.

5.5 Future Research

Based on the findings for this study, there is need to conduct a study to assess the outcome of a gender responsive transfer of a commodity that was traditionally owned by either gender. This is with prior information that the gender responsive strategies have been employed.

A gender analysis on existing national and regional policies and strategic plans especially on land and agriculture is also crucial.

REFERENCES

African Beekeeping Resource Centre (ABRC) (2015). Unlocking the Potential of African Beekeeping: Beekeeping Case Study (Kenya 1) Leah Kimani, Nakuru County. http://africanbeekeeping.org/category/case-studies/

Ali, A. (2005).Livelihood and Food Security in Rural Bangladesh. PhD. Thesis. Wageningen University.

Alkire, S., and M. E. Santos (2010). Acute Multidimensional Poverty: A New Index for Developing Countries. OPHI Working Paper 38. Oxford, UK: Oxford Poverty and Human Development Initiative.

Alkire, S., Meinzen-Dick, R., Peterman, A., Quisumbing, A.R., Seymour, G., and Vaz, A. (2012). The Women's Empowerment in Agriculture Index. IFPRI Discussion Paper 01240, December 2012. IFPRI

Ayoade, J., A., Ibrahim, H.I, Ibrahim, H., Y. (2009). Analysis of women involvement in livestock production in Lafia area of Nasarawa State, Nigeria. *Livestock Research for Rural Development* 21:220. http://www.lrrd.org/lrrd21/12/ayoa21220.htm (Accessed on 22 January 2014).

Agri-ProFocus (2012). Challenging Chains to Change. Gender Equity in Agricultural Value Chain Development, pp. 209-260. KIT publishers, Amsterdam.

Babbie, E. (2007). The practice of social research (11th ed.). Belmont, CA: Wadsworth/Thomson

Obama, Barak (2015). United States President: The Global Entrepreneurs Summit (GES) held in Nairobi Kenya.

Becker, E. (2012). "Themes from Feed the Future Women's Empowerment in Agriculture Index: Report from Qualitative Case Studies in Bangladesh, Guatemala, and Uganda." Unpublished report submitted to the International Food Policy Research Institute, Washington, DC, pp. 5-10.

Blumberg, Rae, Lesser. (1984). "A General Theory of Gender Stratification," Sociological Theory 2, pp. 23-101.

Bravo-Baumann, H. (2000). Gender and livestock: capitalization of experiences on livestock projects and gender. Working Document. Swiss Agency for Development and Cooperation, Bern. http://www.fao.org/wairdocs/LEAD/X6106E/x6106e00.HTM accessed on 22/1/2014

Browning, M. (2000). The saving behavior of a two-person household. *Scandinavian Journal of Economics* 102(2): 235–251.

Budaka, D., B., Darca, N. and Kantar, M. (2005). Women farmers and extension services in small ruminant production in mountain areas of Turkey. *Journal of Arid Environments* 62(3):507–515.

Carroll, Thomas (2002). A study of the beekeeping sector in Kenya. Baraka Beekeeping Development Unit/ Self Help Development International (SHDI) Molo, Kenya. http://www.sustainableag.org accessed on 1/8/2014.

Carroll, Thomas (2006). A study of the beekeeping sector in Kenya. Baraka Beekeeping Development Unit/ Self Help Development International (SHDI) Molo, Kenya.

Carroll Tom. (2013). Webmaster Apiconsult. The African Beekeeping Resource Centre. http://www.apiconsult.com/why-beekeeping.htm (accessed on 6/11/2013)

Chawatama, S., Mutisi, C. and Mupawaenda, A., C. (2005). The socio-economic status of smallholder livestock production in Zimbabwe: a diagnostic study. *Livestock Research for Rural Development* 17(12). http://www.cipav.org.co/lrrd/lrrd17/12/chaw17143.htm. (Accessed on 22 January 2014).

Constitution of Kenya. 2010. The National Council of Law Reporting: Revised Edition

Creswell, John. W. (2012). Educational research: Planning, conducting, and evaluating quantitative and qualitative research (4th ed.). Upper Saddle River, NJ: Merrill.

Creswell, John. W. (2014). Research design: Qualitative, Quantitative and Mixed method Approaches. Fourth Edition. Sage Publications, Inc. United Kingdom. pp. 267-290. http://www.sageresearchmethods.com (Accessed on 30 June 2015).

Dirk, Meganck. (2012). Technology Transfer for Food Security: Helping Asia's Poorest. European Commission Directorate-General for Development and Cooperation, Europe Aid, Greece. http://ec.europa.eu/europeaid/index_en.htm

Denzin N. K. and Lincoln Y. S (2011). The SAGE handbook of qualitative research (4th ed., pp. 97–128). Thousand Oaks, CA: Sage. http://www.sageresearchmethods.com Accessed on 30 June 2015.

Deshingkar P, Farrington J, Rao L, Akter S, Sharma P, Freeman A, Reddy J. 2008. Livestock and poverty reduction in India: findings from the ODI Livelihood Options Project. ILRI Discussion Paper 8. Nairobi (Kenya): ILRI. (Available at http://mahider.ilri.org/bitstream/10568/281/1/ accessed on 1/8/2014.

Due, J., Magayane, A. and Temu, A. (1997). Gender again: views of female agricultural extension officers by smallholder farmers in Tanzania. *World Development* 25(5):713–125.

EADD. (2008). East Africa Dairy Development Project. Baseline Report No 6. Gender, Dairy Production and Marketing. EADD/ ILRI, Nairobi Kenya.

Engle, P. L. (1993). Influences of mothers' and fathers' income on children's nutritional status in Guatemala. *Social Science & Medicine* 37(11): 1303–1312.

Farmbiz Africa (2016). Beekeeping Venture Shields Farmer from Climate Change http://www.farmbizafrica.com/pests/1208-beekeeping-venture-shield-farmer-from-climate-change

FAO (1990). Beekeeping in Africa, by Adjare Stephen. FAO Agricultural Services Bulletin 68/6 Rome. http://www.fao.org/docrep/t0104e/T0104E00.HTM accessed on 30/8/2014

FAO/WHO. (2005). Informal food distribution sector in Africa (street foods): importance and challenges. FAO/WHO Regional Conference on Food Safety for Africa, Harare, Zimbabwe, 3–6 October 2005.

FAO (2006). Value-added products from beekeeping, by R. Krell, FAO Agricultural Services Bulletin No. 124, Rome, pp. 20-35.

FAO (2009). Bees and their role in forest livelihoods, by N. Bradbear, Non-wood forest products No. 19, Rome, pp. 32-42.

