WOMEN'S AGENCY IN AGROFORESTRY AND ITS CONTRIBUTION TO HOUSEHOLD FUELWOOD SECURITY IN KIMILILI SUB-COUNTY IN WESTERN KENYA

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DECLARATION

I declare that this thesis is my original work and has not been submitted in any other university.

Signature:  Date: October 4th, 2023

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This thesis has been submitted for examination with my approval as the university supervisor.

Signature:  Date: November 22nd, 2023

Dr. Dalmas O. Omia

DEDICATION

I dedicate this work to my ever-caring father Henry Nyongesa, my loving mother Evelyne Nyongesa and my brothers Colvin Wafula and Alvin Nyongesa.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABBREVIATIONS AND ACRONYMS

GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
FAO	Food and Agriculture Organization
GBM	Green Belt Movement
GoK	Government of Kenya
ICRAF	International Centre for Research in Agroforestry
IDRC	International Development Research Centre
IFAD	International Fund for Agricultural Development
IEA	International Energy Agency
KEFRI	Kenya Forestry Research Institute
KNBS	Kenya National Bureau of Statistics
LPG	Liquified Petroleum Gas
NACOSTI	National Commission for Science, Technology and Innovation
NGO	Non-Governmental Organization
SDGs	Sustainable Development Goals
UN	United Nations
UNEP	United Nations Environment Programme

ABSTRACT

Despite aspirations to transition away from fuelwood reliance, the persisting reality is that billions worldwide, particularly in Sub-Saharan Africa, continue to depend on it as their primary cooking energy source. Being the primary users of fuelwood in many cultural contexts, women possess valuable knowledge and expertise related to fuelwood use and management. Cultural norms and beliefs, however, shape women's opportunities and constraints with regard to fuelwood production and utilisation. As a sustainable source of fuelwood, this cross-sectional descriptive study investigated women's agency within agroforestry and its consequential impact on household fuelwood security in Kimilili Sub-County located in Western Kenya. The research scrutinized the cultural influences on the choice of tree species used as fuelwood, the norms guiding women's roles in tree planting, and the resulting implications for fuelwood security. Guided by the structuration theory, the study centred on individual women engaged in agroforestry as its primary unit of analysis. Data were gathered through a multifaceted approach, encompassing in-depth interviews, focus group discussions, and key informant interviews. The qualitative data were managed using NVivo 12 Plus and analysed thematically. The findings of the study illuminated the specific tree preferences among women, a predilection influenced by distinct properties such as heat retention, reduced smoke production, and rapid drying. Trees such as *Grevillea robusta* (kumukrivelia) and *Eucalyptus saligna* (kumwiti) were widely noted as the most preferred, given their superior burning qualities as well as their extensive availability. The study also unveiled a wide spectrum of beliefs, varying from one tree species to another, yet unified by their impact on the decision-making process regarding fuelwood selection. As such, the findings underscored that cultural beliefs play an influential role in shaping the choice of specific tree species for fuelwood, echoing the structural element of cultural norms. The current utilisation of *Erythrina abyssinica* (kumurembe), a tree culturally prohibited due to the belief that it caused mumps, however, indicates the dynamic nature of culture. This dynamism is accentuated by the evolving role of women in tree planting practices, traditionally restricted to men. Driven by shifting family structures, education, employment, religion, and fuelwood scarcity, the findings show that women's growing role in tree planting has been impactful, specifically with regards to household fuelwood security. However, the study also highlights the lingering influence of entrenched cultural norms, which continue to hinder active female participation in agroforestry with negative implication on household fuelwood security. In this context, findings show that women's autonomy to harvest trees for fuelwood use is significantly constrained by extant power dynamics within households. This restrains women's ability to ensure a steady supply of fuelwood for their households. As a vital step forward, therefore, community sensitization efforts are recommended to shed light on the detrimental effects of women's restrained autonomy. This requires the collaboration of agroforestry extension offices, local community leaders and influential village elders. It also recommended that during the distribution of trees by agroforestry extension officers, trees with good burning qualities and that are void of men's economic interests, should be propagated. This will not only be useful to women, given their preference for trees with good attributes, but will also contribute to more sustainable and equitable agroforestry practices. By prioritizing tree species like *Erythrina abyssinica*, which align with women's preferences and needs, agroforestry initiatives can foster greater agency and autonomy for women in agroforestry and, thus, ensure fuelwood security.

CHAPTER ONE

INTRODUCTION AND BACKGROUND TO THE STUDY

1.1 Introduction.

This chapter provides a comprehensive background on the research topic by examining the discrepancy between prevailing energy policies and the extensive use of fuelwood. It sheds light on the emerging scarcities and the current state of agroforestry, including its contribution to fuelwood production and the gendered dynamics within agroforestry that result in the cultural marginalization of women. The chapter also explores efforts to increase women's participation in agroforestry and the impact of these efforts on cultural norms.

1.2 Background to the study.

Presently, the issue of securing continued fuelwood availability for its users receives limited attention (Owen *et al.*, 2013; Shackleton *et al.*, 2022). As opposed to encouraging sustainable production of fuelwood, global policy debates on energy have mostly ignored fuelwood (Jepng'etich, 2020). In Sub-Saharan Africa, energy debates over the past few decades have largely endorsed the transition from traditional biofuels to conventional 'modern' fuels (Hiemstra-van der Horst and Hovorka, 2009). Perceiving fuelwood as 'primitive' and 'backward' (Sepp and Mann, 2009) and the cause of deforestation (Owen *et al.*, 2013), energy policies in many Sub-Saharan African countries pursuing modernisation and industrialisation are actively pushing to end its use.

In Kenya, for instance, the National Energy Policy of 2018 provides an impetus for the elimination of fuelwood as a household energy source (GoK, 2018). In its place, the use of modern fuels, notably LPG and electricity, have been extensively promoted (Gok, 2016). The same trend is apparent in South Africa, Nigeria, Malawi among other sub-Sahara African countries. These initiatives demonstrate the continent's commitment towards achieving SDG7 that emphasises on the need for affordable, reliable, sustainable, and modern energy for all (Karanja and Gasparatos, 2020).

Though it is tempting to simply call for fuelwood use to disappear through policy goals and targets, Mendum and Njenga (2018) note that it is tantamount to wishful thinking to expect so. The reality is that approximately 3 billion people globally continue to rely on fuelwood as their primary domestic energy (IEA, 2016). In Sub-Sahara Africa, modern energy sources are even more unlikely to provide primary household energy needs for the 78% of the residents who still rely on fuelwood as their primary source of energy (Breeze, 2014). Even beyond 2030, predictions by the IEA (2017) show that fuelwood will still account for 42% of primary energy consumption further rendering modern fuels an unlikely source for some decades yet.

In Kenya, where fuelwood consumption contributed to approximately 65% of the total energy demand as of 2017 (Rahnema *et al.*, 2017), and only 14% of the population have access to clean cooking technologies (Karanja and Gasparatos, 2020), the overwhelming reality is that fuelwood substitution is an ambitious goal that will take decades to materialise. This is particularly so given that contemporary trends in energy dynamics continue to be defined by sharp increases in prices of electricity, gas and kerosene (Vyamana *et al.,* 2023).

With energy policy emphasis running counter to the reality of fuelwood use and production in sub-Sahara Africa, the long-awaited fuelwood crisis remains a latent social-ecological challenge (Callo-Concha *et al.,* 2022). In rural Sub-Saharan Africa, Matsika *et al.* (2013) notes that despite several 30 years of debate on its relevance, fuelwood scarcity continues to be highly topical. Several studies across different parts of the continent substantiate this situation noting that it is a pertinent problem in some localities and contexts. In specific areas of Ethiopia (Guta, 2014), Ghana (Amoah *et al.,* 2015), Uganda (Egeru *et al.,* 2014; Abigaga *et al.,* 2016), Tanzania (Scheid *et al.,* 2019), and Kenya (Kitheka *et al.,* 2020; Ochenge and Atamba, 2023), a common observation is that fuelwood scarcity has resulted in the use agricultural waste as an alternative for fuelwood. The utilisation of less preferred fuel forms such as crop residues or cow dung, as Duguma *et al.* (2014) and Mekonnen *et al.* (2017) suggest, signal serious energy development problems in the making.

Although agroforestry is espoused as most potent and sustainable solution to fuelwood shortages in Africa (Iiyama, 2014; Nenova and Behrend, 2016; Toth *et al.,* 2019), its contribution is not commensurate to the widespread use of fuelwood. In Africa, only 20% of fuelwood is produced in agroforestry systems (Sharma *et al.,* 2016). In Kenya, its contribution is even lower, as rough estimates by the Kenya Forest Service suggest a figure between 10 and 20% (Kinyili, 2022). The low contribution of agroforestry implies that forests are majorly relied on to cater for household fuelwood use.

In western Kenya, Murphy *et al.* (2018) note that households have a high tendency to spend more time and effort collecting fuelwood off-farm than switch to on-farm fuelwood production, as fuelwood scarcity increases. This is echoed in a study by Njenga *et al.* (2021) in central

Kenya. In Tanzania, Kegode *et al.* (2017) reveal that the choice to obtain fuelwood from the forest is motivated by the perennial availability of preferred fuelwood trees. The study further shows that female-headed households have a higher tendency to collect fuelwood from forests than male-headed households (Kegode *et al.*, 2017). Though this reflects women's enculturation and familiarisation with fuelwood collection from forests (Gururani, 2002; Matinga and Clancy, 2020), the choice of forests over on-farm agroforestry by female-headed households points to gender issues involved in agroforestry and deep-seated cultural norms that limit women's participation in agroforestry.

Considerable evidence suggests that gender plays an influential role in determining agroforestry practices and resource access, albeit in specific sites (Kiptot and Franzel, 2012; Catacun and Naz, 2015; Abebe and Mulu, 2017). In Africa, male motivation to incorporate trees on farms is largely conditioned by financial factors, whereas females are more interested in meeting subsistence needs (Villamor *et al.,* 2014). This is well illustrated in western Kenya (Scherr, 1995) and Rwanda (Ndayambaje *et al.,* 2012) where it was found that women tend to plant more trees used primarily for fuelwood as opposed to men. The proclivity to plant trees for fuelwood use reflect women's greater emphasis on meeting household fuel needs as opposed to men who seldom consider fuelwood shortages as a serious problem, nor be interested in planting fuelwood trees (Dagar *et al.,* 2020). In Nigeria, Callo-Concha *et al.* (2022) make a similar observation noting that due to the gendered nature of fuelwood collection, male landowners invest less effort on planting trees given their lack of awareness of increasing scarcities.

Though women have a vested interest in planting trees for fuelwood use, qualitative studies show strong cultural taboos against women participating in tree planting. In Tanzania, Petro *et al.*

(2015) observe that certain tree species cannot be grown by women as it may lead to barrenness or death of the husband. Similarly, in Kenya, studies in different communities show that cultural beliefs and taboos deter women from planting trees (Omare, 2011; Kiptot and Franzel, 2012; Oloo *et al.,* 2013; Mugure and Oino, 2013; Oloo, 2015). In Bungoma, western Kenya, some trees such as Makhamia Lutea (*Lusiola*) are only planted by respected clansmen (Kiprop *et al.*, 2017).

It has been noted that these beliefs and taboos are mostly upheld in patrilineal communities, where land ownership and inheritance is typically passed down through male lineage (Ipara, 1992). In these communities, women are restricted from tree planting practices since the act establishes and solidifies customary claims to land ownership (Kiptot, 2015; Benjamin *et al.,* 2021). In Uganda, for instance, women are forbidden from planting Ficus because it symbolises land ownership (Mukasa *et al.,* 2016). As social mechanisms to prevent women challenge male authority in land ownership, beliefs and taboos are perpetuated to maintain the existing power dynamics. The prevalence of these beliefs and taboos has contributed to women's low participation in agroforestry enterprises in sub-Sahara Africa (Kiptot and Franzel, 2012) and, in effect, the poor performance of tree planting projects for fuelwood production (Dagar *et al.,* 2020).

In the recent past, however, significant efforts have been made in sub-Sahara Africa to challenge and address gender-based discrimination in land tenure systems and to promote more inclusive practices that recognise and protect women's land rights (Ramaroson *et al.* 2022). In Kenya, the 2010 constitution introduced new rights for women considerably ensuring their access to land and security of land rights (FAO, 2017). These rights were further strengthened by the Land Registration Act of 2012 which effectively recognises that "a spouse's may acquire an interest in

his/her spouse's land if this spouse contributes by labour or other means to productivity, upkeep and improvement of the land". Even so, discrepancies between these legal reforms for gender equality in land ownership and ground level realities are still vast (Djurfeldt, 2020). At the grassroot level, socio-cultural norms that discriminate against women's right to access, use and inheritance are still extant (Dokhe, 2016).

There are, however, transformative and progressive practices, or rather social innovations, going on in communities to address the issue of land and tree tenure insecurity that hinders women from participating in agroforestry and equitably benefiting from it (Wanjira and Muriuki, 2020). In Kakamega County, western Kenya, for instance, the women's organisation, Shibuye Community Health Workers, in collaboration with TMG and GIZ have jointly developed and piloted a pioneer innovation to address land tenure challenges face by female-headed households and young farmers (Stiem-Bhatia *et al.,* 2022). Rooted and co-developed with the communities that experience the challenges, the social innovation known as community-led land lease guidelines demonstrates that bottom-up solutions to land tenure challenges can be found. In the neighbouring county of Uasin Gishu, farmers are handling the tenure challenges by allotting portions of land to women, where they can plant trees for their own uses (Kiprop *et al.*, 2017).

Besides supporting the development of progressive practices in land access, grassroot level initiatives have considerably contributed towards encouraging women's engagement in planting trees and strengthening their tenure rights. In Uganda, the extensive application of the Adaptive Collaborative Management (ACM) approach by the ACM team has yielded significant results. With facilitation and support, women have planted trees such as Ficus, Maesopsis spp., eucalyptus and pine commonly planted by men (Mukasa *et al.*, 2016). In Kenya, the Green Belt

Movement (GBM) has, since its inception in 1977 by Prof. Wangari Maathai, empowered women and communities in rural parts of the country to plant trees (Kinoti, 2022).

In the wider study area of Bungoma County, western Kenya, VI Agroforestry has enabled local farmers, among them women, to plant trees on their farms (Agroforestry Network and Vi-skogen, 2018). By encouraging women to overcome cultural barriers to planting trees, GBM and VI Agroforestry, among other grassroot initiatives, have effectively opened up opportunities to improve women's agency in different localities. This is evident Bungoma County, where a shift towards decision joint decision-making, especially on long-term trees, is reportedly getting entrenched (Katothya *et al.,* 2021). This has tremendous impact on gender equality and sustainable development at the community level.

1.3 Problem statement

Being the primary users of fuelwood in many cultural contexts, including the study area, women possess valuable knowledge and expertise related to fuelwood use and management. They are often familiar with local tree species, their qualities as fuel sources, and appropriate harvesting techniques. Cultural norms and beliefs, however, shape women's opportunities and constraints. On one hand, traditional practices, rituals, and taboos influence the choice of tree species for fuelwood use or restrict them from accessing specific resources while on the other hand, power dynamics restrict their involvement in decision-making processes related to tree selection, and tree planting.

Nonetheless, as actors in the procurement of fuelwood, women's ability to engage and shape constraining cultural practices and norms is critically important, especially in the face of scarcities. While much focus has gone into assessing the dynamic effects of fuelwood insecurity

and the autonomous coping strategies used by households, there is limited understanding on women's ability to make decisions, exercise control and take actions that shape fuelwood production in agroforestry. Moreover, as cultural barriers that limit women from planting and using trees slowly fade away in many Kenyan communities, there is inadequate information on women's agency in agroforestry and its contribution to household fuelwood security.

To address this gap, the study was deemed necessary. It situated women at the centre of investigation so as to document their ability to exercise control and make decisions that ensure lasting fuelwood security. Given the varying nature of agency from place to place, the study was conducted in Kimilili Sub-County so as to understand the location-specific factors influencing women's actions with respect to tree planting and usage. Specific attention was furnished on the cultural factors influencing the usage of certain tree species as fuelwood, the cultural norms and beliefs shaping women's role in tree planting, and how women's agency in agroforestry has contributed to household fuelwood security. As such, the study was guided by the following research questions:

1. What cultural factors are influencing the usage of different tree species as fuelwood in Kimilili Sub-County?
2. What cultural norms and beliefs are shaping women's role in tree planting in Kimilili Sub-County?
3. What are the contributions of women's agency in agroforestry to household fuelwood security in Kimilili Sub-County?

1.4 Objectives of the study.

1.4.1 Overall objective.

To assess women's agency in agroforestry and its contribution to household fuelwood security in Kimilili Sub-County, Western Kenya.

1.4.2 Specific objectives.

1. To examine the cultural factors that are influencing the usage of different tree species as fuelwood in Kimilili Sub-County.
2. To assess the cultural norms and beliefs that are shaping women's role in tree planting in Kimilili Sub-County.
3. To find out the contributions of women's agency in agroforestry to household fuelwood security in Kimilili Sub-County.

1.5 Assumptions of the study.

1. The usage of different tree as fuelwood in Kimilili Sub-County is affected by certain cultural factors.
2. Women's role in tree planting in Kimilili Sub-County is being shaped by cultural norms and beliefs.
3. Women's agency in agroforestry is contributing to household fuelwood security in Kimilili Sub-County.