FAO (2011). Notes on Livestock, Food Security and Gender Equity. Animal Production and Health Working Paper. No. 3. Rome.

FAO (2011a). The State of Food and Agriculture: Women in Agriculture: Closing the gender gap for development. Rome: FAO.

Flintan F. (2008). Women's Empowerment in Pastoral Societies. WISP, GEF, IUCN, UNDP. George, P. S .and Nair, K. N. 1990. Livestock Economy of Kerala. Kerala:Centre for Development Studies. http://www.smallstock.info/reference/LID/livestock.pdf. (Accessed on 22 January 2014).

Fowler, F. J. (2009). Survey research methods (4th ed.). Thousand Oaks, CA: Sage.

Grace D. (2007). Women's reliance on livestock in developing-country cities. ILRI Working Paper. International Livestock Research Institute, Nairobi, Kenya.

Green, R. and White, M. (1997). Measuring the Benefi of Home-owning: Effects on Children. *Journal of Urban Economics* 41(3): 441–461.

GOK (2005). Trans Mara District Strategic Plan 2005-2010 for Implementation of the National Population Policy for Sustainable Development, pp. 4-14.

GOK (2008). Ministry of Livestock Development Strategic Plan (MOLD) 2008-2011. Nairobi, Kenya.

GOK, (2009). Draft National Bee Keeping Policy 2009. Nairobi, Kenya.

GOK (2010). 2010 Population and Housing Census, Nairobi, Kenya.

Gebey, T., Berhe, K., and Hoekstra, D. (2010). Beekeeping Development Using Value Chain Approach in Fogera District Ethiopia: Experiences from IPMS Project Interventions, ILRI, Addis Ababa, pp. 2-8

Gotschi E, Njuki J, Delve R. 2009. Equal Numbers, Equal Chances? A Case Study of Gender Differences in the Distribution of Social Capital in Smallholder Farmer Groups in Búzi District, Mozambique. *European Journal of Development Research* 21(2):264–282.

IFAD (International Fund for Agricultural Development) (2008). Enabling Poor Rural People to Overcome Poverty: A Beekeeping /Honey Value Chain Financing Study Report. The Institute of Community and Organizational Development (CODIT), Nairobi, Kenya.

IFAD (2014). The Gender Advantage: Women on the Front Line of Climate Change. IFAD, Rome, Italy. http://www.ifad.org/climate/resources/advantage/gender.pdf

Herath S. 2007. Women in livestock development in Asia. *Journal of Commonwealth Veterinary Association* 24(1):29–37.

Herrero M, Thornton PK, Notenbaert A, Wood S, Msangi S, Freeman HA, Bossio D, Dixon J, Peters M, van de Steeg J, Lynam J, Parthasarathy Rao P, Macmillan S, Gerard B, McDermott J, Seré C,Rosegrant M. (2010). Smart Investments in Sustainable Food Production: Revisiting Mixed Crop–Livestock Systems. 327:822–825.

Johnson, R. B., Onwuegbuzie, A. J., & Turner, L. A. (2007). Toward a definition of mixed methods research. Journal of Mixed Methods Research, 1(2), 112–133

Katinka Weinberger (2014). Technology Transfer and Adoption in ASEAN Region: Towards A Future Without Poverty Supporting Sustainable Agriculture in Asia and The Pacific. Centre for Alleviation of Poverty through Sustainable Agriculture of the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP).

Kenya Agricultural and Livestock Research Organization (2017). Strategic Plan 2017-2021. KALRO. Nairobi, Kenya.

Kenya's Vision 2030 **(**2010)**:** An Audit from an Income and Gender Inequalities Perspective Society for International Development: Nairobi, Kenya.

Kimani, T., M., Ngethe, E., W. (2007). Enhancing livestock management skills amongst Maasai pastoral women of Magadi Division in Kenya: a CVA funded Kenya Women Veterinary Association Project. 4th Pan Commonwealth Veterinary Conference, 4–8 November 2007. Barbados, West Indies.

King, S. (2013). Women's Collective Action in the Honey Sector in Ethiopia: Involving Marginalized Women in Collective Action. In Women's Collective Action in African Agricultural Markets: The missing link for empowerment ed. Baden, S. and Davies, I. Oxfam GB. E. http://womenscollectiveaction.com/Phase+III accessed on 22/1/2014

Kiptarus, J., Asiko, G., Muriuki, J., and Biwott, A. (2011). Beekeeping in Kenya: The Current Situation: A paper presented at the 42nd International Apicultural Congress, Apimondia 2011, in Buenos Aires, Argentina.

Koissaba, Rapaine, Ben. (2009). Transmara District Booklet Project: Follow-up To the Report of the Visit by the UN Special Raportour for Indigenous Peoples Rights and Freedoms, Maa Civil Society Forum.

Kristjanson, P., Waters-Bayer, A., Johnson, N., Tipilda, A., Njuki, J., Baltenweck, I.,Grace, D., and MacMillan, S. 2010. Livestock and Women's Livelihoods: A Review of the Recent Evidence. Discussion Paper No. 20. Nairobi, Kenya, ILRI

Kugonza, D., Kamatara, K., Nabakabya, D. and Kikonyogo, S. (2009). Effects of Hive Type and Tree Shade on Colonization Rate and Pest Prevalence of Honeybee (*Apis Mellifera*) Colonies in Central Uganda. Africa Journal of Animal and Biomedical Sciences 4(2): 1–5.

Kyotalimye, Miriam (2013). Gender and Agricultural Value Chains. A paper presented on Policy Analysis and Advocacy Programme – ASARECA on 8th – 11th July, 2013 at Hilton Hotel, Nairobi, Kenya

Laven, A. and Verhart, N. KIT (2011). A Report on Addressing Gender Equality in Agricultural Value Chains: Sharing Work in Progress.

Will Margaret. (2015). Contract Farming Handbook: A Practical Guide For Linking Small-Scale Producers and Buyers Through Business Model Innovation Volume II – Selected Tools and Case Examples. Metzgerdruck, Obrigheim, Germany.

Martin, H., Nicola, B., and Danilo, M. (2012). Bee Keeping and Sustainable Livelihoods: Diversification booklet number 1 Second edition. FAO, Viale delle Terme di Caracalla, 00153 Rome, Italy.

Matanmi, B., Adesiji, G. and Adegoke, M, (2008). An analysis of activities of bee hunters and beekeepers in Oyo state Nigeria. African Journal of Livestock Extension, 6:7–11.

McPeak J and Doss C. 2006. Are household production decisions cooperative? Evidence on migration and milk sales from northern Kenya. *American Journal of Agricultural Economics* 88(3):525–541.