1.6 Justification of the study.

This study addresses a critical and timely issue within the Kenyan context, particularly in light of the prevailing global energy crisis. Escalating costs of electricity, LPG, and fuel oil – alternatives sources of household cooking energy – have underscored the urgency of employing affordable substitutes such as charcoal and fuelwood. In this context, the study holds immense promise in contributing valuable insights to the ongoing discourse surrounding agroforestry as a sustainable source of fuelwood used in numerous rural areas. By exploring the factors influencing women's choice of trees, the study provides a nuanced understanding of the underlying cultural elements that shape fuelwood production and consumption patterns in Kimilili Sub-County.

The significance of this understanding lies in its ability to contextualize the values attached to different trees and, consequently, their utility. This knowledge is poised to aid agroforestry extension officers and the Kenya Forestry Research Institute (KEFRI) in the selection and promotion of tree species that not only benefit rural women in Kimilili Sub-County but are also readily accepted by the community. This strategic step towards aligning the benefits of agroforestry with women's agency in the field is of paramount importance.

Furthermore, the study underscores the imperative of factoring in cultural dynamics when designing agroforestry initiatives. It illuminates how deeply ingrained beliefs and norms can exert a profound influence on women's decision-making authority regarding tree planting and harvesting. This insight is invaluable for development practitioners, underscoring the criticality of engaging with local communities and gaining a comprehensive understanding of their sociocultural contexts.

In the realm of Development Anthropology, this study holds substantial theoretical and empirical significance. By delving into the intricate dynamics of agroforestry practices and their impact on household fuelwood security, the study provides a nuanced understanding of the complex interplay between cultural, social, and environmental factors. The empirical contributions of this study lie in its meticulous examination of women's agency within the context of agroforestry. It uncovers the multifaceted ways in which cultural norms, historical constraints, and evolving societal structures intersect with women's roles in tree planting and harvesting. The empirical findings, thus, serve as invaluable data points that can be utilized to refine existing theoretical frameworks within Development Anthropology.

From a theoretical standpoint, this study advances our comprehension of how cultural beliefs and norms are not static, but rather dynamic and subject to transformation. The findings illustrate that women's agency in agroforestry is not merely a passive adaptation to existing norms, but an active process that shapes, and is shaped by, broader socio-cultural trends. This offers a more nuanced understanding of how individuals navigate and negotiate their roles within evolving cultural contexts. Its contributions extend beyond the immediate context of Kimilili Sub-County, offering valuable lessons and frameworks that can be applied in similar socio-cultural settings globally. By recognizing and validating the agency of women in agroforestry, the study advocates for a more inclusive and holistic approach to development that empowers individuals and communities alike.

1.7 Scope and limitations of the study

This study was conducted in the rural area of Kimilili Sub-County, located within Bungoma County, Western Kenya. Its primary focus was on elucidating the agency of women in the realm

of household fuelwood security, meticulously scrutinizing the intricate cultural elements influencing their roles within the parameters of the set objectives. The study specifically zeroed in on women who primarily employ fuelwood as their key source of domestic cooking energy, and who concurrently engage in agroforestry as a pivotal means of production.

A pivotal facet of this research entailed a profound assessment of the myriad factors that sway women's choices in tree selection. This entailed discerning both the inherent attributes that influence the choice of tree species utilized as fuelwood, as well as the extraneous elements that circumscribe this selection process, many of which are culturally entrenched. Beyond this, the study delved deeper, endeavouring to unearth the cultural norms and transformative practices that have played a pivotal role in reshaping women's roles in tree planting. This in-depth exploration sought to discern the underlying factors that bolster their agency within the realm of agroforestry.

Additionally, the study scrutinized the palpable contributions of women's agency in agroforestry to household fuelwood security within the designated study area. The research methodology meticulously employed was predominantly qualitative, affording a panoramic view of the participants' thoughts, perspectives, and experiential narratives. Employing a cross-sectional descriptive study design, data were triangulated to enrich and substantiate the validity of the findings. Guided by the structuration theory, the study embarked on a nuanced exploration of how individuals' actions and decisions are shaped by societal norms and structures.

It is imperative to acknowledge that, due to the highly context-specific nature of culture, the findings of this study might not be readily generalizable to broader contexts. Furthermore, given the study's targeted approach involving a relatively small cohort of participants and the

utilization of qualitative methodologies, the degree to which the findings can be extrapolated or applied beyond the specific context is notably circumscribed. This study, therefore, is best understood as providing a rich and contextually grounded exploration of the agency of women in agroforestry and its profound implications for household fuelwood security within Kimilili Sub-County.

1.8 Operational definition of terms

Adoption: The action of choosing to take up or utilize agroforestry as a means of fuelwood/firewood production.

Autonomy: The freedom to make decisions on the type of trees to plant and harvest

Change: The act or process through which culture becomes different.

Choice: The act of selecting different tree species for use as fuelwood.

Commercialisation: The exploitation of fuelwood for profit.

Custodian: The responsibility of taking care of or protecting fuelwood tree species.

Female domain: An area of activity considered as belonging to females.

Fuelwood access. The ability to harvest and utilize tree species as fuelwood or firewood.

Fuelwood scarcity: The unavailability of fuelwood preferred for domestic cooking and heating.

Male domain: It is an area of activity that is owned and controlled by males.

Perception: The way in which tree species preferred as fuelwood are regarded by women.

1.9 Structure of the thesis report.

The thesis consists of seven chapters. Following the introduction chapter:

Chapter 2 offers an overview of agroforestry's historical development in Kenya, the initiatives that have promoted its development as well as the role of key stakeholders in it. The chapter also delves into the impact of cultural preferences on fuelwood choices and how this affects agroforestry practices. Additionally, it examines the cultural and traditional roles of women in fuelwood use, the challenges they face and their agency in overcoming them. Finally, the theoretical framework used in the study is discussed to provide context for the subsequent analysis.

Chapter 3 presents the approach employed in the study to address the research questions and objectives. It also provides a background description of the study area, a description of the sample population and the sampling procedures as well as the systematic steps that were taken to gather data. The analytical and presentation approaches deployed in the study are also presented in this chapter.

Chapter 4 presents findings that speak to the first research question/objective – cultural factors influencing the usage of different tree species as fuelwood. It delves into the qualities desired in fuelwood species, unveiling the intricate interplay between functional attributes, individual preferences, and local sociocultural norms. It also looks into how established community norms and beliefs interact with individual agency, shaping the choice and selection of specific tree species for fuelwood use. The evolutionary aspect of social structures, revealed through changing

beliefs and the utilisation of traditionally restricted trees in the study area, is also presented in this chapter.

Chapter 5 presents findings on the second research question/objective – cultural norms and beliefs that are shaping women's role in tree planting. It scrutinizes the entrenched cultural norms and beliefs that have historically constrained and delineated women's participation in tree planting. It also highlights the transformative forces that are currently shaping socio-cultural change, consequently altering the dynamics of women's tree planting. In so doing, it offers a comprehensive view of the evolving roles of women in tree planting practices, underscored by the intricate interplay between cultural dynamics, structural shifts, and the burgeoning agency of women in the realm of tree planting

Chapter 6 presents findings on the third and last research question/objective – contributions of women's agency in agroforestry to household fuelwood security. It demonstrates how women's expanding agency has translated into tangible benefits in terms of fuelwood accessibility and sustainability within households. This not only underscores the pivotal role of women in ensuring household fuelwood security, but also accentuates the significance of gender-sensitive approaches in the broader context of agroforestry.

Chapter 7 consists of the thesis summary, a general synthesis and discussion of the main results as well as policy and research recommendations. The discussion takes cognisance of the theoretical framework employed in the study and highlights the connection of findings to the broader framework.

CHAPTER TWO

LITERATURE REVIEW AND THEORETICAL FRAMEWORK

2.1 Introduction

This chapter provides a review of the historical trajectory of agroforestry in Kenya. This is aimed at providing the context within which agroforestry's development has taken place, as well as the policy drive that has gone into its growth. The role of major stakeholders and the initiatives they have propagated in a bid to scale agroforestry's adoption in Kenya are also looked into. Further into the chapter, the interplay between culture and fuelwood choice, how these preferences impact agroforestry, and the complexities of promoting sustainable practices in light of deep-rooted cultural norms are explored. Finally, the cultural/traditional role of women in fuelwood acquisition and usage is reviewed alongside the structural challenges affecting women's ability to fully realise the benefits of agroforestry. Their agency in light of these challenges as well as the influence this agency has on culture is also looked into. The theoretical framework deployed in the study is also discussed at the end of this chapter.

2.2 History and policy context of agroforestry in Kenya

Within the broad framework of sustainable development, agroforestry has been widely touted for its exceptional capacity to contribute towards achieving a majority of the 17 SDGs (Partey *et al.,* 2017; Plieninger *et al.,* 2020; Octavia *et al.,*2022). In its fifth decade since it was coined by researchers and development professionals (Bene *et al.,* 1977), agroforestry is best seen as a nexus point of all SDGs (Noordwijk, 2020). Moreover, it is viewed as a platform for bridging

agriculture and forestry in their interactions with the environment, as well as a possible driver for economic development (Galabuzi *et al,* 2021).

As an integrated land use approach, agroforestry has been an integral part of Kenya's landscapes since its inhabitation (Kitayi *et al.,* 2013). For centuries, local communities have intuitively recognised the value of incorporating trees on their farms (Muriuki *et al.,* 2012). Among the Kikuyu, for instance, trees were intentionally propagated to furnish fundamental items of the material culture such as utensils, fencing, timber, fuel, medicine and weapons (Castro, 1991) For a significant period, however, indigenous agroforestry practices were not widely recognised or promoted by formal policies. Instead, they often fell victim to policies that, for the most part, sidelined and even undermined them. As a consequence, agroforestry's importance declined while other approaches to land use, especially agriculture, developed.

To a large extent, the history of agroforestry in Kenya is intricately connected to the land use practices of the colonial era. In this period, as Kinoti (2022) accounts, the colonial government's land policies promoted the notion that land productivity was synonymous with agricultural production. Reflecting this view, the Crown Lands Ordinance was put into effect in 1902 to provide a legal framework for European settlement. Armed with the idea that extensive clearing of 'idle' land was an imperative step towards progress, the arrival of European settlers led to the conversion of forested lands into settlement schemes and agricultural land (Nyamwange, 1990).

In 1946, the African Land Development Plan (ALDEV) was enacted to promote large-scale commercial farming. As such, large-scale plantations, often characterised by monoculture practices of extensively growing a single crop were established. Under the banner of promoting economic modernisation, the Swynnerton Plan of 1954 was adopted to further promote large-

scale agricultural production in Kenya and prevent subdivisions of land (Kinoti, 2022). With much focus being put on cash crop production, such as coffee, tea and sisal, for export, these monoculture plantations had profound implications for land use patterns and agricultural practices in Kenya.

Following independence in 1963, Kenya faced the challenge of food shortage and achieving economic development. By invoking tenets of modernisation theory such as industrialisation and utilisation of 'idle' resources, the post-colonial administration settled on supporting the agricultural sector and making it the backbone of the economy. To this end, agricultural policies aimed at increasing crop yields, improving efficiency, and modernising farming practices were adequately supported by the government as articulated in the Agricultural Act of 1967 (GoK, 1967). With the scale skewed heavily in favour of agricultural production, the consequences of overemphasis on monoculture began to emerge in the 1970s, starting with the severe drought and famine of 1970.

With streams drying up, food supply becoming less secure, and firewood and water getting scarce, the modernisation plan was yielding serious environmental problems (Swanson, 2018). Though the forestry sector had been growing in Kenya since the colonial period, it was often promoted as an auxiliary to an increasingly agricultural-based economy and, as such, experienced frequent logging that increased the rate of deforestation. The scale of tree plantations at this moment, including those in the agroforestry *'Shamba'* system established in 1910, was not proportional the demand of wood in the country. Even the introduction of fast-growing exotic tree species such as *Eucalyptus* spp., *Grevillia robusta, Sesbania* spp, and *Cassia spectabilis* could not sustain the construction and industrial needs of wood.

Cognisant of the environmental consequences of deforestation, a special division of Rural Afforestation Extension Scheme was established 1971 to encourage forest regeneration in rural areas (Cheboiwo, 2015). In the wake of the oil crises of 1973 and 1979, and mounting international concern about the looming fuelwood 'crisis', a great shift in national emphasis towards forest development ensued (Owino, 1981). Women, who in most cases face the adverse effects of natural resource shortages, played an instrumental role in this development. Encouraged and supported by the Green Belt Movement (GBM), a women-led organisation since its founding in 1977, they significantly demonstrated their agency and initiative to increase tree cover in their communities. By regarding participants as capable agents with the creativity to design approaches that best served their needs, the organisation promoted a bottom-up, hands-off approach to development. While tree planting gave rural women greater autonomy over their livelihood, the hand-off approach facilitated the revival of indigenous knowledge systems that went a long way in re-establishing agroforestry practices that had begun to disappear.

Seeing that the earlier evolution of professional sciences of agriculture and forestry since the 1800s had significantly influenced the increasing predominance of crop and tree monocultures in different settings, the institutionalization and inauguration of agroforestry as a separate scientific discipline from forestry and agriculture was deemed necessary (Pancel and Köhl, 2016). In 1978, therefore, the international Council for Research in Agroforestry (ICRAF, now known as World Agroforestry) was established with the institutional mandate to initiate, develop and facilitate research carried out by forestry and agricultural institutions. This marked a significant turning point in the history of agroforestry development in Kenya and the world at large.

However, faced with the real and large problem of discerning which agroforestry systems were appropriate to farmers or individual landholders, the next important step, as noted by Owino (1981), was to identify and rationalise the most appropriate agroforestry packages for different ecological zones. Through collaboration with the Kenya Agricultural Research Institute (KARI) and the Kenya Forestry Research Institute (KEFRI), ICRAF, therefore, launched research stations in Machakos, Maseno and Embu to develop agroforestry technologies that were regionally appropriate. Their establishment, according to Tengnas (1994), was particularly relevant in the dissemination of agroforestry technologies that could address the foreseen household energy crisis, livestock fodder shortages, declining soil health and land degradation in the country. As a major global and national concern, the Kenyan government steered and supported the development of agroforestry to contribute towards fuelwood security in Kenya. baby

Fundamentally influencing the unprecedented expansion in formal agroforestry research and development activities globally, the Beijer Institute Report was instrumental in the development of agroforestry in Kenya, particularly in the western region (Hambly, 1999). Among the early agroforestry programs initiated in the region included; the Kenya Woodfuel Development Project (KWDP), started by the Beijer Institute in 1983 and operated in Kisii and Kakamega Districts (now counties) until 1989, when it was renamed the Kenya Woodfuel and Agroforestry Program (KWAP). This program was expanded to Busia and Siaya Districts (also counties now) in 1990 and ran until its termination in 1997. The CARE Agroforestry Extension Project (AEP), also operating in Siaya from 1988 to 1998, constituted the main programs initiated by NGOs to promote agroforestry development in Kenya. These programs, according to Tengnas (1994) and

Noordin *et al.* (2014), applied community-based approaches to disseminate agroforestry practices that would provide alternative sources of household fuelwood.

Though the focus shifted at the turn of the millennium to other mounting challenges such as land productivity and climate change, the development of agroforestry in Kenya continued to gather pace. Between 1997 and 2004, more than 100 organisations including ICRAF, KEFRI and KARI piloted scaling of agroforestry practices to improve soil fertility in western Kenya (Wanjira and Muriuki, 2020). With the growing contemporary awareness and interest in climate change, its mitigation broadened the scope and focus of agroforestry.

In the recent past, several agroforestry initiatives in Kenya, among which include; the Western Kenya Ecosystem Management Project executed by KARI and ICRAF between 2006 and 2010 (Shames *et al.,* 2012), and the Livelihood Enhancement (AGRILIVE) project ran by CARE-Kenya between 2008 and 2011, have partaken in making farmers more resilient to climate change. In Bungoma and Kakamega Counties, Vi Agroforestry, a Swedish NGO, has undertaken a 9-year programme of promoting agroforestry through the implementation of the Kenya Agriculture Carbon Project (KACP) and the Farmer Organisations and Agroforestry (FOA) project. Starting in 2008, these projects have aimed at restoring degraded agricultural land, increasing farmers adaptability to climate change as well as enhance food security.

In several ways, agroforestry extension efforts have been impactful in different localities of Kenya. In Murang'a County, for instance, Githiomi *et al.* (2012) notes that multipurpose trees grown on farms provide reliable fuelwood supply for households. Njenga *et al.* (2017) also show a similar situation in Embu County, where 40% of households depend exclusively on on-farm trees for fuelwood. In Bungoma and Kakamega Counties, over 5 million trees have been planted

(Kiprop *et al.*, 2017), with modest, yet statistically significant effects on household asset accumulation, particularly among female represented households (Hughes *et al.*, 2020).

Be that as it may, the scale of agroforestry adoption in Kenya is still low (Yila, 2016). A recent review on policy and institutional aspects anchoring agroforestry in Kenya identifies the lack of harmonized policy frameworks as the major drawback to scaling agroforestry adoption (Mumina and Bourne, 2020). This is corroborated by Kinyili (2022) who notes a general lack of suitable policies and legal frameworks to facilitate the adoption of agroforestry practices in the country. According to Poulton and Kanyinga (2014), this situation is attributed to the fragmented, sector-specific approach that has dominated agricultural and forestry sectors since the colonial era. Since agroforestry cuts across multiple sectors and falls among the ministries of agriculture and forestry, it often becomes the subject of policy conflicts and adverse incentives that work against its development (Dlamini, 2020).