Meinzen-Dick R, Pradhan R, di Gregorio M. 2004. *Collective Action and Property Rights for Sustainable Development: Understanding Property Rights*, 2020 Focus Brief 11. International Food Policy Research Institute, Washington, D.C.

Mburu, S., Njuki, J., and Kariuki, J. (2013). Livestock Information and Financial Services. In Women Livestock Ownership and Markets: Bridging the Gap in Eastern and Southern Africa, ed. Jemmimah Njuki and Pascal Sanginga, pp. 79-92. Nairobi, Kenya, ILRI.

Millennium Declaration Goal 3 (2000). http://www.undp.org/mdg/goal3.shtml United Nations

Miriti, Lydiah. C. (2011). Gender Responsive Strategies Employed In Banana Production And Marketing In Imenti South District, Meru County. MA. Thesis. Kenyatta University, Kenya.

Miriti, L., Mariara, J. and Karienyeh, M. (2017). A Draft Report on Participation of Small Holder Farmers in Avocado Contract Farming: Evidence from a Qualitative Study in Kandara Sub-County, Kenya.

Murigi, Miriti, L., S., Muthoni, E. and Mariara, J. (2018). A Draft Report on Technology Adoption in Banana Farming among Small Holder Farmers in Kirinyaga County, Kenya.

Miruka, K. Maureen and Maina, N. Immaculate. (2009). Development of Pro-Poor Agro-Enterprises Value Chains For Sustainable Rural Development. A project proposal to FORD Foundation for the period of *December 1st 2009-November 30th 2011*

Monga, K. and Manocha, A. (2011). Adoption and constraints of beekeeping in District Panchkula (Haryana), India. Livestock Research for Rural Development. Volume 23, Article #103., http://www.lrrd.org/lrrd23/5/mong23103.htm Accessed on 1/8/ 2014

Mujuni A, Natukunda, K. and Kugonza, D. (2012). Factors Affecting the Adoption of Beekeeping and Associated Technologies in Bushenyi District, Western Uganda. *Livestock Research for Rural Development. Volume 24, Article 133.* http://www.lrrd.org/lrrd24/8/muju24133.htm Accessed on 1/8/ 2014

Mullins, G., L., Wahome, P., Tsangari, A., and Maarse. L. (1996). Impacts of Intensive Dairy Production on Smallholder Farm Women in Coastal Kenya. *Human Ecology Journal* 24(2):231–253.

Mutai, D. and Kedowa (2006). Bee Keeping Case Study: The African Beekeeping Resource Centre. http://www.apiconsult.com/why-beekeeping.htm (accessed on 6/11/2013)

Muyanga, M. (2008). Smallholder Adoption and Economic Impacts of Tissue Culture Banana in Kenya. Paper presented in All Africa Horticultural Congress in Nairobi on 31st August to3rd September 2009.

NALEP (2009). Particular Vulnerabilities of Rural Women within the Agricultural Sector in Kenya, pp. 50

Ndegwa, Agnes. (2018). Draft Report on an On-going Study on the Evaluation of Greenhouse farming among Small Scale farmers in Kenya. USAID, Nairobi.

Ndungo, C., Ngari, G., Okemwa, p., Musyoki, K., and Kizito, P. (2011). Gender Impact Assessment of the National Agriculture and Livestock Extension Programe (Nalep). Final Report submitted to NALEP from Gender Department, Kenyatta University

Niamir-Fuller, M. (1994). Women Livestock Managers in The Third World: Focus on Technical Issues Related To Gender Roles in Livestock Production. Staff Working Paper 18, IFAD, Rome.

Njuki, J., Waithanji, E., Kariuki, J., Mburu, S. and Lymo-Macha, J. (2011) Gender and Livestock:Markets, Income and Implications for Food Security in Tanzania and Kenya. Report on a study commissioned by IDRC and Ford Foundation. Nairobi: ILRI.

Njuki, J., Mburu, S., and Pimentel, P. (2013). Livestock and Intra-household Income Management. In Women Livestock Ownership and Markets: Bridging the Gap in Eastern and Southern Africa, ed. Jemmimah Njuki and Pascal Sanginga, pp. 63-75. Nairobi, Kenya, ILRI.

PACT Kenya (2011). Scoping Study and Value Chain Analysis for Bee Keeping and Honey Products. A draft report by Liaison Consulting ltd. Available at http://www.act.or.ke/publications/act-annual-reports/ accessed on 31/12/2013

Quisumbing, A. R. and Pandolfelli, L. (2010). "Promising Approaches to Address the Needs of Poor Female Farmers: Resources, Constraints, and Interventions". World Development, 38(4): 581-592.

Rangnekar, S. (1998). Women in livestock production in developing countries. International Conference on Sustainable Animal Production, 24–27 November, Hisar India.

Republic of Tanzania (2004). A Plain Language Guide to the United Republic Of Tanzania: National Beekeeping Programme**,** Ministry of Natural Resources and Tourism, Dare Salam

Rivière-Cinnamond A. 2005. Animal health policy and practice: scaling up community-based animal health systems, lessons from human health. Pro-Poor Livestock Policy Initiative Working Paper 22. Rome: FAO

Ruchi, T., Youjin, B., Karl, D., Nadia, S., Robin, W., Olivia, W. Monique, M., Hilary, W., Daphne, J., Jenny, R., and Marina, C. (2012). A Report on What Works for Women: Proven Approaches for Empowering Women Smallholders and Achieving Food Security. London.

Rubin, D., Tezera, S., Caldwell, L. (2010). A Calf, A House, A Business of One's Own: Microcredit, Asset Accumulation, and Economic Empowerment in GL CRSP Projects in Ethiopia and Ghana, Global Livestock Collaborative Research Support Program.

Rosenzweig, M., R. (2001). Savings Behaviour in Low-Income Countries. Oxford Review of Economic Policy 1: 40–54.

Salman, M., D., Morley, P., S., and Ruch-Gallie, R. (eds). (1999). International Society for Veterinary Epidemiology and Economics, Nairobi (Kenya). Proceedings of the 9th symposium of the International Society for Veterinary Epidemiology and Economics. Paper 333. Nairobi.

Shicai, S. and Jie, Q. (2009). Livestock Projects in Southwest China: Women Participate, Everybody Benefits. Leisa Magazine 25 (3 Sept.).

Sitati, Noah and Bett, Stanely (2012). An Evaluation of Bee Keeping in the Agro-pastoral Masai Community of Trans Mara District, Kenya. Paper Presented during Sustainable Land Management National Conference in Naivasha, Kenya from 26th to 29th November 2013.