To remedy this situation, however, the Kenya National Agroforestry Strategy (2021-2030) was drafted in 2021. Through multi-stakeholder consultation, and support from the Ministry of Agriculture, Livestock, Fisheries and Cooperatives (MoALFC) and the Ministry of Environment and Forests (MoEF), this national strategy represents a significant milestone in the development of agroforestry in Kenya. While offering intermediate solutions to the harmonisation and synchronisation challenges across various departments, it provides a viable pathway for securing the commitment for the enactment and materialisation of a national agroforestry policy in the country.

With the road map towards a national agroforestry policy finally set in place, the advancement of agroforestry practices in the country ultimately depends on whether they are being promoted to

address the basic needs and problems that communities identify as their priorities. As an immediate concern for the 89% of rural households relying primarily on fuelwood for their cooking energy (Jepng'etich, 2020), the enhancement of fuelwood security offers a strategic avenue for propagating agroforestry in rural areas. This is particularly so given the fact that cases of fuelwood shortages are still prevalent in different rural areas (Ndegwa *et al.,* 2020), and studies suggest that fuelwood scarcity is one of the key factors that motivate tree planting (Dixit and Dixit, 2010).

2.3 The cultural influence on the choice of fuelwood tree species and its implication on agroforestry.

In many rural communities, fuelwood use is an entrenched cultural practice. For this reason, as noted in several empirical studies (Nlom and Karimov; 2015; Uhunamure *et al.,* 2017), fuelwood has remained a key source of cooking energy, even where modern fuels are affordable (Heltberg, 2003; Madubansi and Shackleton, 2007; Mirza, 2009; Wassie *et al.,* 2021). In Kenya, for instance, empirical findings show that in most households using LPG as their primary cooking energy, fuelwood contributes 17% of the household fuel mix (Ministry of Energy and Cleaner Cooking Association of Kenya, 2019).

As a deep-rooted cultural practice, the predominance of fuelwood is driven by entrenched cooking practices that span several generations and centuries. This is evident in a study conducted by Taylor *et al.* (2011) which showed that households avoid using new fuels since their adoption would require revolutionary changes in deeply culturalized cooking practices. Among the Ebira of Nigeria, using fuelwood is widely regarded as a way of life and, as such, it is strongly believed that ill health and other misfortunes could befall a person who contravenes

traditional cooking norms (Akintan *et al.*, 2018). According to previous and more recent studies (Masera *et al.*, 2000; Ouedraogo, 2006; Yadav *et al.*, 2021), however, the preference of fuelwood over other sources of cooking energy boils down to taste preferences that result from cooking with it.

A study by Masera *et al.*, 2000), for instance, showed that fuelwood is a preferred source of cooking energy in Mexico since its efficacy results in better tasting tortillas. This preferential choice was also observed by Ouedraogo (2006) in Burkina Faso, where the preparation of 'tô' – a meal rooted in the cooking culture of Ouagadougou – increases the chances of using fuelwood. In India, recent research by Yadav *et al.* (2021) also echoes such tendencies, showing that many households preferred cooking some meals using fuelwood since they favoured the taste of food cooked that way.

To meet these socially established taste preferences, traditional cooking practices are often adapted to the qualities of available fuelwood species. Dependent on geo-ecological settings, communities have identified trees species that possess unique qualities that affect the flavour and aroma of the food being cooked. For example, some woods may produce aromatic smoke that infuses a distinct taste into the food, while others may burn at different temperatures, providing specific cooking characteristics. Due to their perceived qualities, such as generating intense heat for rapid cooking, imparting desirable flavour to food, or producing minimal smoke, cultural preferences for different tree species have, for many generations of fuelwood use, observation and experimentation with various plant species, emerged (Cardoso *et al.*, 2015).

Several studies have accorded significant attention in determining the most preferred tree species in different local contexts (Abbot *et al.*, 1997; Bhatt and Tomar, 2002; Ramos *et al.*, 2008; Miah

and Islam, 2020). Two distinct scientific techniques have been employed to identify the preferred fuelwood species. Based on the fuel value index (FVI), a widely used method of screening and ranking tree species preferred for fuelwood, studies show that trees with the highest FVI are most commonly preferred (Abbot *et al.,* 1997; Deka *et al.,* 2007; Marques *et al.,* 2020). The principal parameters employed in the construction of the index include basic physical properties intrinsic in different trees but in varying degrees. They constitute the caloric value, moisture content, density, and ash content. The most preferred trees, therefore, possess certain amounts of these properties (Ojelel *et al.,* 2015).

However, given that local preferences are based on socially defined qualities such as flammability, high heat retention and ease of ignition, the pair-wise comparison method, firstly introduced by Abbot *et al.* (1997), is often used as an alternative to the FVI. It depends upon certain observable quality criteria such as fast drying rate, the ability to produce embers and low weight when dry to rank fuelwood preferences. Species with the highest number of desirable traits are considered the most preferred ones for fuelwood use. Sufficient resemblance in results obtained from these two techniques suggests the existence of a direct relationship between physical properties of fuelwoods and the locally perceived qualities (Ramos *et al.,* 2008; Ojelel *et al.,* 2015; Mitchual *et al.,* 2014). As such, relying on local preferences, guided by indigenous knowledge on qualities of trees, can act as a reliable way of gauging the relative physical value of a tree obtained through laboratory analyses. Upholding this view, Deka *et al.* (2007) argue that using the pair-wise comparison method, as used by rural people, is a simpler and accurate technique for identifying preferred fuelwood species.

Existing empirical literature show that tree species preferences fundamentally influence the choice of its source (Mahiri, 2003; Jumbe and Angelsen, 2011; Kegode *et al.*, 2017). The study by Kegode *et al.* (2017) in south-west Tanzania exemplifies this effect noting that, households that prefer *Acacia tortilis* are more likely to obtain it on-farm while those that prefer *Brachystegia* spp. are more likely to fetch it from the forest. Mahiri (2003) noted also noted that *Acacia* spp. was highly preferred by women in Nyando District (now a constituency in Kisumu County) situated in Western Kenya due to its good qualities, although its scarcity often forced women to buy it in the market whenever it was available. Given the importance of preferences, agroforestry interventions aimed at planting trees on farms for fuelwood use should take them into account. More importantly, since most plants exploited for fuelwood are native trees (Tabuti *et al.*, 2003; Kaschula *et al.*, 2005; Walters, 2005; Cardoso *et al.*, 2015), indigenous species capable of growing on farms should be promoted.

Studies recommend the integration of indigenous agroforestry tree species similar to preferred species available in the natural forests (Hafner *et al.*, 2020; Vyamana *et al.*, 2021). According to Vyamana *et al.* (2023), the cultivation of native trees on farms produces species that have FVI that is relatively high, signifying their importance for fuelwood use. In Kenya, however, evidence suggests that exotic trees are more widely incorporated on farms than indigenous trees (Welter *et al.*, 2016; Kiprop *et al.*, 2017). In the broad study area of Bungoma County, Kiprop *et al.* (2017) notes that exotic tree species such as *Grevellia robusta* and *Eucalyptus* sp. are the dominant trees grown on farms despite the county having the largest mix of indigenous tree species.

Introduced during the colonial era (Tengnas, 1994; Scherr, 1995) and extensively promoted by the Rural Afforestation Extension Scheme (RAES), most exotic trees are reportedly not preferred for fuelwood use. Mahiri (2003), for instance, notes that although exotic trees such as *Cassia siamea* and *Eucalyptus* spp. are the most common species, they are not used frequently. Though this reflects the reservation of some exotic trees for usage elsewhere, studies show that exotic trees are often not preferred for fuelwood due to their lower quality (Cardoso *et al.,* 2015). This partly explains why farmer adoption of exotic species has been generally slow (Sileshi *et al.,* 2020), and why most attempts to divert demand from forests to farms through the introduction of exotic species by various agroforestry programs have failed (Johnsen, 1999). Propagation of indigenous trees is, therefore, of vital importance for agroforestry adoption.

It is, however, noteworthy that cultural beliefs play a significant role in influencing the type of indigenous trees propagated in different contexts. Empirical evidence in Bungoma County, for instance, suggests that some local tree species such as *kumutua, kumlaa, kumtare, kumhendie* cannot be propagated due to cultural beliefs associated with planting them, while others such as *lusiola* can only be planted by respected clansmen (Kiprop *et al.*, 2017). This presents a serious obstacle in the propagation of some indigenous tree and endangers them especially if they are preferred for fuelwood.

A host of studies in various parts of Africa, nonetheless, indicate that local cultural beliefs, taboos, attitudes, and customs play a significant part in preventing the use of different trees as fuelwood (Tabuti *et al.,* 2003; Houehanou *et al.,* 2011). In Nigeria, Akintan *et al.* (2018) observe that different ethnicities demonstrate strong variations in actual choice of species used for cooking due to cultural values attached to them. The Yoruba, for instance, do not use *Milicia*

excela, locally known as Iroko, for fuelwood since it is believed to cause miscarriage or still birth. Similarly, the Ebira are forbidden from using *Lecaniodiscus cupanioides,* or Ochuku in local vernacular, as they are associated with sickness among children.

These intercultural ethnic-specific beliefs have also been noted in Uganda, where a number of species are not used as fuelwood because of assigned beliefs (Tabuti *et al.,* 2003). *Gardenia ternifolia* (Lukoolwe), for example, is not used for cooking because it is believed people used it to commit suicide by hanging. In Kenya, the fig tree is the most sacrosanct tree among many ethnic groups such as the Gikuyu, Meru, Luo, and some clans among the Luhya (Mandillah and Ekosse, 2018). It is widely believed to be a sacred plant and it is a taboo among these communities to cut, destroy or use a fig tree as fuelwood.

Recounting various trees that cannot be harvested and used as fuelwood among the Isukha of Kakamega County, Omare (2011) employs the structural functionalism theory to argue that cultural beliefs, values and norms of the Luhya sub tribe provide a strong measure to reckless utilisation of plant species. Recent studies concur with this view noting that taboos are social institutions for resource conservation (Boamah, 2015; Adom and Kquofi, 2016; Adom, 2018; Mndawe, 2019; Rankoana, 2022). It has, however, been argued that cultural values remain important if there are no strong demands for resources (Luoga *et al.* 2000). Tabuti *et al.* (2003) asserts that people may simply ignore the existing taboos if they do not have wood to cook with. Egeru *et al.* (2014) supports this assertion noting that the scarcity of preferred fuelwood has compelled households to indiscriminately use tree species, including those that are traditionally banned.

In Kenya, cases of shortages, especially in rural areas, are becoming more apparent as signified by the three physical indicators of diminishing supply (Ndegwa *et al.,* 2020). These indicators, including; a switch by households to poorer quality substitutes, especially agricultural residues; increase in distances and consequently travel time to the source, and increase in amount of gathering time and effort per unit amount of fuelwood have been gradually observed across the country (Bizarri, 2010; wa Gathui and Ngugi, 2010; Sikei *et al.*, 2011; Wambua, 2011; Zschauer, 2012; Waudo *et al.,* 2013; Boulkaid, 2015; Kitheka *et al.,* 2020; Njenga *et al.,* 2021; Ochenge and Atamba, 2023). This scarcity places tremendous pressure on cultural norms and practices.

In light of these scarcities, there remains a notable gap in empirical information regarding evolving nature of tree uses in response to changing resource availability, particularly in wide study area of Bungoma County. With cultural beliefs playing a crucial role in the selection of trees for various purposes, it is imperative to acknowledge how beliefs and taboos shape individual preferences and uses of different trees as fuelwood. Recognizing and respecting these cultural beliefs is not only a matter of preserving traditions but also a practical consideration for sustainable resource management. By incorporating indigenous knowledge and respecting cultural practices, agroforestry initiatives can align more closely with local needs and preferences. This approach not only enhances the acceptability and effectiveness of tree planting efforts but also strengthens the relationship between communities and their natural resources.

2.4 Women's traditional role of fuelwood acquisition and their agency in agroforestry.

In many cultures, particularly in Sub-Saharan African societies, women bear the primary responsibility for fuelwood collection, making it an intricately gendered task (Blomley, 2013). Their predominant role in this task is underscored in the historical study by Williams (1983).

This has been reaffirmed across various Sub-Saharan African countries, including Burkina Faso, Togo and Benin, where the predominance of women in fuelwood acquisition denotes the entrenched socio-cultural practice (Kuyah *et al.,* 2020).

It is, however, noteworthy that while it is often assumed that women and girls are the primary firewood collectors, empirical evidence from various Asian and African countries challenge this notion. Studies by Mekonnen (1998) and Cooke *et al.* (2008) reveal a more nuanced reality, indicating that both men and women partake in fuelwood collection, with men occasionally assuming the primary role. This is evident in Madagascar where UN (2015) noted that men assume the primary responsibility, spending an average of 39 minutes daily on fuelwood collection in contrast to women's average of 8 minutes.

Notably, men's participation in fuelwood collection, according to Blomley (2013), often stems from commercial interests, the requirement of tools during fuelwood harvesting, logistical necessities, or fuelwood scarcity. This is evident in the Kalahari Desert where, due to the naturally low densities of fuelwood that make distances too great for fuelwood collection on foot, men tend to assume the role of fuelwood collection by use of donkey carts (FAO, 2013). These gender dynamics vary by specific culture and evolve over time.

Fundamentally, however, the centrality of having a reliable fuelwood supply is particularly significant for women and children, who are predominantly tasked with all aspects related to cooking across most Sub-Saharan African countries (UNEP, 2019). This is epitomized by the translation of a woman getting married (*okhutekha*) among the Luhya community in Western Kenya, which literally means "to cook" (Kuyah *et al.,* 2020). The dedication of about 2-5 hours each day to fuelwood collection in some parts of this region, as noted by Bishop-Sambrook

(2003), attests to the significance of the task and the accompanying chore of cooking. Such phenomena are widely documented in other parts of Kenya (Njenga *et al.,* 2017) as well as in other African countries, such as Malawi, Namibia, Ethiopia, Tanzania and Uganda (Tabuti *et al.,* 2003; Palmer and MacGregor, 2009; Guta, 2014; Sheid *et al.,* 2019), where the gender divide spills over to girls as young as five years old, and the daily gathering time can reach up to 4 hours (Callo-Concha *et al.,* 2022).

A comprehensive analysis conducted in the 1990s estimated that, within sub-Saharan Africa, women contributed between 77% to 93% of the time and effort expended on fuelwood collection (Calvo, 1994). These statistics strongly suggested that women bear the overwhelming burden of fuelwood collection in Sub-Saharan Africa. Further underscoring the substantial investment of women in this endeavour, the study by Karekezi *et al.* (2005) found that the mean time spent on fuelwood gathering by women in Botswana was approximately 3.3 hours. The consistent observation in various studies (Njenga *et al.,* 2017; Fathallah and Pyakurel, 2020; Picornell-Gelabert, 2020) that women work longer hours than men to ensure an adequate supply of fuelwood for their households is indicative of the significant gender disparity in this task. The declaration by the African Development Bank (2007) that the real rural energy crisis is its gendered nature serves as a clear acknowledgment of the deeply entrenched gender inequalities in rural energy dynamics.

These disparities extend to tree planting, a practice essential for ensuring fuelwood security. In Kapchorwa District, situated in eastern Uganda, Bourne *et al.* (2015) observe that decisions regarding tree planting are predominantly made by men, with women often unable to act independently without their husbands' consent. A similar situation was noted by Okullo *et al*.

(2003) in northern Uganda, where only 10% of wives compared to 65% of husbands take up the responsibility of planting trees or shrubs. This gender imbalance is attributed to the formal titling of land situation, which concentrates ownership in the hands of the household's male head, thereby diminishing the bargaining power of wives (World Bank, Food and Agricultural Organization and International Fund for Agricultural Development, 2009). This structural inequality exacerbates the challenges faced by women in accessing and managing essential resources like fuelwood, perpetuating a cycle of energy shortages in rural areas.

The power dynamics that influence tree planting and resource accessibility within the household are bolstered by social and cultural factors. These prevailing socio-cultural factors, which exclude women from the strategic role of tree planting, are deeply entrenched in many societies. Ngugi's (1988) assessment of fuelwood shortages in Kakamega County, western Kenya, highlights how socio-cultural forces contribute to fuelwood scarcity. In some communities, entrenched myths, beliefs, and taboos limit women's involvement in tree planting, as it is seen as establishing a customary claim to land ownership (Wamugunda, 1989). These taboos and beliefs, such as the notion that tree planting could lead to barrenness in women, are well-documented (Tengnas, 1994; Kiptot and Franzel, 2012). Even in communities where such customs are not overt, women often require their husband's permission to utilize a tree, as once planted, it is considered the property of the man (Gichuki and Njoroge, 1989, Kiptot, 2015). This restricted authority, influenced by communal practices, effectively discourages women from engaging in tree planting for fuelwood.

The gendered conflict within agroforestry, as highlighted by Wamugunda (1989), is a crucial issue, particularly in fuelwood production, where men often resist tree planting by women

regardless of fuelwood shortages. The conflict arises in many cases where a wife attempts to plant trees without obtaining her husband's explicit approval. This attempts, as noted by Okullo *et al*. (2003), is perceived as a direct affront to the husband's authority and position of dominance as it would be equating herself to the husband.

To navigate this complex landscape and avoid conflict within the households, women in Kenya have demonstrated remarkable ingenuity. One strategic approach involves interspersing non-tree vegetation, such as Egyptian river hemp, among crops. This innovative method ensures a steady supply of firewood while working within the constraints of prevailing cultural norms (Wamugunda, 1989). Additionally, in some cases, women opt for planting woody shrubs, which may hold less economic value and, therefore, be of lesser interest to men (Bourne *et al.*, 2015). This alternative strategy can serve to reduce conflicts over resource control.