Stango, V. and Zinman, J. (2008). The Price is Not Right (Not Even on Average): Exponential Growth Bias, Present-biased perceptions and Household Finance. Working paper, Dartmouth College. Hanover, NH: Dartmouth College.

Tabinda, Q., Murad, A., Sajida, T. and Nadeem, A. (2013). Impact Assessment of Beekeeping in Sustainable Rural Livelihood. Journal of Social Sciences, COES&RJ-JSS, 2(2), pp. 82-90.

Teufel, N., Kuettner, K. and Gall, C. 1(998). Contribution of goat husbandry to household income in the Punjab (Pakistan): a review. *Small Ruminant Research* 28:101–107.

UN (United Nations) Sustainable Development Goals: 17 Goals to Transforming our World. United Nations. New York. USA. https://www.un.org accessed on 19th June 2018.

Upadhyay B. (2005). Women and Natural Resource Management: Illustrations from India and Nepal. *Natural Resources Forum* 29:224–232.

USAID (2009). Promoting Gender Equitable Opportunities in Agricultural Value Chains: A Handbook for review by the United States Agency for International Development. Prepared by Deborah Rubin (Cultural Practice LLC) and Cristina Manfre and Kara Nichols Barrett (DTS), pp. 90-99.

Valdivia C. 2001. Gender, livestock assets, resource management, and food security: lessons from the SR-CRSP. *Agriculture and Human Values* 18(1):27–39.

Waithanji, E., Njuki, J. and Nabintu, B. (2013). Gender participation in livestock Markets. In Women, Livestock Ownership and Markets: Bridging the Gap in Eastern and Southern Africa ed. Jemimah Njuki and Pascal Sangi, pp. 40. Ottawa, Canada: IRLI and IDRC.

Wambugu, F. M., Mbogoh, S.G., Sam, W. (2002). Socio-Economic Impact of Biotechnology Applications: Some Lessons from the Pilot Tissue- Culture Banana Production Promotion Project in Kenya, 1997-2002. Paper presented at the XXV IAAE Conference, August 2003, Durban, South Africa.

World Bank (2008). Enabling Poor Rural People to Overcome Poverty. Gender in Agriculture Source Book, pp. 316-320. Washington D.C. World Bank

World Bank (2012). Gender Equality and Development Report. Washington D.C.: World Bank.

Yisehak, K. (2008). Gender Responsibility in Smallholder Mixed Crop–Livestock Production Systems of Jimma Zone, South West Ethiopia. Livestock Research for Rural Development. 20:11. http://www.lrrd.org/lrrd20/1/yise20011.htm (Accessed on 22/1/2014)

NB: Permission was achieved from those who participated as key informants in order to have them listed in the report as Oral Informants.

List of key informants

Name	Date of Interview
Stanley Bett,	2/12/2015
Kanda and Bett,	2/12/2015
Lelei, Nalikungishu, Kipas, and Tolian	11/12/2015
Kanda, Bett and Lelei	14/12/2015
Kanda and Bett	15/12/2015
Tolian,	22/12/2015
Lelei, Nkilapus, and Tolian,	22/12/2015
Stanley and Kanda	24/12/2015
Elizabeth Nalikungishu, Sainyo Maria, Ann Natuno	22/12/2015
Nareiyu Koin	28/12/2015
Tolian, Nerein, and Soila, Kasaini,	28/12/2015
Nerein, Soila, Kasaini	29/12/2015

APPENDICES

APPEDIX 1: RESPONDENTS CONSENT FORM

Kenya Agricultural & Livestock
Research Organization
P.O. Box 220-01000
Thika, Kenya

Interview Consent Form for Individual Survey

Study title: Gender Gaps In Transfer of Improved Bee Keeping: A Case of The *Maasai* Community in Trans Mara, Narok County, Kenya

Researcher: Lydiah C. Miriti (lydiahmiriti@gmail.com) 0722998251 (PhD student)

Main RAs: Mr. Sammy Kariithi
Ms. Maureen Atieno
Mr. David Tolian
Mr. Julius Opondo
Mr. Samuel Limo
MS. Jane wangui

I confirm that I have read the Participant Information Sheet, have understood the nature of the research and why I have been selected. I have had the opportunity to ask questions and have them answered to my satisfaction.

(*Please tick appropriately):*

I agree to take part in this research by participating in an interview.	1. Yes [ ]	2. No. [ ]
I agree to have my photo taken	1. Yes [ ]	2. No [ ]
I agree to have my photo shared for academic purposes	1. Yes [ ]	2. No [ ]

I understand that:

- My comments will be reported anonymously and that the researchers might use generic details about me to help situate my perspective.
- I can request a transcript of my interview, which will be provided to me within one month of the interview date
- I am free to edit any data I provide, within one month from the date of the receipt of the interview transcript
- I am free to withdraw participation at any time during the interview process, and up to month after receipt of the interview transcript, without having to give a reason
- The interview transcript will be kept for 2 years, after which it will be destroyed.
- I understand that this research may generate publication(s) which will be made available to the open public and am free to access them

Signature of Respondent:
_____Date:_____

Name of Interviewer: _____Date _____

APPEDIX 2: RESEARCH INSTRUMENTS FOR OBJECTIVE 1, 2 AND 4.

House Hold Questionnaire

Site Description

Enumerator_____

Date of interview_____

Division_____

Location_____

Sub-location_____

Village_____

Section A:

Household Characteristics

1. Gender of interviewee: **1.** Wife__**2**. single__ **3.** Youth _ **4**. Husband__**5**. Widow
2. Sex of interviewee **1**. Male_____ **2**. Female_____
3. Type of household: **1**. Male headed__**2**. Female headed__ **3**.Child headed_**4.** Youth
4. Marital status of HH: **1**. Married ____**2**. Single___ 3.Separated____**4**. Divorced____ **5.** Widowed_____**6**.Husband away_____
5. Age: **1**. below 20__**2**. 21 to 35 __**3.** 36 t0 45__**4**. 46 to 55_**5.** 56 and above__
6. Education level:**1**. Primary _**2**. Secondary_**3.** College _ **4**.None

Section B: Level of Participation in Bee Production and Marketing

(i). Gender Participation in Bee Production

7. What would you rank as the top 5 enterprises in your farm according to:

(i) Income generation (ii). Family food availability and (iii) Medicinal value

8. For how long have you participated in bee keeping?
9. What motivated you to start bee keeping? **1**. Income **2.** Food and Medicinal value
10. Types of bee hives you have and amount of honey produced from them per season?
11. How would you rank the above bee hives types starting with the best?
12. What are the 3 reasons for ranking N**o. 11** above?
13. Would you say there is more honey/beekeeping now or 10 years ago?