In the negotiation of rights related to agroforestry technologies, the case of Niger sheds light on the intricate interplay of socio-cultural limitations. Here, women are afforded the right to plant trees on their designated land plots. However, their acquisition rights are often restricted to the harvest of specific by-products, such as fruits, leaves, and firewood, rather than the tree in its entirety (World Bank, Food and Agricultural Organization, and International Fund for Agricultural Development, 2009). This reveals a nuanced aspect of gender dynamics within agroforestry, where women's contributions and rights are subject to certain limitations, despite their pivotal role in resource management and agroforestry practices.

In response to emerging economic opportunities in urban areas, however, a notable trend has emerged. Men are increasingly migrating, leaving their wives to manage agricultural activities in rural settings (Colfer et al., 2015). This shift in dynamics has been observed in various parts of

the world, including northern Uganda, where women find themselves shouldering responsibilities traditionally held by men (Okullo et al., 2003). While this transition may lead to an increase in decision-making power for women, it also brings about challenges, including a heightened workload (Colfer et al., 2015).

As women step into the forefront of household management in their husbands' absence, a new dimension of agroforestry emerges. This context is marked by a notable absence of gendered conflicts, potentially paving the way for customized approaches that better cater to the needs of women. However, it's important to note that the extent of decision-making authority may not always experience a drastic shift, as it can be influenced by additional factors, such as the composition of the household, especially in cases involving extended family structures (Doss, 2001). This evolving dynamic highlights the fluid nature of power structures within households, which can impact women's agency in agroforestry practices. There, however, exists limited attention on the evolving nature of women's agency in light of cultural change, and keen focus on how this agency impact fuelwood production within agroforestry practice.

2.5 Theoretical framework

2.5.1 Structuration theory

This study was guided by structuration theory. Proposed by Giddens (1984), this theory seeks to explain how social systems are generated and regenerated across time and space through social interactions. It views people as social constructs acting in accordance with their images of reality and knowledge in that it rests its key concepts and ideas on the basic assumption that humans are

knowledgeable, reflexive and possess the agency to institute changes to the structures of the society through social practice (Layder, 2006).

The various elements that string structuration theory together to bring about its internal coherence are built on social structures that, as Giddens (1984:377) claims, "exist only as memory traces" and are brought to life by knowledgeable actors or agents through social practice (Hardcastle *et al.*, 2005). The memory traces come in the form of learnt or inculcated experiences that guide actors to behave in a manner consistent with those ingrained experiences. The structures are composed of rules and resources from which people draw upon as they interact.

On one hand, resources are divided into two categories, namely, allocative and authoritative (Giddens, 1984). Allocative resources such as land enable the accomplishment of certain activities such as farming or construction while authoritative resources are capabilities inherent in a person that enable him/her to effect changes within the social milieu and are mostly dependent on the hierarchical position or status of a person (Layder, 2006). Resources, as Layder (2006) notes, also come in the form of interactional skills and knowledge learnt either formally or informally and regularly applied in circumstances that call for their use may it be ordinary or threatening. On the other hand, rules may be either explicitly or implicitly set out. For example, promotional guidelines within an establishment are clear rules set up by the management to guide the process through which employees are rewarded for productive work. Employees are made aware of these rules from the moment of employment and this propels their actions within the organisation. Implicit rules mostly apply within social circles and they include appropriate conversational distance, eye contact, eating manners or dress code. While their formulae of

application may not be universally accepted or known in detail, these rules are normally adopted from authoritative people or imparted through social interactions. Both rules, be it explicit or implicit, guide interactions between people, facilitate human actions and thereby prevent them from diverging from established norms.

In a general review of structuration theory, Kilminster (1991:94) notes that Giddens (1984) aimed at portraying the way in which the "actual process of interaction" produces and reproduces the structures as well as the patterning of social relations. Social production, according to Layder (2006), deals with how social life is fashioned by people as they partake in their daily routines while social reproduction involves the recreation and replication of social order across time and space and even beyond the lifetimes of individuals. The institutions that crop out of these repetitive behaviours, as Vaughan (2001:348) notes, persist because of the collective consensus of social actors to adhere to established routines while the systems that support the continuity of institutions are propped up by recursive social practices of the actors.

Notably, however, behaviours cannot entirely be expected to recur every time since humans are endowed with the ability to reflexively examine the "character of the ongoing flow of social life" and change systems and structures by introducing new practices or altering established modes of operation and discursively provide reasons for those actions (Giddens, 1984:3). In as much as humans have the ability to induce systemic change, this capability varies from one person to another and it is contingent on power. Termed as the dialectic of control, Giddens (1984) perceives power as relational and situational depending on existent and forthcoming alterations in their balance. That is to say, people are never entirely helpless in their circumstances but possess some degree of control over them with the resources at their disposal.

2.5.2 Relevance of the theory to the study.

From the stand-point of this study, women are taken as principal actors with their active employment of fuelwood in cooking meals conceptualized as a social practice. As women undertake the collection and use of fuelwood, they pay attention to institutional structures composed of rules and resources that guide these actions. A change in the practice comes from the scarcities that necessitate a need of employing other means of cooking energy or planting trees and, thereby, practicing agroforestry. The initial uptake of agroforestry hinges on the power relations between women and men which are supported by overarching norms embedded within social practices that privilege men over women. However, through constant renegotiations and concessionary agreements, some rights may be waived in favour of women that gives them the proper settings for their adoptions. The subsequent widespread application of this practice then depends on a reflexive monitoring of this activity and requires the practical and discursive levels of awareness to ensure its perpetuity.

This theory is, thus, vital in mapping out key features in the application of agroforestry, answering research objectives and explaining the elements that need tweaking in order to facilitate its uptake. The theory has been widely applied in other fields of studies, for example, in explaining how nurses produce, reproduce and transform the nursing practices as well as answering vital dilemmas in criminology (Hardcastle *et al*., 2005; Vaughan, 2001). In the field of Anthropology, structuration theory is used widely. In Ghana, for example, Antwi-Nsiah and Huff (1994) have applied structuration theory in explaining how a breakdown of the traditional property inheritance system is changing the male-dominated power relations. The theory has also been used by Hagan (1990) to show the configuration of gender relations in Canada while Apter

and Garnsey (1994) use it in examining the processes which give rise to inequalities and their persistence. Finally, Robben (1989) demonstrates how domestic practices within the Brazilian culture influences the spatial structure of the house in a way that inherent family relations become evident.

2.6 Conclusion

From the literature reviewed in this chapter, it is ostensible that agroforestry's development in Kenya is still an ongoing process. Though several initiatives geared towards scaling its adoption have been put into effect, the adoption of agroforestry still faces challenges, including fragmented policies and lack of harmonisation. The development of the Kenya National Agroforestry Strategy in 2021, nonetheless, represents a significant milestone in addressing existing challenges and charting a path for the future of agroforestry in Kenya. Ultimately, however, the success of agroforestry in Kenya hinges on its ability to align with local needs and priorities. While promoting sustainable land use and environmental stewardship, it must offer practical solutions to pressing issues such as fuelwood scarcity. This necessitates the recognition of local cultural practices and beliefs, which exert a profound influence on the continued use of fuelwood. Effective policies should be crafted with these dynamic cultural factors in mind, serving as a bridge between time-honoured traditions and contemporary sustainability objectives. Furthermore, women, who play a central role in the usage of trees as fuelwood, ought to be recognized for their demonstrated agency in agroforestry practices. Their apparent contributions are integral to the formulation of agroforestry policies that are not only more inclusive and holistic in approach, but also focused on promoting fuelwood security in rural households.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter presents the approach employed in the study to address the research questions and objectives. It provides a background description of the study area, including the key elements that justified its selection. An explanation of overall research design, and the rationale behind its choice is also presented. A detailed description of the sample population and the sampling procedures that went into selecting the study's respondents are subsequently provided in this chapter. The systematic steps that were taken to gather data and justification of the same are also illuminated alongside the analytical and presentation approaches deployed in the study. Finally, the ethical considerations taken into account during the study are explained at the end of the chapter.

3.2 Research site

The study was conducted in Kimilili Sub-County located in Bungoma County, western Kenya (Figure 3.1). It is located in the northern part of the county, and is composed of four administrative wards, namely; Kamukuywa, Kibingei, Kimilili and Maeni. As the most ancient settlement area of Bungoma (Backes, 2001), the research site is historically and culturally homogeneous with the Bukusu predominantly inhabiting it. Other minority ethnic groups residing in the study area include the Sabaot, Iteso, Tachoni and Batura who mainly live in neighbouring sub-counties.

The sub-county is strategically situated on the foothills of Mount Elgon and, as such, it experiences high annual rainfall ranging from 1,200-1,800 mm per annum. Its proximity to the rainforest fairly contributes to the area's conducive weather patterns and fertile soils that promote and anchor agriculture as a predominant economic activity. Though the research area is centered mostly on sugarcane and maize industries, tree planting on farms also constitutes an important land use practice for farmers in the region (The County Government of Bungoma, 2013). This is particularly so given the fact that 77.4% of the 35,053 households living in the area depend primarily on fuelwood for cooking energy (Kenya National Bureau of Statistics, 2019).

However, due to small farm sizes and a high population density of 902 persons per square (Kenya National Bureau of Statistics, 2019), agroforestry in the region is mostly a niche activity that is often concentrated on boundaries (Kiprop *et al.*, 2017). This presents a significant challenge to the expansion of agroforestry in the study area. Another major challenge in the study area is the highly gendered nature of tree planting which, according to Kiprop *et al.* (2017), is dominated by males (67%). This signifies the entrenchment of cultural norms that impede female participation in tree planting as well as their ability to access and use trees for fuelwood. For this reason, together with the fact that fuelwood use in the study area is a deep-rooted cultural practice, the study site was selected to assess women's agency in agroforestry and how it is contributing to fuelwood security in their households.

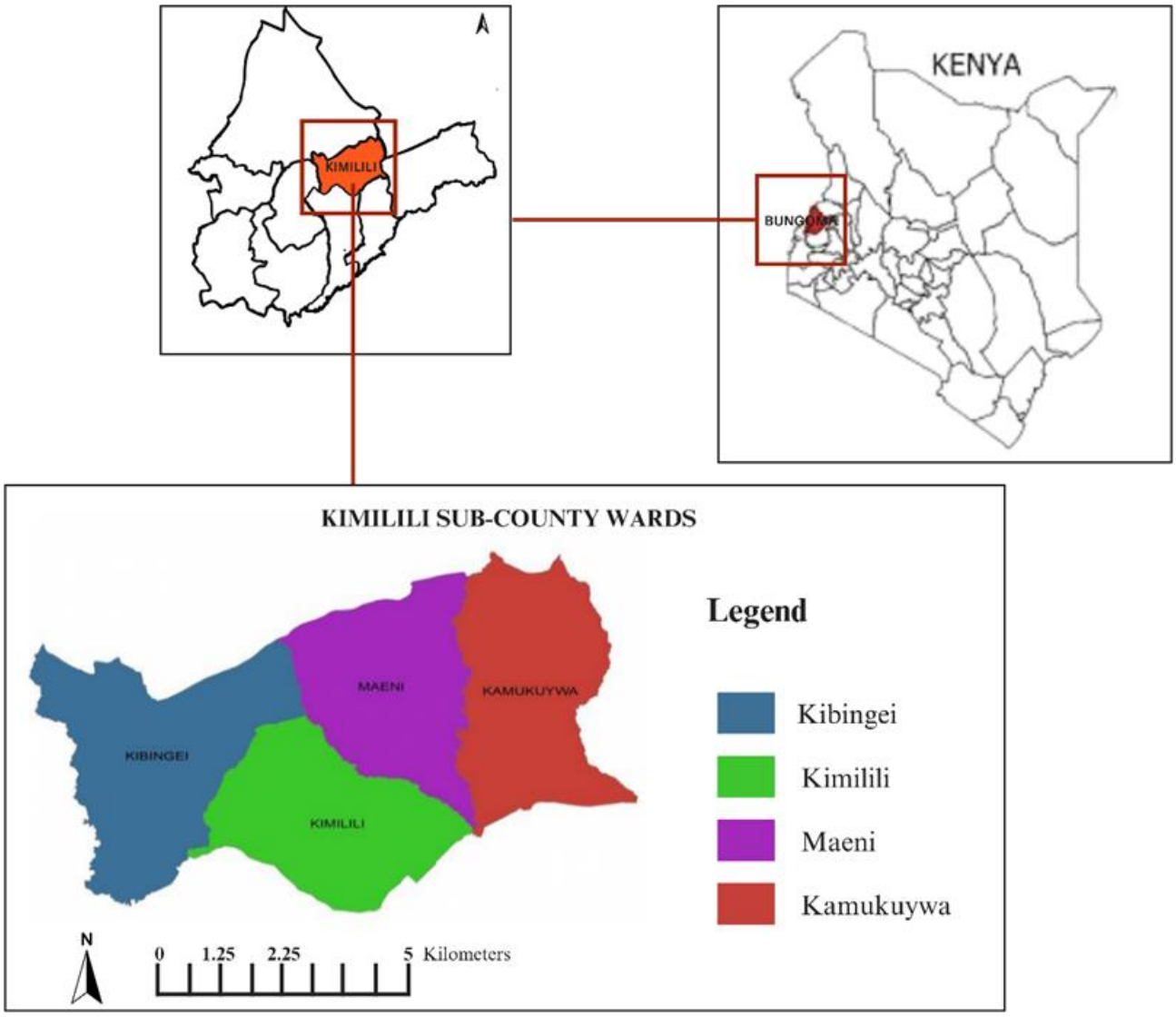

Figure 3.1. Location of Kimilili Sub-County in Kenya.

Source: County Government of Bungoma (2013)

3.3 Research design

This research was a cross-sectional descriptive study. It employed a qualitative approach to explore and uncover salient issues, perspectives, and experiences raised by participants as well as comprehensively address the research questions. To obtain a rich and detailed understanding of

the socio-cultural factors influencing women's actions and decision-making processes, qualitative data collection methods, including in-depth interviews, key informant interviews and focus group discussions, were used. Interviews and group discussions with participants were directed by interview guides that contained open-ended questions relating to the research questions.

The data collection process commenced in May, 2020 with in-depth interviews that engaged purposively selected women for the study. Open-ended questions were used to elicit detailed information from the identified participants. Through probing, the study delved deeper into participants' responses, uncovering nuanced perspectives that enriched the analysis and interpretation of findings. To compensate the limited scope of inquiry covered within the in-depth interviews and broaden the perspectives obtained from these interviews, focus group discussions were initiated in September, 2020. By involving males in these focus group discussions, gendered perspectives that failed to feature in in-depth interviews were brought to the fore. Having obtained diverse views from both women and men, key informant interviews were introduced in November, 2020. Lasting a period of 2 months, the key informant interviews proved resourceful in complementing the data obtained from the preceding data collection methods.

Generally taking a period of 9 months, the triangulation of data collection methods was deemed fit for corroboration purposes and the enhancement of the data's validity and credibility. Moreover, it aided in strengthening data analysis which was thematically conducted. To provide direct and authentic perspectives, as raised by the participants during fieldwork, verbatim quotations were used in the presentation of findings.

3.4 Study population and unit of analysis

The study population comprised of all married women aged 40 years and above in Kimilili Sub-County. The unit of analysis was an individual married woman who practices agroforestry and lives in the study site.

3.5 Sample population and sampling procedures

To ensure a broad representation of experiences as well as maximise on women's heterogeneity, including differences in backgrounds, preferences, perceptions, levels of exposure and autonomy, the sample population was selected from the four wards of Kimilili Sub-County. With the aid of an Agroforestry Extension Officer, women practicing agroforestry in each ward were identified. Diverse initial contacts with the women identified by the extension officer were established through the help of village elders who located their homes. The contacted women were requested to identify other potential informants engaging in agroforestry, preferably those outside their immediate localities. The use of snowball sampling technique was to help in identifying a broader range of women beyond those recognised by the extension officer.

Purposive sampling technique was then deployed in the selection and recruitment of participants identified. From the broad range of identified informants, patterns of preferential bias including personal relationships were tracked. An exclusion criterion for participant selection was used to ensure diverse backgrounds, localities and demographics were fully represented in the study. To tap on rich experiences and knowledge of the subject under study, women who were 40 years and above were selected for interviews while those who were less than 40 years were excluded. The selected women also had to be married and practiced agroforestry.

After explaining the scope and importance of the study and permission for interviewing was granted by each informant, a meeting was scheduled with each of them at their own convenience and timings that would not be subject to interruption. At the prearranged time, the in-depth interviews were conducted at the respondents' homesteads. Data saturation was reached after conducting a total of 30 interviews across the four wards of Kimilili Sub-County. Focus group discussants and key informants were also sampled purposively. Convenient sampling was used in the selection of a sub-chief since the purposively selected chief was unable to partake in the key informant interview.

3.6 Data collection methods

3.6.1 In-depth interviews

To conduct interviews with women informants purposively selected for the study, their respective homes were deliberately chosen to offer comfortable and familiar settings conducive for open sharing. This choice was also dictated by the prevailing Covid-19 pandemic that necessitated minimal social interactions. To ensure the protocols set in place by the government were adhered to, the interviews were carried outdoors. Cognisant of the fact that this would attract attention from onlookers, secluded spots within their homesteads were selected. Before commencing the interviews, present family members were briefed of the interviews estimated duration and duly requested to minimise interruptions. This fostered a quiet atmosphere free from interjections and disturbances.

Guided by an in-depth interview guide (Appendix II), open-ended questions tailored to the study's objectives were posed. Since a majority of respondents were conversant in Kiswahili and Lubukusu, the questions were posed in either of the two languages depending on the choice of

each respondent. This was aimed at enhancing the participants' understanding of the questions being asked and encourage greater participation and responses from them. The open-ended nature of the interview guide was significant in capturing information in the respondents' own words and, thus, provide a full picture of the respondents' feelings, thoughts and attitudes.

Most interviews took roughly 40 minutes. A few, however, lasted for an hour while others took 30 minutes. Active listening was employed throughout the interviews, encouraging participants to elaborate on their responses. To maintain fidelity, thorough notes were taken during interviews capturing pivotal points. Audio records were also taken to ensure the accuracy of data collected and facilitate subsequent reference. The high level of cooperation given by the respondents throughout the interviews was significant in gathering sufficient data for analysis. At the conclusion of each interview, the informants were duly appreciated for their participation.

3.6.2 Focus group discussions

Focus group discussions provided complementary qualitative data to the in-depth interviews. This method of data collection shifted the focus away from individual knowledge to community understanding and focused on the norms, expectations and practices extant at the community level. The study targeted a total of four focus group discussions. Participants were identified with the help of the Agroforestry Extension Officer, purposively selected and invited to the focus group discussions. Invitations were extended through personal visits, where the research objectives and the significance of their participation were explained and consent sought from willing participants.

The study conducted a total of four focus group discussion, each composed of 8 participants. Two of the focus group discussions were exclusively for women, and they were carefully segregated to include women who practiced agroforestry and those who did not. This approach aimed to capture diverse perspectives on agroforestry practices, reasons for non-uptake, and potential barriers faced by women in adopting these practices. The two remaining focus group discussions involved male discussants, with one entirely composed of men and the other made up of both genders. The inclusion of male participants in the focus group discussions was aimed at obtaining a comprehensive view of agroforestry practices from both gender perspectives. By involving men, key insights into decision-making processes related to fuelwood use and tree planting, as well as gender-specific roles and conflicts arising from agroforestry systems were obtained.

The focus group discussions took place in open spaces mostly designated as gathering spots within community centers. The choice of these locations was arrived on through negotiation and unanimous support from the respondents. With the aid of a focus group discussion guide (Appendix III), open-ended questions were posed. The language used by the researcher and the discussants during discussions was the local vernacular, which aligned with the participants' linguistic fluency and cultural background. This choice of language facilitated participants' expression of their experiences, opinions, and emotions more authentically, leading to a deeper understanding of their views. With permission from respondents, discussions were audio recorded to ensure accurate documentation and enable thorough transcription and analysis. Notes capturing key points put forth during discussions were also taken to facilitate further probing.

Facilitated by the researcher, the duration of each focus group discussion was carefully planned to strike a balance between gathering comprehensive data and respecting participants' time. On average, each session lasted approximately 1.5 to 2 hours. This duration allowed ample time for in-depth discussions and exploration of participants' perspectives on fuelwood use, decision-making and the role of culture in the community vis-à-vis tree usage and planting.

Generally, the use of focus group discussions as a complementary data collection method alongside in-depth interviews provided a more holistic understanding of agroforestry dynamics at the community level. By engaging participants from different backgrounds and gender perspectives, the study gathered valuable insights into the norms, expectations, and practices that shape agroforestry systems and fuelwood use in the local community.

3.6.3 Key informant interviews

The study targeted a total of 8 key informants, purposively selected based on their expertise and roles within the community. The select group comprised a local chief and sub-chief, two village elders, two female community leaders, one agroforestry extension officer, and one cultural officer. The inclusion of informants from various strata of community leadership, cultural domains, and expertise levels provided a well-rounded and comprehensive understanding of the community's cultural dispositions and their influence on agroforestry practices. While the study initially intended to interview two chiefs, practical considerations led to the utilization of convenient sampling for the selection of a sub-chief. This pragmatic approach ensured that a diverse range of perspectives was captured, enhancing the overall validity of the study.

The interviews took place in settings that resonated with the informants' familiarity and comfort. These spaces included community meeting halls, local administrative offices, and designated gathering spots within the villages. These locations were selected by each informant to facilitate candid conversations and create an environment conducive to insightful exchanges. To collect the data during these key informant interviews, a meticulously designed key informant guide (Appendix IV) was employed. This guide facilitated structured yet open-ended conversations, allowing informants to expound on their experiences, perspectives, and cultural insights in a manner that upheld both the rigor and the authenticity of the research. The methodological soundness of employing a single guide for the key informant interviews was underpinned by the need for consistency and effective comparability of responses during the analysis phase.

Depending on the informants' linguistic fluency, English, Kiswahili and Lubukusu languages were used during the interviews. The choice of languages fostered open dialogue and enabled informants to express themselves authentically, articulating their insights and knowledge without any linguistic barriers. Each key informant interview had an average duration of 30 minutes. While taking the informants' busy schedules into consideration, this timeframe allowed for comprehensive interviews, permitting informants to delve into their experiences and viewpoints at a depth that ensured a rich and nuanced data collection process. The informants shared their insights on a range of critical areas. These encompassed cultural factors influencing the preference and utilization of specific tree species for fuelwood among women, as well as cultural beliefs pertaining to tree planting and their impact on the adoption of agroforestry practices.

3.6.4 Secondary data

Secondary data sources were used in the development of this thesis and they were continually consulted to authenticate and contextualise the findings that were obtained from primary data sources. Various kinds of material were relied on in this study to inform on the background and provide a more situated discussion of the research questions. These materials included: government reports and surveys such as KNBS (2019); international organizations' documents (IEA, 2016; IEA, 2017; FAO, 2017) as well as academic research inform of published books, journals, articles, theses, dissertations, and projects. Geospatial data from the County Government of Bungoma (2013) were also used to provide information on the geographical location of the study site and its description.

3.7 Data processing and analysis

Qualitative data that were audio-recorded from the field were transcribed and translated. The transcription process began as soon as the first few interviews were conducted. In tandem with data collection, the transcription process continued intermittently until the end of data collection to allow further clarification on data vaguely recorded. This was also done to ensure the accuracy and completeness of transcripts and enhance the validity of findings. Properly done transcripts were then imported into NVivo, a qualitative data software, to aid in organising and managing the data effectively.

Taking into consideration that a set of codes, according to Bernard (2006), may be a list of themes, a complex model with themes, indicators and qualifications that are causally related, the transcripts were broken down into an extensive list of discrete units to develop codes. Through a

constant process of comparison and reflection, the data was iteratively revisited to come up with codes that fully represented its diverse aspects, including key concepts, themes and patterns that emerged from the participants' shared meanings and perceptions of their cultural practices.

Deductive and inductive relations between codes were then established. Dictated by the study's objectives, connections between disparate codes were obtained. Similar codes were then categorised and grouped together into themes that directly addressed the research questions. Research findings were then reported in a clear and meaningful way. To contextualise and situate the findings, the data was interweaved together with literature and the theoretical framework that guided the study. Direct verbatim quotes were used to project participants' voices in the presentation of the findings as well as reserve the authentic meaning of their statements.

3.8 Ethical considerations

Key ethical considerations were adhered to throughout the research process. Prior to conducting the study, an introduction letter issued by the University of Nairobi was used to seek research permit from the National Commission for Science, Technology, and Innovation (NACOSTI) in the Ministry of Education, Science and Technology.

During data collection, respondents were fully informed about the study's objectives and purpose, the data collection process, the expected time commitment for participation, their voluntary participation and confidential handling of their information. To further reinforce the confidentiality and privacy aspect, participants were assured that their identities would remain anonymous and their personal information would not be disclosed in any research outputs. They

were also informed about their right to withdraw from the study at any point in time without consequences.

Upon obtaining informed approval, consent forms (Appendix I) were duly issued and signed by informants as surety of their acceptance and voluntary participation in the study. Before audio-recording conversations, permission from respondents was also sought. To protect participants' anonymity and privacy during interviews and publication of research findings, unique identifiers were used. Referenced works were acknowledged before the submission of the study findings.

3.9 Ethical challenges and their solutions

One of the challenges experienced was the expectations of respondents to receive monetary compensation in exchange for the information sought or rather the time used in acquiring the information. This was especially difficult mainly because earlier researchers used money to incentivize informants to relay the information that was required. This challenge was tackled by making it clear from the onset that this study was in essence an academic research, and that the findings would be useful to subsequent researchers. Clarification on the importance of this study in the formulation of policies also helped in addressing this challenge.

Another ethical challenge was that some respondents were not willing to participate in the study. The solution to this challenge was to inform the respondents that their participation was highly appreciated and more so, any information shared would be confidential. Time factor was also a challenge since the size of the study county necessitated travelling a lot in order to cover the study region as well as conduct research. This prolonged the time taken during data collection process.

3.10 Conclusion

Conducted in Kimilili Sub-County, Bungoma County, Kenya, the study shed light on the intricate interplay between cultural norms, gender roles, and agroforestry practices. Through a cross-sectional descriptive design and a qualitative approach, the research uncovered valuable insights into women's agency in agroforestry and its impact on fuelwood security. By employing diverse data collection methods, including in-depth interviews, focus group discussions, and key informant interviews, a holistic understanding of the socio-cultural factors shaping agroforestry dynamics and women's role in it emerged. Despite challenges experienced during data collection, the study's rigorous methodology ensured the credibility of its findings, which contribute to the larger discourse on sustainable agroforestry and offer meaningful implications for policy and practice.

CHAPTER FOUR

CULTURAL INFLUENCE ON FUELWOOD PREFERENCE AND USAGE IN KIMILILI SUB-COUNTY.

4.1 Introduction.

This chapter presents and discusses findings on the influence of culture on fuelwood preferences and their usage in Kimilili Sub-County. It delves into the qualities desired in fuelwood species, unveiling the intricate interplay between functional attributes, individual preferences, and local sociocultural norms. Attention on cultural influence reveals how established community norms and beliefs interact with individual agency, shaping the choice and selection of specific tree species for fuelwood use. The section is divided into four sub-sections, namely; fuelwood preference and use, preferred tree species, cultural beliefs and choices in fuelwood selection, and conclusion.

4.2 Fuelwood preference and use.

The study reveals a deeply ingrained social practice within the study region, where fuelwood remains the primary source of cooking energy. This practice, rooted in local traditions, is informed by a profound understanding of the qualities inherent in various tree species. These qualities were found to play a pivotal role in shaping the preferences for specific tree species. Among these qualities, a prevailing concern among participants was the heat intensity and duration that a particular fuelwood species could provide. Respondents emphasized the need for fuelwood that could generate high levels of heat swiftly, and sustain that heat over an extended

period. This characteristic was deemed critical for cooking tasks that required consistent temperatures, such as simmering or boiling stews.

> ‘I prefer trees that get pots boiling quickly. It saves me the trouble of constantly adjusting the fire.’ 53-year-old female

> ‘I mostly prefer trees that have high heat retention, and can cook quickly and well.’ 58-year-old female

> ‘Some trees are normally preferred because when dry they heat very fast and their heat retention capacity is high.’ 46-year-old female.

> ‘While cooking beans, I usually prefer using fuelwood that burns for a longer during. This is because beans require more time to properly cook and using trees that burn out quickly can waste more wood’ 49-year-old female.

The ease of ignition and overall combustibility of a fuelwood species were repeatedly emphasized by participants. Quick ignition was deemed valuable, especially in households where time efficiency was paramount. Participants expressed a preference for fuelwood that caught fire easily, reducing the effort required to start the cooking process.

> ‘When you have hungry mouths waiting, you need wood that catches fire with just a spark. In this case, tree that light fast become highly preferable.’ 42-year-old female.

> ‘I prefer the type of trees that catches fire very fast because it reduces the time I spend in lighting the fire.’ 49-year-old female.

> ‘My husband likes warm food. Whenever he comes home late and needs his meal heated up, I use fuelwood that ignites quickly.’ 45-year-old female.

Minimizing smoke emission emerged as a key consideration, particularly for indoor cooking environments. Participants highlighted the health implications associated with excessive smoke,

including respiratory issues and discomfort. Consequently, fuelwood species that produced minimal smoke were highly favoured, contributing to a healthier cooking atmosphere.

> ‘Cooking inside with too much smoke is a real challenge. We choose woods that burn cleanly, allowing us to cook without choking on smoke.’ 54-year-old female.

> ‘My kitchen is not properly ventilated and cooking with tree that produce too much smoke can affect the cooking process. I mostly use trees that produce less smoke when burning.’ 46-year-old female.

An additional attribute that participants considered was the drying rate of the fuelwood species. Quick drying was mentioned as a desirable quality, as it allowed for the timely use of the wood for cooking. The ability of a tree species to dry rapidly after being harvested was deemed valuable, particularly in scenarios where fuelwood was needed on short notice.

> ‘Wood that dries fast is a blessing. We don't want to wait days for it to be ready. It's great when we can use it right after cutting.’ 68-year-old female.

> ‘I prefer trees that dry quickly since it saves a lot of time spent on waiting for wood to dry. It allows food to be prepared at any time without facing the problems of using wet wood.’ 49-year-old female.

The focus group discussions also revolved around the burning properties required for optimal cooking. Participants exhibited a nuanced understanding of the qualities required in fuelwood species to ensure effective and efficient cooking practices. Spanning heat intensity, fast drying rates, smoke emission, and the ease of ignition, these considerations demonstrated that the preferences for specific fuelwood types are not arbitrary; rather, they are cultivated through a keen awareness of their distinct attributes. As such, the choice of different tree species reflects a pragmatic approach in the selection of the most suitable fuelwood for its user.

Besides the quality of tree species, the availability and accessibility of fuelwood also factored into participants' preferences. This aspect emerged as a significant consideration in participants' decision-making process regarding their choice of fuelwood. Interestingly, the aspect of accessibility was closely intertwined with gender dynamics within the community. Participants noted that in many instances, women were primarily responsible for collecting fuelwood. This distribution of labour significantly shaped preferences for fuelwood that could be conveniently gathered without requiring extensive travel or physical effort, enabling women to fulfil their domestic roles efficiently.

> 'For us women, it's not just about what burns well, but what we can easily bring home. We have other tasks to manage too. Personally, I like trees that are readily available on farm.' 44-year-old female.

> 'At my age I cannot walk long distances anymore to fetch fuelwood. I prefer trees that are available on my farm and are easily accessible. This makes my work easier.' 52-year-old female.

The preference for locally available and accessible fuelwood was, thus, not only driven by practical considerations but also aligned with prevailing gender roles and responsibilities. The impact of gender dynamics on fuelwood preferences was also evident in the multifaceted purposes that trees served within the community. While women primarily engaged in activities related to cooking and household maintenance, men often determined the allocation of trees for construction, rituals, or other economic purposes. The influence of males in determining which trees to harvest and utilize for fuelwood played a significant role in shaping the preferences observed among participants.

Participants' accounts underscored the significant role that gender-based decision-making plays in shaping the availability and accessibility of fuelwood. A 56-year-old female respondent noted that, ‘There's a hierarchy of tree uses. What's considered 'important' often depends on what men want.’ In corroboration of this view, a 48-year-old female respondent aptly pointed out, ‘Some trees are seen as more valuable for construction or other uses. Men usually have a say in what gets cut for those purposes.’ This sentiment resonated across the study, with a 65-year-old respondent candidly remarking;

> ‘My husband controls the usage of trees for fuelwood. I wait to pick fuelwood from the dry branches that fall since the trees are planted for commercial purposes.’

A male key informant acknowledged his role in authorizing tree cutting, usually favouring bent trees. Remarkably, these responses revealed a common thread: the acquisition of fuelwood invariably emerges as an ancillary outcome of trees designated for distinct objectives and fuelwood collection is primarily intertwined with trees that are cultivated for other purposes. Moreover, they denote that the hierarchy of tree uses is frequently tied to gendered divisions of labour and activities within the community.

The study determined that lack of autonomy in harvesting trees as fuelwood disadvantages women since they have to depend on the final decisions of their husbands as noted by a female key informant: “Negotiations need to be done and men mostly have the final say.” This gendered asymmetry in decision-making power becomes particularly pronounced when male partners veto their wives’ requests to harvest specific tree parts, despite their potential as fuelwood. A telling statement from a 57-year-old female respondent illustrates this situation;

> "Men determine the cutting and usage of trees as fuelwood and my husband rarely gives me permission to cut trees. My husband controls the cutting and usage of trees as fuelwood and in some cases, he does not give me permission to harvest trees."

The adamant tendencies of men denying their wives permission to harvest tree branches indicates that tree availability on farms and its accessibility do not always match. A such, while trees might be physically present on the farm, the findings show that women's agency in accessing and utilizing them for fuelwood is contingent upon a complex interplay of factors including economic worth, decision-making latitude, and control.

Since men tend to have a final say with regard to harvesting trees that have economic value, this, according to focus group discussants, affects the choice of trees used as fuelwood. Their refusal to grant permission leads women into choosing trees that are regarded to be of less economic value as argued by female focus group discussants;

> 'Women prefer trees that have low monetary value so as to avoid conflict in the homestead. In this case, trees that cannot make good timber, those that have been broken by wind and those that grew while bent are preferred.'

Male focus group discussants echoed these remarks, arguing that trees bent or broken cannot fetch high monetary value. As such, women often have permission to use these trees without any hinderance.

This multifaceted perspective provides valuable insights into the intricate decision-making process underlying fuelwood preferences within the study region. The interplay between gender dynamics, the diverse utility of trees, and the resultant preferences for fuelwood species underscores the complexity of factors that contribute to the entrenchment of specific practices. It

illustrates how decision-making process often involve a complex negotiation between the functional attributes of the tree, its socio-cultural value, and the role it plays in the community. Consequently, unravelling the threads of gender influence offers deeper insights into the reasons behind participants' choices of fuelwood species.