14. What are the 3 major reasons for your answer in **13 above?**

15. Gender Division of Labour in the Household and productive work-Activity Profile.

Productive Work in Bee Keeping	**Men**	**Women**	**Boys**	**Girls**
Hive cleaning				
Hive perfuming				
Hive repair				
Internal hive inspection				
Water provision				
Swarm catching				
Feeding the bees				
Strengthening weak colonies				
Colonies replacement				
Queen rearing				
Supplement feeding				
Pest management				
Preparation and handling of smoke				
Honey extraction (Harvesting)				
Making of honey products				
Grading bee products e.g. honey				
Packing				
Marketing of bee products				

16. What factors determine the above role allocation?

Access to Productive Resources in Bee Keeping Households

17. Total farm size in acres? **1**. 0.5 to 1.0 _**2**. 1.1 to 2.4 _**3**. 2.5 to 5.0 _**4**.

18. Do you own land title deed? **1**. Yes_____**2**. No_____

19. If yes, in whose name? **1**. Husband/ father/son__**2**. Wife/ mother/ daughter_

20. Factors that determine the ownership of land tile deeds in this area?

21. Who has access and control to the following resources? (Tick)

Component	**Access**		**Control**	
	Men	**Women**	**Men**	**Women**
<u>Resources</u>				
• Land				
• Domestic Animals				
• Farm Equipment/Machinery				
• Farm input (Fertilizers, manures				
• Trees and Fruit tress				
• Vegetables				
• Farm produce (harvests, milk, etc)				
• Farm structures (ponds, sheds, hives)				
• Labour				
• Education/training				

Benefits from Bee keeping	Access		Control	
	Men	Women	Men	Women
• Income from bee products				
• Honey for food				
• Honey for medicine				

22. What factors influence access to and control of resources?

23. Do you intend to expand beekeeping enterprise? **1.** Yes **2**. No

24. If No, why

(ii). Gender Participation in Bee Products Value Addition and Marketing

25. What quantity of honey do you harvest? (Average Kg/season/hive) _____

26. What do you do with the harvested honey? **1**. Home use **2**. Sold **3**. Both

27. If used in the home specify as what in the table below and rank

Uses of honey in the household	Ranked uses starting with mostly used as no. 1
Medicine (colds, treat burns etc.)	
Food (in porridge, sweeten tea etc.)	
Traditional beer	
Other (specify)	

28. If **sold** specify how, in the table below and rank

Honey sold as:	Ranked methods of sold honey with most as no. 1
Crude	
Semi-refined	
Refined	
Chunk	
Comb	

29. What are the 3 major reasons for the above ranking in no. 37

30. If refined, how do you process it?

31. How do you package your honey?

Methods of packaging honey	Ranked methods
Plastic jars with lids	
Glass jars (bottles)	
Metal tins	
Readily available containers	

32. What marketing channels do you use to sell your honey and average prices per kg?

Marketing channel	**Average price/kg**	**Terms of payment**
Local consumers		
Local retail Shops		
Open air market		
Co-operative/wholesale		
Middle men		

33. Are the above price fluctuations constant throughout the seasons? **1.** Yes_ **2**. No

34. If **No**, what factors determine price variations?

35. Are there are consumer preferences and tastes for honey? **1**. Yes_ **2**. No.__

36. If yes, what are the most preferred market qualities for honey

Preference	Local level	Retail shops	Open air	wholesale	Middle men
Taste,					
Purity,					
Colour					
Liquidity					
Cleanliness					
Other(specify)					

37. How do you transport your honey to the selling point? **1**. Carry by myself **2**. Own bicycle **3**. Hired bicycle **4.** Own motorbike **5.** Hired motorbike **6**. Own vehicle **7**. Hired vehicle **8**. Own cart (by donkey/oxen) **9.** Hired cart **10.** Public vehicle__

38. How much do you sell the following categories of honey (Average /Kg)?

Type of honey,	**Price/kg (Ksh)**
Crude	
Semi-refined	
Refined	
Chunk	
Comb	

39. What do you do with the **wax**? **1.** Thrown away___ **2**. Left in the hive___ **3**. Brewing___ **4**. Sold with honey___**5**. Sold to processors___ **6**.Used as bee attractantion___**7.** Refine__

40. Do you sell other bee products apart from honey and wax? **1**. Yes____ **2.** No_____

If yes what other bee products? **1**. Propolis ____ **2.** Royal gel_____ 3. Other (specify) ___

41. How do you use the cash obtained from bee products? (Rank)

42. Do you save some cash from bee products sales? **1.** Yes_____ **2.** No_____

43. If yes which channel do you use?

1. Bank account____**2**.Table banking (merry go round) ____ 3. In the house_____

Section C: Constraints in Bee Keeping

Access to credit

44. Have you benefited from any source of credit in the last 5 years? **1**. Yes_ 2. No_____

45. If yes, answer the following:

Source of Credit	**Type of source e**	**Amount obtained**
1. Bank		
2. Microfinance		
3. Cooperative		
4. Group		
5. NGO		
6. other(specify)		

46. How did you use the credit obtained above?(Please Rank)

47. Are there times you were in need of credit and you failed? **1**. Yes___ **2**. No_____

48. If yes give reasons why you failed (limitations to credit) **1.** Lack of security __ **2**. Lack of information on credit sources **3**. Fear of interest rates ____**4.** Other specify_____

49. For the last 1 year have you been visited by extension officer on promoting improved bee keeping? **1**. Yes_____**2**. No_____

50. If yes How many times? **1.** Once___**2**. Twice___**3**. Thrice___4. More than 3 times___

51. Have you ever been trained on bee keeping before? **1**. Yes_____**2**. No_____

52. If yes which training? Please fill in the table below:

Training	**Year**	**Place done I. On-farm 2. Away from home**
1.Bee production skills e.g. pests management		
2. Harvesting skills		
2. Processing of honey skills		
3.Processing of wax skills		
4. Packaging skills		
5. Storage skills		
6. Marketing strategies skills		
7. General management skills on improved technology		

53. If No, please give 2 major reasons why you have never attended any bee training

54. Do you experience absconding and bee migration from your apiary? **1**. Yes__**2**.No___

55. If **yes,** what in your view are the possible reasons for absconding? (Rank if more than one)

Possible reasons bee absconding	Ranked reasons from the most serious as no. 1
Shortage of food (pollen & nectar)	
Lack of water	
Pests and predator attack	
Overcrowding of hives	
Lack of protection from bad weather	

56. Do you do anything to control absconding and migration? **1**. Yes_____**2**. No_____

57. If yes what do you do? **_____**

58. If No, give 2 major reasons for not doing anything

59. Have you encountered any pests in your apiary? **1**. Yes_____**2**.No_____

60. If **yes** do you control them? **1**. Yes_____**2**. No_____

61. Do you know the names of these pests? **1**. Yes all___**2**. Yes some_____**3**.Not at all_____

62. How would you rate the severity of the problem? **1** No problem___ **2** Minor_____ **3.** Moderate____ **4**.serious problem_____ **5.** Very serious problem_____

63. In which season is the pest infestation most prevalent?

64. Which hive type are mostly affected by the pests?

65. Which methods do you use to control pests? (Rank them)

Methods of controlling pests	Ranked methods of pest control starting with mostly used
Hive hygiene	
Hanging of hives	
Greasing	
Other (specify and rank)	

66. How would you rank the following constraints in bee production, marketing and value addition (tick starting with the most serious challenge to the farmer as **no. 1**, in that order)

Major constraints in bee keeping production	Rank
Land to set up hives for the safety of neighbouring environment	
Capital to buy improved hives, bee suits, smokers and agro chemicals	
Credit e.g. due to lack of access to collateral	
Inadequate training on improved hive management	
Local skilled trainers in bee keeping technology a challenge	
Proper use of agro-chemicals for diseases and pest control	
Theft of hives and honey	
Drought	
Access to extension agents promoting improved beekeeping methods	
Fear (phobia for bee stings),	
1. Major constraints in bee keeping value addition and marketing	**Rank**

Markets for their products	
Improved packaging materials, e.g. new glass jars with lids cost is high.	
Honey collection centres a challenge	
Inadequate skills on harvesting skills	
Inadequate skills on processing, handling and packaging bee products	
Inadequate skills on quality control	

67. What would you suggest the government and other stake holders in bee sector should do to assist small holder farmers improve in their bee keeping enterprise? Please 3 major suggestions

NB: The WEAI questionnaires were very large and due to the nature of their set-up, they were printed in landscape format hence, they could not be included in the Thesis.

APPEDIX 3: QUESTIONNAIRE FOR KEY INFORMANTS

Name: _____

Gender: Male_____ Female _____

1. How long have you known the project? _____
2. List activities related to Pro-poor initiative which you have been involved in?
3. Which activities did you improve?
4. Briefly describe the response of men, women, youth to improved technology
5. In your view, how have the men, women and youth benefitted from trainings?
6. Describe the achievements to men, women, youth
7. In your view to what extent do men, women and youth participate in pro-poor initiated activities?
8. In your own opinion, to what extent have the following benefitted from pro-poo activities?

Actors	**0-25 %**	**26 – 50%**	**51 – 75%**	**76 – 100%**
Men				
Women				
Youth (Males)				
Youth (Females)				
Vulnerables				

9. How do you think pro-poor activities will be sustained after winding up?
10. Recommendations that may improve response to pro-poor activities.
11. What cultural and social barriers would you say do not allow small holder farmers participate actively in the pro-poor activities?
12. What other challenges are faced by men women and youth in terms of production, marketing and value addition.

APPEDIX 4: INTERVIEW FOCUS GROUP DISCUSSIONS

Questions for different categories of groups e.g. men only, women only, youth etc

1. How do women/men/youth/vulnerable individually use the income from the group? (let them discuss)
2. Do you own individual bank accounts (income from bee enterprise and other activities in the group)?(let them discuss)
3. In your opinion are you benefiting from the income from the group?(Explain)
4. If no what do you suggest should be done for all to benefit equally in your households?
5. Are there methods or alternative strategies you have devised to curb the access to resources like land, labour, time, inputs, and benefits from bee products? e.g. the following: (explain)
    1. Turning to private sectors for extension and information
    2. Off-farm commercial activities(microenterprises)
    3. Merry go rounds etc.

6. List 5 major challenges your are facing in the bee enterprise (Rank the challenges from the most challenging) in terms of production, marketing and value addition of bee products

In your view what cultural and social barriers do not allow you to participate actively in the adoption of bee technology? (Let them discuss)

7. Please let us discuss the tasks done by women, men, boys and girls in an everyday (net page)
8. How do women balance their triple roles (explain Triple roles) especially now that they spend some days in the bee producer groups.

9. What in your opinions should be done to make the roles, responsibilities and benefits equitable for all

APPENDIX 5: APPROVAL OF RESEARCH PROPOSAL, GRADUATE SCHOOL

KENYATTA UNIVERSITY
GRADUATE SCHOOL

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

P.O. Box 43844, 00100
NAIROBI, KENYA
Tel. 810901 Ext. 57530

Internal Memo

FROM: Dean, Graduate School

DATE: 29th June, 2017

REF: C82/23446/13

TO: Ms. Lydiah C. Miriti
C/o Department of Gender & Development Studies
KENYATTA UNIVERSITY

SUBJECT: APPROVAL OF RESEARCH PROPOSAL

This is to inform you that the Graduate School Board at its meeting 17th May, 2017 approved your Ph.D. Research Proposal entitled **"Gender Differentials in Technology Transfer among the Maasai Community: A Case of Bee Keeping in Trans Mara, Narok County, Kenya".**

You may now proceed with your Data collection, subject to clearance with the Director General, National Commission for Science, Technology & Innovation.
As you embark on your data collection, please note that you will be required to submit to Graduate School completed supervision Tracking Forms per semester. The form has been developed to replace the progress Report Forms. The Supervision Tracking Forms are available at the University's Website under Graduate School webpage downloads.

By copy of this letter, the Registrar (Academic) is hereby requested to grant you substantive registration for your Ph.D. studies.

Thank you.

REUBEN MURIUKI
FOR: DEAN, GRADUATE SCHOOL

c.c. Registrar (Academic) Att; Mr Likam
Chairman, Department of Gender & Development Studies

Supervisors:

1. Prof. Grace Wamue
   C/o Department of Gender & Development Studies
   KENYATTA UNIVERSITY

2. Dr. Casper Masiga
   C/o Department of Gender & Development Studies
   KENYATTA UNIVERSITY

RM/cao

APPENDIX 6: RESEARCH AUTHORIATION LETTER, KENYATTA UNIVERSITY

KENYATTA UNIVERSITY
GRADUATE SCHOOL

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

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

Our Ref: C82/23446/13

Date: 29th June, 2017

The Director General,
National Commission for Science, Technology & Innovation,
P.O. Box 30623-00100,
NAIROBI

Dear Sir/Madam,

RE: RESEARCH AUTHORIZATION FOR MS.LYDIAH C. MIRITI - REG. NO. C82/23446/13

I write to introduce Ms. Miriti who is a Postgraduate Student of this University. She is registered for a Ph.D. degree programme in the **Department of Gender & Development Studies in the School of Humanities & Social Sciences.**