The findings of the current study concur with observations of Cardoso *et al.* (2015) that communities have certain cultural preferences for different tree species. These observations are reflected in several studies that underscore the importance of tree qualities in the selection of fuelwood to cook with (Abbot *et al.*, 1997; Bhatt and Tomar, 2002; Ramos *et al.*, 2008; Miah and Islam, 2020). Moreover, the qualities preferred by the current study's respondents such as fast-drying rate, long lasting embers and the ability to produce hot flames, constitute those used by Deka et al. (2007) in the pair-wise comparison method to rank trees preferred a in their study. The findings also resonate with empirical literature and findings from Kiptot and Franzel (2011) and Kiptot (2012) that emphasize the fundamental influence of gender dynamics on the choice of trees used as fuelwood.

By inference, the remarks of respondents in the current study confirm the dictums of structuration theory that emphasize that social systems are characterised by a duality of structure – the recursive relationship between the rules, norms and resources that make up the social structure and individual agency (the capacity to act and make decisions) within that structure. The knowledge of qualities desired encompasses the understanding of the norms, values, and expectations that shape what is perceived valuable or desirable in a given social context. These norms and values are part of the structural elements that guide women's behaviour. Women possess agency, which refers to their capacity to make choices, take actions, and influence the

social context. In the context of knowledge of qualities desired, women actively engage with the norms and values of their society, interpreting and internalizing what is considered desirable. They interact with gender norms prevalent in the study area to make decisions about trees to use as fuelwood. Men's active role in decision-making and women's dependence on these decisions is an ingrained social practice that simultaneously reflects and reinforces existing gender norms. Through participation in social practices, women acquire and apply their knowledge of qualities desired and trees that are accessible to decide on which trees to use as fuelwood.

4.3 Preferred tree species.

The study unveiled the tree species preferred for fuelwood and the attributes driving these choices. Enumerated in Table 4.1 below, a total of 31 trees were identified by participants.

Table 4.1 Trees preferred as fuelwood.

Scientific terminology	**Bukusu name**
Markhamia lutea	Lusoola/Kumusola
Eucalyptus saligna	Kumwiti
Ficus thonningii blume	Kumutoto
Grevillea robusta	Kumukrivelia
Bridelia micrantha	Kumulonda mwombe
Croton macrostachys	Kumutoboso/Kumutototoa
Combretum molle	Kumukimila
Acacia seyal	Kumunyenya
Ziziphus abyssinica	Kumukomboti
Ficus sycomorus	Kumukhuyu
Cussonia arborea	Kumwifubulu
Ozoroa insignis	Kumwandanda
Gardenia ternifolia	Siuna
Mangifera indica	Kumuembe
Caesalpinia decapetala	Lunani
Combretum elgonense	Kumulaha/Kumukalukha

Cassia siamea	Mbekoraisi/Kumuraisi
Cordia africana	Kumukikhili/Mukumari
Syzygium guineense	Kumutekesi
Psidium guajava	Kumupera
Vangueria apiculata	Kumukomosi kumusecha
Bridellia scleuroneura	Kumunyekerwe
Terminalia wollis	Kumukhonge
Syzygium guineense	Kumusitole
Coffea arabica	Ekawa
Cupressus lusitanica	Kumusayiprasi
Sesbania sesban	Chisubasubi
Erythrina abyssinica	Kumurembe
Syzygium cordatum	Kumusemwa
Erythrococca bongensis	Lupiriapiria
Ricinus communis	Kumubono

Source: Nyongesa (2021); field notes and scientific terminologies adopted from Backes (1998), Omare (2011) and Wanzala *et al.* (2012).

Respondents emphasized different species' qualities, such as quick ignition, low smoke production, and sustained heat, aligning with their diverse cooking needs. *Eucalyptus saligna (*kumwiti) and *Grevillea robusta* (kumukrivelia) were consistently singled out as the most preferred tree species. This was mainly because they dry quickly, light faster, produce less smoke and have a high heat retention rate.

> "I prefer using kumwiti (*Eucalyptus saligna*) because it dries very fast and has high heat retention." 53-year-old female respondent.

> "Kumwiti (*Eucalyptus saligna*) and kumukrivelia (*Grevillea robusta*) are less smoky and light very fast especially when split in small section." 58-year-old female respondent.

The prevalent use of *Eucalyptus saligna* (kumwiti) and *Grevillea robusta* (kumukrivelia), both exotic trees, by the study's respondent marks a significant deviation from findings in other studies such as Mahiri (2003). Respondents noted that these trees were readily available since

they were the most commonly planted trees on farms. These findings concur with evidence from Kiprop *et al.* (2017) that shows the prominence of these trees in the study region. Their widespread application by respondents, therefore, suggested that apart from their burning qualities, their availability was influential in their selection.

The study, nonetheless, noted that although both kumwiti (*Eucalyptus saligna*) and kumukrivelia (*Grevellia robusta*) featured prominently in the responses given by the respondents, their accessibility was often problematic. As such, they were seldom used as fuelwood. This was mainly because such trees possess commercial and construction value and are, thus, grown for those purposes. To avoid conflict resulting from using these trees, respondents noted that other trees with low monetary value such as *Erythrina abyssinica* (kumurembe) were preferably used. A statement from a 48-year-old female respondent encapsulates this situation;

> "The multipurpose trees especially those planted mainly as a source of income, for instance kumukrivelia (*Grevillea robusta*) and kumwiti (*Eucalyptus saligna*), can be cut by women only after permission is sought from the husband who is the head of the household. Kumurembe (*Erythrina abyssinica*) trees can be cut by women without permission."

The remarks were echoed by other respondents who stated that they prefer *Erythrina abyssinica* (kumurembe) because it is accessible, it grows on its own and moreover, it has low commercial demand. A 46-year-old female respondent, for instance, stated that;

> "I prefer using kumurembe (*Erythrina abyssinica*) because it has low demand when sold and, therefore, it does not fetch as much money as other types of trees. My husband has granted me the right to cut this tree without his permission."

Male focus group discussants upheld these views noting that;

> "Kumurembe (*Erythrina abyssinica*) can be cut because in most cases husbands grant permission. This is mainly because no cost is incurred to make it grow to its maturity"

The same went for *Croton macrostachys* (kumutoboso) as pointed out by female focused group discussants;

> "Women often prefer trees that have no monetary value to avoid competition with men. A tree known as kumutoboso (*Croton macrostachys*), for instance, is used as fuelwood because when used as timber it decays quickly and, thus, it has no monetary value."

The ownership and self-propagation issue surrounding trees was pointed out as a contributing factor in the selection of *Erythrina abyssinica* (kumurembe) as well as other tree species such as *Ficus sycomorus* (kumukhuyu), and *Cordia africana* (kumukikhili).

> "Kumurembe (*Erythrina abyssinica*) and kumukikhili (*Cordia africana*) grow on their own. I can use them because they do not have ownership issues." 40-year-old female respondent.

> "Kumukhuyu (*Ficus sycomorus*) is an indigenous tree that grows on its own. No one can claim to have planted it for a certain purpose. I prefer using it because I do not require permission to cut its branches." 59-year-old female respondent.

The study findings indicated that indigenous trees were often preferred not only because they lacked ownership problems but also because they have a high heat retention rate and, take long to extinguish.

> "Hard wood such as kumukhuyu (*Ficus sycomorus*) take long to extinguish itself. It is easily available and accessible." 64-year-old female respondent.

> "The indigenous trees such as kumusola (*Markhamia lutea*), kumutoto (*Ficus thonningii blume*) and kumukhuyu (*Ficus sycomorus*) have high heat retention capacity and they use less wood to cook properly." 43-year-old female respondent

These findings resonate with evidence from Tabuti *et al.* (2003), Kaschula *et al.* (2005), Walters (2005) and Cardoso *et al.* (2015) which suggests that the most exploited tree species for fuelwood are those that are native. This supports the conclusions from studies by Hafner *et al.* (2020) and Vyamana *et al.* (2021) that recommend the cultivation of native trees on farms. This is particularly so because all the indigenous tree species were noted to have good burning qualities. The long period taken by indigenous trees to grow to maturity was noted as a compelling factor that promoted the prevalence of fast-growing exotic trees such as *Eucalyptus saligna* (kumwiti) and *Grevillea robusta* (kumukrivelia). However, *Cupressus lusitanica* (kumusayiprasi), an exotic tree in the study region, was identified as problematic given its unlikable burning qualities as remarked by a 42-year-old female respondent:

> "I do not like using kumusayiprasi (*Cupressus lusitanica*) because it produces a lot of sparks during cooking."

Nonetheless, as mentioned by an 80-year-old female respondent, *Cupressus lusitanica* is preferably useful because it dries faster despite the fact that it does not last longer while cooking.

Combretum molle (kumukimila) and *Bridelia micrantha* (kumulonda mwombe) are preferred because they light faster. Apart from lighting faster, *Combretum molle* (kumukimila) is fancied because it retains heat for longer periods and dries quickly just as *Terminalia wollis* (kumukhonge), another tree that was notably preferred by respondents. Similarly, *Mangifera indica* (kumuembe) was noted as a preferable tree for fuelwood use because it lights faster and has a high heat retention rate. *Croton macrostachys* (kumutoboso) is favoured since it has a high

heat retention rate and dries quickly. *Psidium guajava* (kumupera) is preferred because it has high heat retention rate. Some trees are, however, preferred for reasons beyond their inherent burning characteristics. This is attested by a key informant who states that;

> "Chisubasubi (*Sesbania sesban*) does not destroy crops. When young it is fed to livestock as fodder but when it matures it is used as fuelwood."

This underscores the multifaceted considerations that influence the choice of trees for fuelwood use. These considerations, alongside the enumeration of trees preferred in the study area, pave way for a deeper exploration of how cultural beliefs interplay with the practical concerns during fuelwood selection as covered in the succeeding sub-section.

4.4 Cultural beliefs and choices in fuelwood selection.

The intersection of cultural beliefs and fuelwood choices became evident through participants' personal accounts. These accounts unveiled a wide spectrum of beliefs, varying from one tree species to another as listed in table 4.2, yet unified by their impact on the decision-making process regarding fuelwood selection.

Table 4.2 Tree species not used as fuelwood.

Scientific terminology	**Bukusu name**
Cordia africana	Kumukikhili/Mukhumari
Cupressus lusitanica	Kumusayiprasi
Prunus africana	Kumwilima
Cordia monoica	Kumukhendie
Cassia siamea	Mbekoraisi/Kumuraisi
Azadirachta indica	Kumwarubaine
Ziziphus mucronata willd.	Kumukomboti

Microglossa pyrifolia	Enguu
Rhus natalensis	Kumusangula
Solanecio mannii	Nandebe
Solanum incanum	Endulandula
Terminalia mollis	Kumukhonge
Erythrina abyssinica	Kumurembe
Clerodendrum myricoides	Kumusilangokho
Rhoicissus tridentata	Kumukoyakoye
Hymenocardia acida	Nangoso
Ozoroa insignis	Kumwandanda
Euclea divinorum	Kumuchanjasi
Pittosporum viridiflorum sims	Nambaa

Source: Nyongesa (2021); field notes and scientific terminologies adopted from Backes (1998), Omare (2011) and Wanzala *et al.* (2012).

The findings underscored that cultural beliefs play an influential role in shaping the choice of specific tree species for fuelwood, echoing the structural element of cultural norms. The impact of cultural beliefs on fuelwood choices was apparent in participants' remarks:

> "Kumurembe (*Erythrina abyssinica*) is not used as firewood. It is a medicinal plant. A person who gets mumps has to go with firewood early in the morning walking backwards to the tree while saying mumps will come to an end on kumurembe (*Erythrina abyssinica*), drop the firewood and leave without looking back until he or she arrives at home." 61-year-old female respondent.

> "There are trees I do not use as fuelwood. I cannot use nangoso (*Hymenocardia acida*) because it treats skin rushes." 79-year-old female respondent.

> "Kumurembe (*Erythrina abyssinica*) cannot be used as fuelwood because it is used to cure mumps. It is believed that if someone uses it, she could get mumps." 64-year-old respondent.

> "I do not use Kumurembe (*Erythrina abyssinica*) since it causes bad omens and mumps." 58-year-old female respondent.

> "I cannot use kumukhendie (*Cordia monoica*) since it can cause deaths in the homestead."

> "Kumwilima (*Prunus Africana*) is believed to bring bad luck so I do not use it. I cannot prove if it is true but I would not want to try."

Though these beliefs encompassed consequences ranging from curable effects to ominous outcomes like death, what is notable is the consistent nature of these beliefs across certain trees. This uniformity of beliefs across certain trees indicates a shared understanding of specific tree's effects as well as the structural aspect of cultural norms that shape the participants' convictions. This is ostensibly clear in the beliefs surrounding *Erythrina abyssinica* (kumurembe).

Strikingly, *Erythrina abyssinica* (kumurembe), which was widely noted as a preferable choice among women, also featured largely as a tree rooted in the study area's beliefs. Though women documented its preference and frequent usage, a closer examination of participants' accounts reveals a more nuanced history. Contrary to the current ease exhibited by women's ability to use *Erythrina abyssinica* (kumurembe) without any kind of social restrictions, remarks denote that age and gender dynamics often imposed limitations on women's agency in utilising the tree.

> "Kumurembe (*Erythrina abyssinica*) could only be used by women who had stopped giving birth." 53-year-old female respondent.

The utilisation of *Erythrina abyssinica* (kumurembe), thus, indicates an erosion of beliefs within the study area. This is exemplified in the remarks of a 73-year-old female respondent who noted that;

> "Trees such as kumurembe were formerly not used as fuelwood. This is because traditionally, when a person suffered from mumps, they could walk to that tree and get healed. This was the belief back then but nowadays it is used to cook."

Responses from the female respondents who claimed to be using *Erythrina abyssinica* (kumurembe) indicated that its use was borne out of experienced fuelwood scarcity in the area.

> "Earlier on, there used to be so many trees for fuelwood. Nowadays, land clearing for agricultural purposes has made trees scarce. This scarcity has forced women to go ahead and use prohibited trees. That is why even young women can use kumurembe without fear." 51-year-old female respondent.

Similar findings on the use of culturally prohibited tree species were noted by Tabuti *et al.* (2003) and Egeru *et al.* (2014). In these studies, it was noted that existing taboos may simply be ignore if people do not have wood to cook with. In the current study, the widespread use of *Erythrina abyssinica* (kumurembe), thus, confirms the argument that cultural values remain important if there are no strong demands for resources.

Though women have grown accustomed to using *Erythrina abyssinica* (kumurembe) out of social practice, other tree species remain widely avoided due to their perceived effects. Still reflecting the intricate intersection of cultural beliefs with age and gender dynamics, *Rhoicissus tridentata* (kumukoyakoye) and *Solanum incanum* (endulandula) are deemed appropriate only for women who have ceased giving birth. According to respondents:

> "Endulandula (*Solanum incanum*) is only used by women who are past child-bearing age because it is believed to cause barrenness." 79-year-old respondent.

> "Endulandula (*Solanum incanum*) when used can cause itchiness during menstruation. Women still experiencing menstruation are advised not to use it." 53-year-old female respondent.

The same situation was noted with *Rhoicissus tridentata* (kumukoyakoye), which was also deemed appropriate only for women who had ceased giving birth. According to a 45-year-old female respondent;

> "Kumukoyakoye (*Rhoicissus tridentata*) could not be used as fuelwood because it was believed that when it is used, it could lead to delayed labour. Nowadays it is used as fuelwood, especially when there are no alternatives."

This view was echoed by other respondents who noted that:

> "Kumukoyakoye (*Rhoicissus tridentata*) causes a woman to bleed out during child birth. It is not used by a woman is still at child bearing age." 48-year-old female respondent.

> "Kumukoyakoye (*Rhoicissus tridentata*) cannot be used by pregnant women because it causes boils." 84-year-old female respondent.

The functional role of these beliefs emerged from the remarks of a 79-year-old female respondent who stated that *Rhoicissus tridentata* (kumukoyakoye) was not used because it was utilized as a painkiller. This cultural assignment of specific roles to particular tree species was found to be a deeply rooted practice in the study area. The designation of certain tree species for medicinal purposes was noted as an influential factor in the selection of trees to use as fuelwood.

Medicinal trees that were mentioned by respondents include *Terminalia mollis* (kumukhonge) which is valued for its effectiveness in treating sexually transmitted infections, *Clerodendrum myricoides* (kumusilangokho) which treats inflammation from venereal diseases, *Solanecio mannii* (nandebe) which cures malaria, *Ozoroa insignis* (kumwandanda) for treating children, *Euclea divinorum* (kumuchanjasi) for treating diarrhea, *Pittosporum viridiflorum sims* (nambaa) for constipation treatment, and *Hymenocardia acida* (*nangoso*) which treats rashes.

Interestingly, these medicinal practices are intertwined with cultural beliefs and norms. Certain trees, like *Microglossa pyrifolia* (enguu), are considered too valuable for medicinal purposes to be used casually as fuelwood. There's a prevailing belief that using *Microglossa pyrifolia* for fuel might lead to conflicts within the household, particularly between spouses. This is evident from the remarks of a 55-year-old female respondent who stated that;

> "Enguu (*Microglossa pyrifolia*) when used as fuelwood can cause violence in the homestead. It is normally used to stop bleeding after circumcision has taken place as well as hasten the healing process."

In support of these statements, another female respondent aged 58 years stressed that "Enguu (*Microglossa pyrifolia*) cannot be used as fuelwood because it is believed it could cause a fight between a husband and a wife." This showcases how deeply ingrained these beliefs are within the community and how they influence the utilization of valuable resources.

4.5 Conclusion.

In conclusion, the ethnobotanical knowledge shared by the respondents reveals a rich understanding of the various tree species in their environment. This knowledge deeply ingrained in local traditions plays a profound role in shaping the roles assigned to different tree species based on their unique characteristics and properties. While certain trees may be specifically chosen for fuelwood use due to their burning qualities, such as such as heat intensity, duration of burn, ease of ignition, and smoke emission, others are earmarked for construction purposes, spiritual significance or rather medicinal reasons. These cultural considerations play a crucial role in influencing fuelwood selection in the study area although strict separation of uses is notably receding. This is evident in the utilisation of previously restricted tree species for fuel purposes.

CHAPTER FIVE

CULTURAL NORMS AND BELIEFS SHAPING WOMEN'S ROLE IN TREE PLANTING IN KIMILILI SUB-COUNTY.

5.1 Introduction.

In line with the second objective, the study delves into the cultural norms and beliefs underpinning women's involvement in tree planting practices within Kimilili Sub-County. This chapter unravels its findings in two distinct sub-thematic dimensions: firstly, it scrutinizes the entrenched cultural norms and beliefs that have historically constrained and delineated women's participation in tree planting. These age-old norms, deeply embedded in societal constructs, have dictated rigid roles based on gender, with tree planting traditionally perceived as a male prerogative. This historical context reflects the prevailing cultural attitudes and beliefs, illuminating a landscape where women's agency in this critical environmental practice remained marginalized. Secondly, the chapter delves into the transformative forces that are currently shaping socio-cultural change, consequently altering the dynamics of women's tree planting. These transformative factors encompass shifting family structures, education, employment, land ownership, religious influences, and environmental challenges. Through a meticulous examination of these transformative influences, this chapter offers a comprehensive view of the evolving roles of women in tree planting practices, underscored by the intricate interplay between cultural dynamics, structural shifts, and the burgeoning agency of women in the realm of tree planting.

5.2 Cultural norms and beliefs influencing tree planting by women.

The findings of the study reveal an interplay between cultural beliefs, gender dynamics, and tree planting practices, providing insights into how these factors are influenced by and interact with the broader societal structures. Emerging from the study's findings, the impact of gender on tree planting was found to be deeply rooted in cultural perceptions and societal norms that dictate what is considered appropriate behaviour for different genders. The perception that tree planting by women might challenge these roles and norms emerged as a major structural constraint. The views of female participants attested to this state of affairs as the following remarks alluded.

> "Women always see tree planting as a role for men and, thus, they rarely plant trees." 42-year-old female respondent.
>
> "Tree planting as a role is inclined towards men." 58-year-old female respondent.
>
> "Women were not allowed to plant trees because of defined gender roles. It was a man's job." 68-year-old female respondent.
>
> "Tree planting was not a woman's role. Women had other roles to perform." 48-year-old female respondent.
>
> "Men were the sole decision makers and more so, according to gender roles, it was their work to plant trees." 80-year-old female respondent.
>
> "Women who planted trees in the past were seen as trying to upset gender roles already clearly defined." 55-year-old female respondent.

These voices exemplify the nexus of structure and agency, showcasing the mutual influence between societal norms (structure) and individual behaviours (agency). Phrases such as "role for men," "defined gender roles," and "man's job" underscore the structural rigidity imposed by

cultural norms. Similar to the observations of Chavangi (1984), Kinyanjui and Njenga (2002), Okullo *et al.* (2003) and Oloo (2013), it is evident that socio-cultural norms deeply influence women's decision-making power in tree planting. The adherence to these norms, with the belief that planting trees is a man's job, effectively limits women's agency. This is illustrated by the statements of 41-year-old female respondent who claimed that, "It is my husband who plants trees. I can only plant when he is present mainly because he is the one who decides the space on which trees can be planted."

Notably, the significance of land ownership and its attendant authority was found to be a critical element affecting tree planting practices in the study area. This is attested by a 58-year-old female participant who asserted that "Most pieces of land belong to men and, therefore, they are entitled to plant trees". This indicates that the association between land ownership and gender shapes the perceived right to plant and cultivate trees, revealing a crucial intersection between cultural norms, authority, and access to resources. This view was widely held by female respondents as illustrated by the following remarks.

> "The owner of the land who is the man plants trees and not the woman." 79-year-old female respondent.
>
> "Tree planting was for men given the fact that they are the land owners." 55-year-old female respondent.
>
> "Since men own land, they are the decision makers in the homestead. Women could, therefore not plant trees since it was a man's decision." 68-year-old female respondent.
>
> "Planting trees brings permanent change on land which is mostly owned by men. Women were not allowed to plant trees because land belonged to men." 43-year-old female respondent.

Within the cultural context under scrutiny, it is apparent from the preceding statements that land ownership is primarily vested in men. This accentuates an extant patriarchal social structure and indicates that land ownership plays a focal role in determining whose decisions have weight within a household. This prevailing cultural norm becomes a guiding structure that influences the agency of women, leading to gender-specific roles in tree planting decisions. These findings concur with the observations of Kiptot (2015) that denote the influential role of land ownership norms on tree planting practices. Moreover, they support the view put forth by Benjamin *et al.* (2021) that women are restricted from tree planting practices since the act establishes and solidifies customary claims to land ownership.

Closely intertwined with the aspect of land ownership, the study findings indicated that the restriction of women from planting tree is rooted in the perception off women as outsiders who become part of the clan through marriage. A prominent illustration of this phenomenon is observed in the case of certain tree species, such as *Ficus thonningii blume* (kumutoto), which hold symbolic significance as markers of clan membership and entitlement. Since women are perceived to lack the inherent membership that would confer the right to engage in such planting practices, the propagation of such trees by women is discouraged. This situation was clearly emphasised by a 61-year-old female respondent who pointed out that;

> "Some trees such as kumutoto (*Ficus thonningii blume*) cannot be planted by women because it is a sign of belonging and entitlement and since they are not members of the clan, they are not supposed to plant trees."

This sentiment was echoed by a male member of a focused group discussion who noted that;

> "Kumutoto (*Ficus thonningii blume*) tree cannot be planted by women because it is where traditional rites are performed by men. Those who plant kumutoto together with crops do not know its use. When it is planted around as a fence, it loses its function and cannot be used as a ritual tree."

This exclusionary belief becomes a manifestation of the structural norms at play within the community and it demonstrates the influence of structural norms on agency. These findings are similar to observations by Mukasa *et al.* (2016) in Uganda which indicate that women are forbidden from planting *Ficus* because it symbolises land ownership. In the study region, the findings confirm the results of Kiprop *et al.* (2017) which found that some tree species such as *Markhamia lutea* (lusiola) can only be planted by respected clansmen.

Marriage, as a social institution, was also found to play an influential role on tree planting activities in the study area. Findings indicated that a woman's marriage, and the subsequent transfer to another clan, casts a shadow over tree planting practices. The fear of potential conflicts arising from a tree planted by a woman who would later belong to a different household brings to the fore the delicate intricacies of decision-making around tree cultivation. This is exemplified in the remarks of a 73-year-old female respondent.

> "Women were not allowed to plant trees because eventually they would get married off and a homestead could not afford such an instability brought about by multiple claims from the male members of the household with respect to the tree."

The study's findings shed light on a cultural practice where women still at the child-bearing age were discouraged from engaging in tree planting. Female participants' accounts revealed that trees were endowed with symbolic meanings that dissuaded them from taking part in such

activities. The belief that a tree sapling's failure to thrive could bring about barrenness was a prominent factor influencing their decisions, as reflected in the following statements:

> "Women were barred from planting trees because of the belief that if it failed to grow it could result in barrenness." 66-year-old female respondent.

> "A woman who was still giving birth or had not reached menopause could not plant trees because of the belief that if the tree does not grow, it could lead to the death of children at birth or barrenness." 84-year-old female respondent.

> "Only women who had stopped giving birth could be allowed to plant trees. This is because it was believed that a woman who plants trees may not give birth if the tree fails to grow." 58-year-old female respondent.

All in all, the findings of the study suggest that the act of planting trees, within the context of the study region, was accorded great importance and carried deep cultural meaning. At its core, the practice was closely intertwined with notions of authority and power dynamics within the household. The observation of an 84-year-old female respondent that, "Even unmarried men could not plant trees because they were not in a position to make decision" attest to the fact that tree planting played a pivotal role in symbolizing and reinforcing the authority of the male head of the family. The participants' statement reveals that tree planting was not merely an agricultural or environmental activity, but a symbolic act that conveyed the authority and control that the male head of the household held over his family. This belief was so deeply ingrained that even unmarried men were restricted from engaging in tree planting, as it was perceived as an assertion of a role they had yet to assume.

Moreover, by limiting the act of tree planting to men through a myriad of beliefs, the community reinforced the traditional gender roles and patriarchal power structures that existed within their

social framework. A woman was expected to conform to these socio-cultural norms since "it was a sign of respecting the husband's position as the head of the household" as testified by an 84-year-old female respondent. Out of care and concern for the husband, a woman was further deemed to follow these set norms, given the widespread belief that the act of a woman planting trees would reduce his lifespan or, even worse, cause his death. This is substantiated by the following participants' views:

> "Women could not plant trees because it was feared it could lead to the death of the husband." 43-year-old female respondent.
>
> "Only men could plant trees and women avoided the task as it was believed that it could cause the death of the husband." 52-year-old female respondent.
>
> "Women were not allowed to plant trees because of the belief that trees belonged to men and if a woman planted trees her husband could die." 64-year-old female respondent.

To all intents and purposes, these beliefs served as a social mechanism to ensure that women do not challenge the authority of male-decision makers. This is exemplified by the remarks of a 45-year-old female respondent who pointed out that:

> "Cultural beliefs made women not to plant trees for the fear that it could cause the deaths of their husbands, while in real sense it was a way of maintaining the authority the man had as the head of the homestead."

As such, this practice bolstered the perception of men as the decision-makers and custodians of the household, with the ability to shape the family's environment and resources. The act of planting trees, thus, became a visible and tangible manifestation of this authority.

Furthermore, this authority extended beyond the household to encompass broader social norms and expectations. The prohibition of unmarried men from planting trees emphasized that the role of a household's head was not only confined to immediate family dynamics, but also projected a broader image of responsibility and stewardship within the community. In essence, the act of tree planting carried deep cultural significance beyond its ecological implications. It underscored the complex interplay of cultural norms, gender roles, and power dynamics.

However, the general view according to the study's participants was that cultural norms and beliefs were pervious to change with profound effect on tree planting practices by women. In the statements of a key informant; "Earlier women were not allowed to plant trees because trees belonged to men. Conflict could be caused in the homestead if women decided to plant trees. Nowadays, women are allowed to plant trees in the given in-between spaces." With this view widely held among respondents, it is clear that cultural beliefs are not static entities but rather, living constructs that continuously shape and are shaped by the actions and interactions of individuals.

5.3 Transformative factors influencing socio-cultural change and their effects on women's tree planting.

The study delved into the catalysts driving transformative shifts within the cultural landscape, revealing a multitude of factors contributing to these changes. Among the prominent drivers was the alteration in family structures, catalysed by events like the death of a husband. This transition often thrusts women into the position of household leaders, necessitating their assumption of roles and responsibilities traditionally held by men. A noteworthy observation is that widows, in the absence of their husbands, find themselves empowered to engage in tree planting, as

illuminated by participants' responses:

> "Women who are widowed are widowed can plant trees on their farms since they assume the responsibilities of their husbands." 43-year-old female respondent.

> "Widows could plant trees since their husbands were deceased. As the heads of their households, they were exempted from cultural norms that restricted women from engaging in tree planting." 84-year-old female respondent.

The study noted that polygynous marriages have also played a notable role in upholding and reshaping attitudes towards women's participation in tree planting. This observation is corroborated by respondents, who affirm that within polygynous marriages, each wife assumes a significant role in the management of her own homestead. This extends to decisions regarding tree planting. One respondent aptly captures this situation noting that;

> "The family structure that is polygynous gives women a chance to plant their own trees since each woman has to be responsible for her homestead. I control the cutting and usage of trees for fuelwood since I am in a polygynous marriage and every woman plants trees to cater for individual needs mainly because my husband may not be present on some occasions."

This dynamic exerts a considerable influence on the younger generations raised in such households. They grow accustomed to witnessing women's participation in tree planting and, therefore, become more inclined in letting their wives partake in the process. As such, shifting family structure caused by events like the passing of a husband or family expansion through polygynous marriage, is a prime example of how structural changes influence cultural dynamics.

By thrusting women into positions of household leadership, the shift in gender roles and responsibilities exemplifies the interaction between social structures and individual agency. In

both contexts, reflexivity, a central concept in structuration theory, becomes evident as women are prompted to reflexively assess their roles and responsibilities within evolving family structures. Afforded more control and influence, their newfound empowerment incites a re-evaluation of traditional norms and beliefs that exposes the inadequacies of adhering to them. Through their active agency, these women's engagement in tree planting marks a departure from previous norms that restrained their involvement, thus, bringing about broader socio-cultural change in tree planting activities.

The influence of education emerged as another significant factor driving cultural evolution. It was argued that educated individuals, both male and female, displayed a heightened awareness of the collective benefits associated with tree planting as exemplified by a 48-year-old female respondent;

> "Education has also made people aware that regardless of who plants trees, the entire homestead benefits. Men who are educated allow their wives to plant trees."

This view was resoundingly put forth by other participants who noted that:

> "Education has contributed to change in cultural beliefs since people have become aware that women's task of cooking requires tree planting for steady supply of fuelwood." 53-year-old female respondents.

> "Education has influenced tree planting by women since men have come to terms with the fact that most tasks performed by women make use of trees." 50-year-old female respondent.

This aptly demonstrates that educated individuals, acting as knowledgeable agents within the broader social context, possess greater awareness of the inherent weaknesses within the prevailing social structures. This awareness, brought to life through their conscious engagement

in social practices, leads to transformation of perceptions and attitudes which translates into more accommodating views toward women's involvement in tree planting practices. Possessing greater agency, the educated men, thus, encourage more inclusive approaches to tree planting. The sum of these actions essentially challenge the reproduction of existing gendered norms, thereby bringing to life new social norms and practices that engage women in tree planting activities.

Employment, identified by a notable proportion of respondents, was also a driver of cultural transformation. This factor is closely intertwined with the effects of shifting family dynamics on gender roles, as previously discussed. The following participants' accounts of their experiences illustrates how employment-induced family dynamics impact women's roles in tree planting:

> "My husband's job takes him away from home for most of the week. So, I've taken charge of planting trees in our homestead. It just makes sense. Someone has to do it, and I can't wait for him to come back every time a decision needs to be made." 43-year-old female respondent.

> "Employment has contributed to women's active participation in tree planting. My husband, for example, works far from home and comes after a long while. I, therefore, assume the role of planting trees to ensure an adequate supply of wood for various purposes including firewood." 50-year-old female respondent.

From these remarks, it is evident that employment represents a structural change in the traditional family setup. The disruption in this setup compels women to take on responsibilities traditionally meant for their husbands. By engaging in tree planting, women in effect demonstrate their agency in responding to new structural demands.

Another dimension posited by participants' views was that employment has also served as an economic source for women, granting them the means to acquire land and, consequently, engage

in tree planting practices:

> "Employment, which is also a s source of income for women, has empowered them with ability to contribute in land purchases. This has made them capable of making decisions with regards to tree planting." 61-year-old female respondent.

This indicates that women who are employed gain access to economic resources, which, in turn, grant them agency and opportunities for self-determination. This economic empowerment enables women to acquire land, a critical resource previously concentrated in the hands of men.

Crucially, the study identified the evolving gender dynamics within the context of land ownership. Economic and societal shifts, including the education of women and the promotion of gender equality, have led to a reconfiguration of power dynamics. Land ownership, traditionally concentrated in male hands, is slowly shifting, allowing women the agency to participate in tree planting as landowners. This is attested by the remarks of a 48-year-old female respondent who claimed that;

> "I plant trees especially for fuelwood and I make the decision on the cutting and usage of tree branches for fuelwood because I own the land. Formerly women were not allowed to plant trees because the land belonged to men. Nowadays women have the ability of owning land since employment opportunities are also availed to them."

This participant's statement underscores the economic empowerment brought about by employment. Her ability to make decisions regarding tree planting is directly linked to her economic independence, which challenges traditional norms associated with land ownership.

Legal frameworks like the Constitution of Kenya, 2010, and related acts such as the Land Act 2012 and the Land Registration Act 2012, have granted women greater rights to access and own

land (Gaafar, 2014). The constitutional change, alongside the alteration of perceptions regarding women's land ownership capabilities, has been instrumental in reshaping the cultural norms that previously restricted women from planting trees. These notable effects were ascertained by focused group discussants. A 48-year-old female expressed that;

> "I remember when I was younger, it was unheard of for women to be involved in planting trees. It was simply not our domain. But now, with the changes in our constitution and the recognition of our land rights, it is like a whole new world. I feel a sense of responsibility towards my homestead, and that includes planting and nurturing trees. It is empowering."

A 64-year-old female discussant shared a similar sentiment noting that;

> "Back in my time, the idea of a woman leading in tree planting was almost laughable. But now, I see my daughter and her friends taking charge, making decisions about which trees to plant and how to care for them. It is heartening. Our perceptions have evolved. The recognition of women's rights to own or use land in equal measure as men is a great step in encouraging women to continue planting trees."

Additionally, the study found that the scarcity of fuelwood has incentivized women to engage in tree planting as reflected in the statements of a 51-year-old female respondent; "Fuelwood scarcity has incentivized planting of trees by women." This has been exacerbated by the disregard men have towards planting trees for fuelwood usage as attested by a key informant;

> "Men have ignored the fact that trees cater for fuelwood much needed by women for cooking and heating. Women are now home fixers and they perform tasks such as planting trees to settle various needs."