Ms. Miriti intends to conduct research for Ph.D. thesis entitled, **"Gender Differentials in Technology Transfer among the Maasai Community: A Case of Bee Keeping in Trans Mara, Narok County, Kenya".**

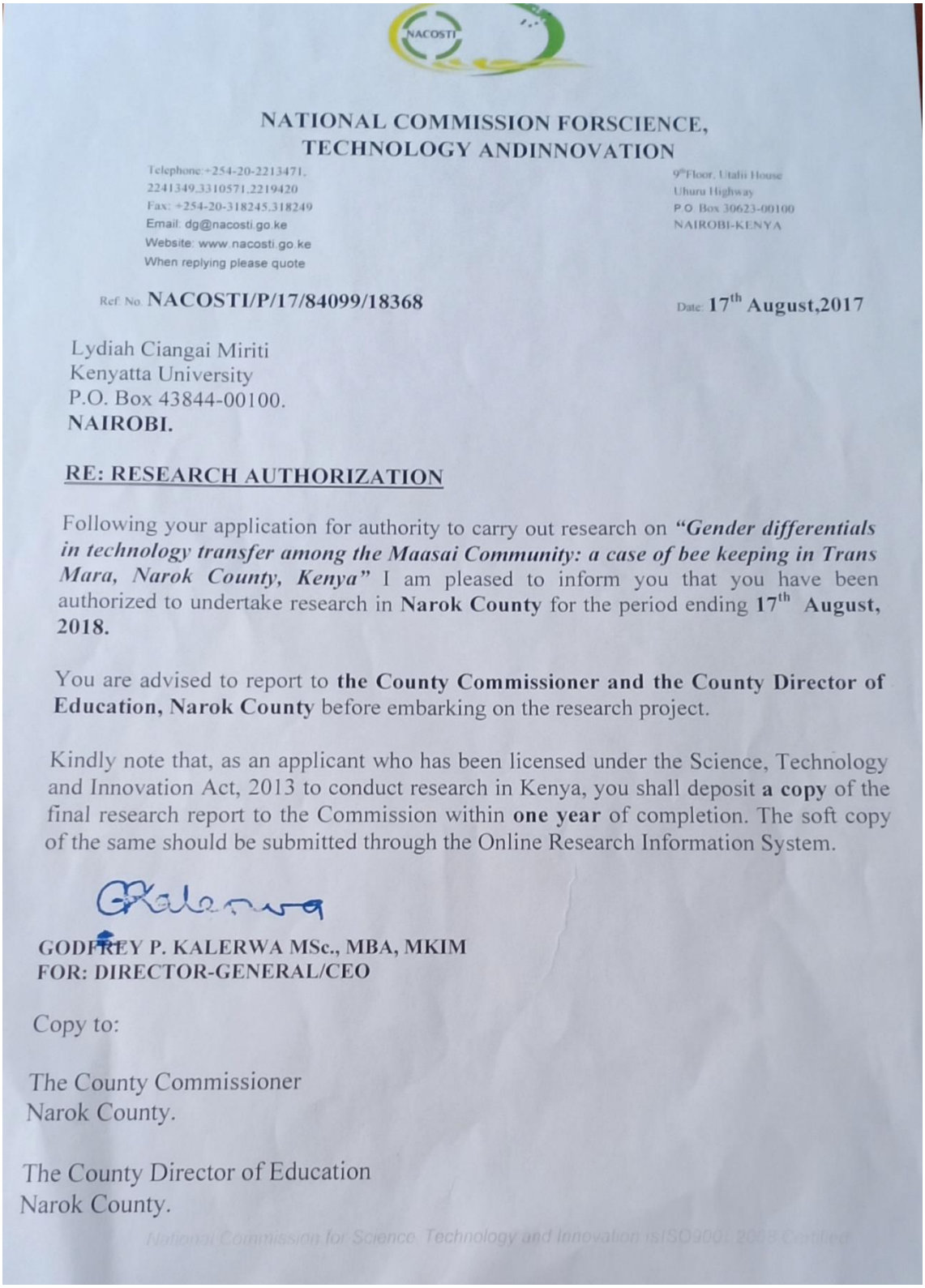
Any assistance given will be highly appreciated.

Yours faithfully,

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

RM/cao

APPENDIX 7: RESEARCH PERMIT LETTER, NACOSTI



NATIONAL COMMISSION FORSCIENCE,
TECHNOLOGY ANDINNOVATION

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Website: www.nacosti.go.ke
When replying please quote

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

Ref. No. **NACOSTI/P/17/84099/18368**

Date: **17th August,2017**

Lydiah Ciangai Miriti
Kenyatta University
P.O. Box 43844-00100.
NAIROBI.

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on ***"Gender differentials in technology transfer among the Maasai Community: a case of bee keeping in Trans Mara, Narok County, Kenya"*** I am pleased to inform you that you have been authorized to undertake research in **Narok County** for the period ending **17th August, 2018.**

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

Kindly note that, as an applicant who has been licensed under the Science, Technology and Innovation Act, 2013 to conduct research in Kenya, you shall deposit **a copy** of the final research report to the Commission within **one year** of completion. The soft copy of the same should be submitted through the Online Research Information System.

GODFREY P. KALERWA MSc., MBA, MKIM
FOR: DIRECTOR-GENERAL/CEO

Copy to:

The County Commissioner
Narok County.

The County Director of Education
Narok County.

National Commission for Science, Technology and Innovation is ISO9001:2008 Certified

APPENDIX 8: RESERCH CLEARANCE PERMIT, NACOSTI

CONDITIONS

1. The License is valid for the proposed research, research site specified period.
2. Both the Licence and any rights thereunder are non-transferable.
3. Upon request of the Commission, the Licensee shall submit a progress report.
4. The Licensee shall report to the County Director of Education and County Governor in the area of research before commencement of the research.
5. Excavation, filming and collection of specimens are subject to further permissions from relevant Government agencies.
6. This Licence does not give authority to transfer research materials.
7. The Licensee shall submit two (2) hard copies and upload a soft copy of their final report.
8. The Commission reserves the right to modify the conditions of this Licence including its cancellation without prior notice.

REPUBLIC OF KENYA

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National Commission for Science, Technology and Innovation

RESEARCH CLEARANCE PERMIT

Serial No.A 15355

CONDITIONS: see back page

THIS IS TO CERTIFY THAT:
MS. LYDIAH CIANGAI MIRITI
of KENYATTA UNIVERSITY, 0-1000
Madaraka,has been permitted to
conduct research in *Narok County*

on the topic: *GENDER DIFFERENTIALS IN TECHNOLOGY TRANSFER AMONG THE MAASAI COMMUNITY: A CASE OF BEE KEEPING IN TRANS MARA, NAROK COUNTY, KENYA*

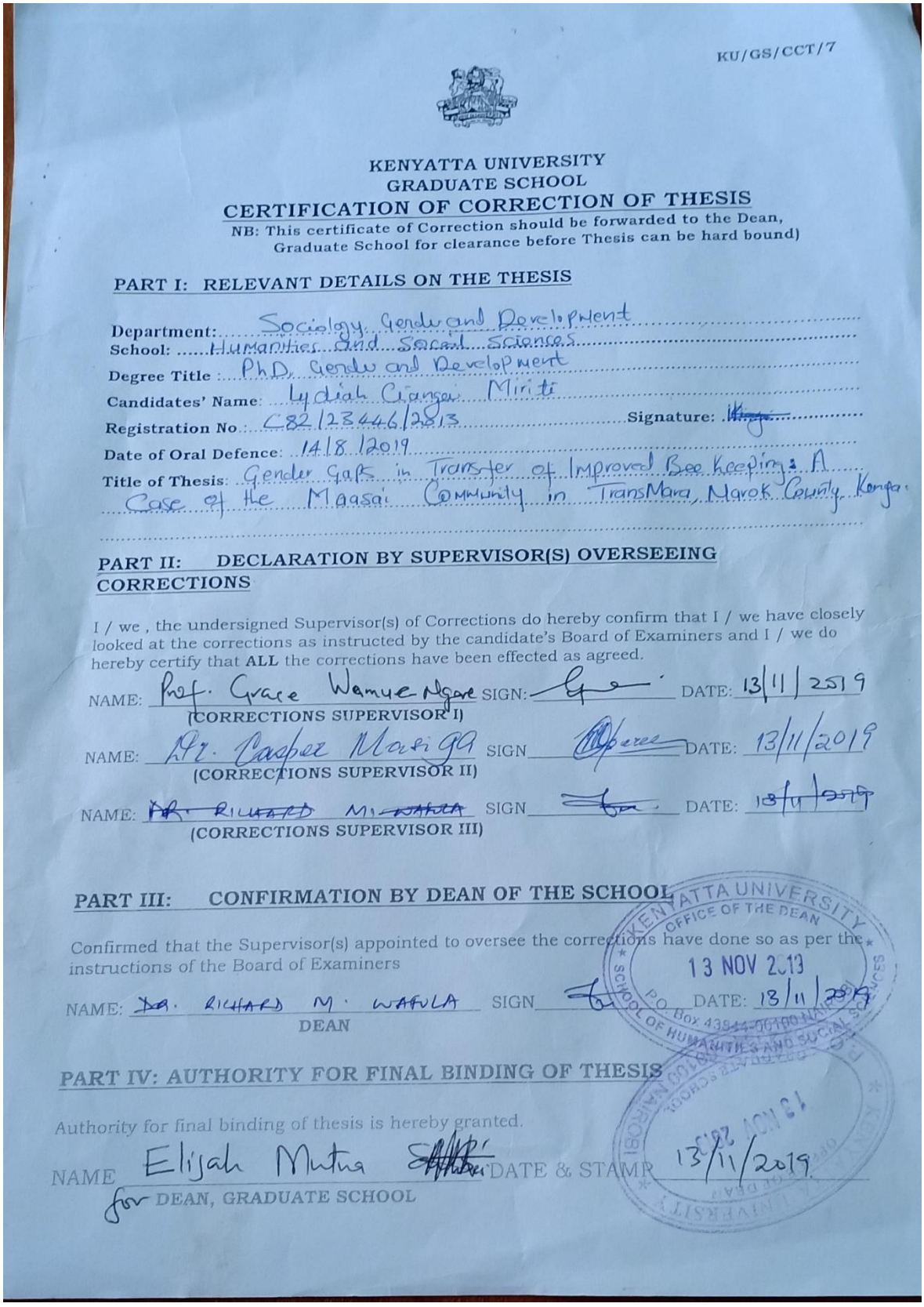
for the period ending:
17th August,2018

Permit No : NACOSTI/P/17/84099/18368
Date Of Issue : 17th August,2017
Fee Recieved :Ksh 2000

.....
Applicant's Signature

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

APPENDIX 9: CERTIFICATION ON CLEARANCE OF THESIS



KU/GS/CCT/7

KENYATTA UNIVERSITY
GRADUATE SCHOOL
CERTIFICATION OF CORRECTION OF THESIS
NB: This certificate of Correction should be forwarded to the Dean, Graduate School for clearance before Thesis can be hard bound)

PART I: RELEVANT DETAILS ON THE THESIS

Department: Sociology, Gender and Development
School: Humanities and Social Sciences
Degree Title: PhD, Gender and Development
Candidates' Name: Lydiah Cianga Miriti
Registration No: C82/23446/2013 Signature:
Date of Oral Defence: 14/8/2019
Title of Thesis: Gender Gaps in Transfer of Improved Bee keeping: A Case of the Maasai Community in TransMara, Narok County, Kenya.

PART II: DECLARATION BY SUPERVISOR(S) OVERSEEING CORRECTIONS

I / we , the undersigned Supervisor(s) of Corrections do hereby confirm that I / we have closely looked at the corrections as instructed by the candidate's Board of Examiners and I / we do hereby certify that **ALL** the corrections have been effected as agreed.

NAME: Prof. Grace Wamue-Ngare SIGN: DATE: 13/11/2019
(CORRECTIONS SUPERVISOR I)

NAME: Dr. Casper Mosiori SIGN DATE: 13/11/2019
(CORRECTIONS SUPERVISOR II)

NAME: ~~DR. RICHARD MWAFULA~~ SIGN DATE: ~~13/11/2019~~
(CORRECTIONS SUPERVISOR III)

PART III: CONFIRMATION BY DEAN OF THE SCHOOL

Confirmed that the Supervisor(s) appointed to oversee the corrections have done so as per the instructions of the Board of Examiners

NAME: ~~DR.~~ RICHARD M. WAFULA SIGN DATE: 13/11/2019
DEAN

KENYATTA UNIVERSITY OFFICE OF THE DEAN 13 NOV 2019 P.O Box 43844-00100 NAIROBI SCHOOL OF HUMANITIES AND SOCIAL SCIENCES

PART IV: AUTHORITY FOR FINAL BINDING OF THESIS

Authority for final binding of thesis is hereby granted.

NAME Elijah Mutua DATE & STAMP 13/11/2019
for DEAN, GRADUATE SCHOOL