The neglect of this vital resource by men, coupled with changing domestic roles, has empowered women to address their energy needs through tree planting. This transformative effect of fuelwood scarcity on traditional social structures is not unique to the study area but has

broader implications. Callo-Concha *et al.* (2022) in their research have also highlighted the significant impact of fuelwood scarcity on traditional regulatory institutions and, consequently, on people's social interactions. These findings resonate with the observations in the current study, suggesting that when essential resources like fuelwood become scarce, it can lead to disruptions in established social norms and structures. As individuals and communities adapt to these resource challenges, it can result in changes in roles, responsibilities, and decision-making processes. In the context of tree planting, the scarcity of fuelwood has acted as a catalyst for women to assume a more prominent role in addressing energy needs.

Moreover, religious influences, particularly from Christianity, have played a significant role in reshaping beliefs regarding tree planting practices. The church's involvement in promoting tree planting has had a substantial impact on altering traditional perceptions. This shift is best illustrated through the insights provided by informants. A female leader, who also holds a prominent role in the community, shared her observations:

> "In churches, women outnumber men. In the church I attend, when tree seedlings are distributed, it is mostly women who take them home and engage in tree planting."

This suggests that the church actively encourages and supports tree planting, with women taking a leading role in these efforts. This influence has led to changes in certain cultural norms, particularly those related to women's involvement in tree planting. As affirmed by in-depth interviewees:

> "Religion, specifically Christianity, has instigated a transformation in certain beliefs, such as the misconception that tree planting by women leads to barrenness. Moreover, it has contributed to the abandonment of outdated cultural norms." 61-year-old female respondent.

> "Christianity has influenced a new way of looking at things. People are no longer held back by the fear of calamities since they believe that trees were created to be planted by everyone. Not even children should be deterred from planting trees." 79-year-old female respondent.

> "The church encourages us to plant trees because it is a form of maintaining the environment. Several trees around my church have been planted by volunteers, a majority of whom are women." 50-year-old female respondent.

These observations indicate a notable shift in belief systems due to religious influence.

The influence of the Green Belt Movement, a grassroot organisation that encourages women to plant trees, also emerged. According to a 43-year-old female respondent; "Cultural beliefs did not influence tree planting since my mother was a member of the Green Belt Movement, and she always encouraged me to plant." This is a testament to the power of the movement in driving cultural change with regards to tree planting.

By and large, observations from a village elder that, "Men from the age bracket of forty to fifty years are slowly allowing their wives to plant trees" affirm that cultural transformation regarding women's participation in tree planting is indeed occurring. This shift towards a more inclusive approach to tree planting aligns with the broader trends observed in Bungoma County, as highlighted by Kathyoya *et al.* (2021). Kathyoya *et al.* (2021) provide additional evidence supporting the factors identified in the current study as driving this cultural shift. They emphasize that women who are widowed, come from enlightened or progressive families, have husbands who reject traditional mindsets, own land, or belong to groups promoting tree planting tend to enjoy greater autonomy in tree planting decisions.

This convergence of findings underscores the transformative power of various factors, such as

changing family structures, education, employment, land ownership, religious influences, and environmental challenges, in reshaping cultural norms and practices. It highlights the agency of individuals and communities in responding to these influences and adapting their behaviours accordingly. The recognition of these evolving dynamics contributes to a more comprehensive understanding of how cultural change unfolds within the context of tree planting practices, aligning with the tenets of structuration theory.

5.4 Conclusion.

In conclusion, this study has unveiled the intricate interplay between cultural norms, transformative factors, and women's agency in tree planting practices within Kimilili Sub-County. Scrutinizing historical constraints, deeply ingrained norms and beliefs surfaced, historically restricting women's involvement in tree planting and perpetuating rigid gender roles. However, amidst these constraints, a transformative landscape emerges, driven by factors such as shifting family structures, educational empowerment, employment opportunities, religious influences, and fuelwood scarcity. These dynamics are reshaping perceptions and practices, allowing women to challenge traditional norms and actively engage in tree planting decision-making. This study highlights the evolving nature of culture, underscoring that cultural norms are not static but continually shaped by individual actions and interactions. As women's agency in tree planting grows, embracing these shifts becomes pivotal for fostering inclusivity and harnessing their contributions to sustainable agroforestry development. The following chapter delves deeper into the how women’s expanded agency in agroforestry has impacted household fuelwood security in the study area.

CHAPTER SIX

CONTRIBUTIONS OF WOMEN'S AGENCY IN AGROFORESTRY TO HOUSEHOLD FUELWOOD SECURITY IN KIMILILI SUB-COUNTY.

6.1 Introduction.

In the two preceding chapters, it is apparent that women's decision-making power, particularly with regards to tree planting, has expanded due to prevailing cultural transformation. This chapter goes further by providing findings on how women's agency in agroforestry has contributed to household fuelwood security in Kimilili Sub-County. The ensuing section presents a detailed analysis of the findings, shedding light on how women's agency has translated into tangible benefits in terms of fuelwood accessibility and sustainability within households in the study area. These findings will not only underscore the pivotal role of women's autonomy in ensuring household fuelwood security, but also emphasize the significance of gender-sensitive approaches in the broader context of agroforestry.

6.2 Women's agency in contemporary agroforestry practices and its influence on household fuelwood security.

Fuelwood scarcity poses significant challenges for rural women and their households, particularly in regions where reliance on fuelwood for cooking is prevalent. In the study area, respondents noted that before practicing agroforestry, fuelwood scarcity was a frequent problem they faced:

> "Finding fuelwood was once a difficult task. No one would allow you onto their farms to fetch wood. Everyone guarded their trees and obtaining permission to collect fallen twigs

was very hard to come by. Back then trees were few as land was mostly used for agricultural production and this caused fuelwood to be rare." 63-year-old female respondent.

"Earlier before I had trees readily available on the farm, I used to experience fuelwood scarcity. As people became so protective of their own land and built fences to keep aware trespassers, people saw the need of planting their own trees." 73-year-old female respondent.

However, with the integration of trees on cropland, they attested the positive impacts of agroforestry manifested through the incessant availability of fuelwood. This is evident in the remarks of a 68-year-old female respondent who noted that; "I have not experienced fuelwood scarcity because I practice agroforestry and wood is ever available." This response was echoed by other participants who claimed to have significantly benefited from planting trees on their farms.

"Practicing agroforestry has helped manage the challenges of fuelwood scarcity such as covering long distances to collect fuelwood, and the inaccessibility of fuelwood due to private ownership of land." 48-year-old female respondent.

"Planting trees on the farm reduced the costs I used to incur in buying fuelwood". 63-year-old female respondent.

"Buying fuelwood and sawdust was a big problem for us so we resorted to planting our own trees. Although the trees took time to mature, we now enjoy the fruits by not having to worry about its scarcity." 55-year-old female respondent.

Resonating strongly with the experiences of female respondents, the accounts underscore the overarching thesis of the research that emphasises the tangible benefits that arise from women's active engagement in agroforestry practices. Aside from serving as a practical illustration of the

positive outcomes associated with women's agency in agroforestry, these accounts also resonate with the theoretical framework of the study. Specifically, they embody the concept of reflexivity, a key element of agency. This concept emphasises the ability of individuals, in this case, women practicing agroforestry, to critically assess and evaluate the effectiveness of their efforts. Through reflexive monitoring, women are not only aware of the challenges posed by fuelwood scarcity but also take conscious initiatives to address them.

Confirming the reflexivity of women as noted by the in-depth interviewees, a key informant stated that;

> "Women perceive agroforestry as a beneficial source of fuelwood since the forests and shrubs that used to exist on fallow land no longer exist. Calliandra (*Calliandra calothyrsus*) is normally given to the community by agroforestry extension officers and it has contributed to the availability of fuelwood. Agroforestry has ensured the availability of fuelwood and has also reduced the cost of buying fuelwood."

This statement affirms that women, based on their own experiences and reflections, perceive agroforestry as a practical and beneficial solution to the challenges of fuelwood scarcity. Primarily, agroforestry, as perceived by women, is that of a sustainable source of fuelwood since it guarantees a steady supply of fuelwood. This contrasts with relying solely on natural forests which can be subject to depletion. As such, they view agroforestry as a useful strategy of ensuring sufficient availability of fuelwood for their households' needs as well as a functional way of alleviating their financial burdens. In essence, the in-depth interviewees' accounts and the key informant's statement together form a coherent narrative that not only highlights the tangible benefits of women's agency in agroforestry, but also reveals the intellectual and evaluative processes that underlie their actions. This integration of practical experience with

informed decision-making is at the core of agency, and it is through this reflexive process that women are able to effectively address challenges like fuelwood scarcity.

The implications of women's knowledgeability of the benefits realised from agroforestry is further demonstrated through their greater initiative in receiving tree seedlings issued by the extension officers. This is well illustrated by the remarks of a key informant who pointed out that, "The extension officers help the community by giving out tree seedlings and when they do so, it is women who turn out in large numbers". This proactive approach towards receiving tree seedlings extends even further into tree planting where a focus group discussant noted that;

> "Those women whose husbands do not take the initiative to plant trees do the planting themselves for the provision of fuelwood. Myself I don't sit around and wait. It is my responsibility to ensure fuelwood is always available, so I just plant them on our farm when my husband shows no interest of doing so."

This active participation and the exercise of agency in tree planting represent a profound acknowledgment of the concrete benefits that agroforestry brings. It also reflects a deep-seated understanding that underpins agroforestry as a practical and effective strategy to secure a steady supply of fuelwood. Consequently, it provides a compelling validation of prior research (Scherr, 1995; Villamor *et al.*, 2014; Dagar *et al.*, 2020) that argue that women, due to their traditional role of fuelwood collection and cooking, often display a heightened concern for fuelwood production compared to men. Their agency in this regard is, thus, both empowering and instrumental in advancing agroforestry practices. This is remarkably displayed by the observations of a key informant who noted that;

> "Women have become more responsible for their own needs and are taking up agroforestry to satisfy these needs. They are also teaching each other how to cultivate trees in nurseries

as well as where to plant them on farmland when mature enough."

Though women demonstrate significant agency in practising agroforestry, and have substantially benefitted in terms of fuelwood availability, the benefits realised from planting trees are uneven across the study area. Findings reveal that women's autonomy plays a pivotal role in this context such that, households where women possess extensive autonomy over tree planting and use, tend to benefit more from agroforestry than those within which women's autonomy is limited. The practical implications of women's greater agency in agroforestry become vivid through accounts of women who possess the autonomy in both tree planting and harvesting.

> "I plant the trees and decide when to use them. This gives me flexibility as it allows me to plan in advance which tree to use." 48-year-old female respondent.

> "Being in control of tree planting and harvesting has allowed me to align it with our family's needs. I can ensure a steady supply of fuelwood without depending on others." 55-year-old female respondent.

A close examination of these responses indicates that women's ability to make independent decisions about when and where to plant and harvest trees translates into a consistent and reliable supply of fuelwood. This signifies that though women's agency is crucial for household fuelwood security, their autonomy of decision-making is equally essential. The importance of autonomy in determining fuelwood security is underscored by the experiences of female respondents whose autonomy, especially in harvesting trees, is limited.

> "Practising agroforestry has made trees more available on the farm but since I cannot access them as freely as want, I still experience fuelwood scarcity at times. This mostly happens when my husband has other plans with the trees, so I cannot use them. When this happens, I am forced to collect from the roadside or my neighbours." 43-year-old female

respondent.

> "Fuelwood scarcity is an occasional problem because my husband has the ultimate say on how to utilise the trees, even if I planted them. I cannot disrespect his authority when he denies me permission." 58-year-old female respondent.

> "I cannot fully depend on the trees on the farm. I have to supplement the wood from other sources so I occasionally send my children to collect whenever they are not studying. This is to ensure that when permission is denied, I have back up supplies." 51-year-old female respondent.

> "When the trees mature and they have the potential of fetching high monetary gain, my husband discourages me from cutting even branches. This decision is at times made so abruptly even when we have exhausted our supplies. This temporary results in fuelwood scarcity that forces me to borrow from my friends." 45-year-old female respondent.

The preceding remarks of the in-depth interviewees provide a vivid illustration of the challenges faced by women who lack autonomy in harvesting. These findings are corroborated by a key informant whose observations suggests that though women in the study area have the agency in tree planting, their agency in usage is contingent on their husbands' decisions:

> "Yes, women have the ability to plant trees even without involving their husbands. But a notable exception is that they cannot just harvest whenever they want. Permission must be sought first before using the tree for fuelwood."

In accordance with the observations of Waudo *et al.* (2013) and Kiptot (2015), these accounts collectively mirror the broader reality that women without autonomy are often subject to decisions made by their husbands. This highlights the presence of deeply ingrained social structures characterized by established norms and power hierarchies within the study areas' households. These norms dictate that husbands typically hold authority in decisions related to

tree harvesting. Consequently, despite the presence of ample trees on farms, women may find themselves constrained by this prevailing framework, leading to fuelwood shortages.

This situation arises, in part, due to the social practice of fuelwood production as a byproduct of trees assigned various key functions. The production of fuelwood as a byproduct within the context of established gender roles and power dynamics perpetuates a cycle where women's agency is limited, despite their active participation in agroforestry practices. This structural constraint, highlighted by occasional fuelwood shortages, underscores the critical need to address and transform these deeply ingrained norms. Providing women with greater autonomy and decision-making authority in fuelwood production and resource management can lead to more equitable and sustainable solutions for households.

It is, however, noteworthy that while women's agency in agroforestry, particularly when coupled with the autonomy to harvest, has undoubtedly enhanced fuelwood security, it is important to acknowledge that there are challenges women must deal with even while engaging in agroforestry. One significant constraint that arises when trees are integrated with crops is the ability to harvest the trees before crops mature. This situation was highlighted by a 58-year-old female respondent:

> "When you plant trees and maize on the farmland, one has to wait till the maize is harvested for one to fall a tree."

This predicament was also observed by a key informant who noted;

> "Fuelwood is not readily available throughout the year from the planted trees. Sometimes this occurs due to the inability to the inability to harvest trees before maize is harvested. This is because it can destroy crops during the process of cutting."

In such circumstances, the prioritization of food production over addressing fuelwood shortages becomes paramount. Consequently, the availability and accessibility of trees for fuelwood becomes a secondary consideration, leading to the reliance on external sources for fuelwood procurement. This interplay between agroforestry and food production underscores the complex dynamics that women navigating these practices must contend with. While agroforestry presents a valuable means of securing fuelwood, it also introduces challenges that necessitate careful coordination and timing. Balancing these competing demands highlights the multifaceted nature of household fuelwood management, and the nuanced decisions that women must make to ensure the well-being of their households.

Other challenges that women must contend with in their endeavour to ensure fuelwood security, as noted by respondents, include high rainfall and poor timing. These challenges were well captured by a 45-year-old female respondent who noted that:

> "High rainfall makes wood to take longer to dry, hence causing fuelwood scarcity. Poor timing also leads to fuelwood scarcity, as existing fuelwood stock depletes before new stock can be dried for use."

Furthermore, limited land sizes also emerged as a prevalent issue among respondents. They mentioned that their small landholdings lead to planting fewer trees. This is a challenge as it often compels women to strike a delicate balance between prioritizing food production and allocating space for tree planting. This aligns with the findings of Waudo *et al.* (2013) and resonates with the observation of a 61-year-old female respondent, who noted;

> "Most women have scarce trees on their farms due to small farm sizes. Consequently, they prioritize food production, resulting in experiences of fuelwood scarcity."

In addition, the practice of agroforestry on limited land holdings has far-reaching consequences for crop production. A 52-year-old female respondent aptly pointed out that “Trees require significant space and compete for essential resources like water and nutrients, leading to diminished crop yields.” These dynamic challenges are echoed in Kiprop *et al.* (2017) where it was noted that people are planting trees in open niches and along farm boundaries as ways of ensuring the trees planted do not adversely affect crop productivity. Planting trees along boundaries was, however, noted to be problematic as it often caused many disputes, where farmers complain that the trees whose roots extend to their farms lowers their soil fertility.

These multifaceted challenges, nonetheless, highlight the intricate dynamics that women face when engaging in agroforestry. It underscores the need for nuanced strategies that account for various factors influencing fuelwood availability, including power dynamics, environmental conditions, land size limitations, and the intricate relationship between tree planting and food production. Addressing these challenges comprehensively will be crucial in ensuring sustainable agroforestry practices and, subsequently, enhanced household fuelwood security.

6.3 Conclusion

This chapter has elucidated the link between women's agency in agroforestry and household fuelwood security. Autonomy emerges as a critical factor, enabling women to actively participate in tree planting and harvesting, ensuring a steady fuelwood supply. This autonomy stands at the heart of understanding this relationship. Beyond autonomy, other factors, including coordinating tree planting with crop cycles and contending with high rainfall and limited land affect women’s ability to ensure stable fuelwood supplies. Recognizing these complexities is vital for effective strategies in managing fuelwood production.

CHAPTER SEVEN

SUMMARY, DISCUSSION AND CONCLUSION.

7.1 Introduction.

This chapter presents a summary, discussion and conclusions based on research findings presented from chapter four to chapter six. Actionable measures and policies to bolster women's agency in agroforestry, specifically targeting the gender disparities in fuelwood access, are recommended at the end of the chapter. Emerging issues in the study that warrant further research are also recommended.

7.2 Summary.

This study assessed women's agency in agroforestry and its contribution to household fuelwood security in Kimilili Sub-County situated in Bungoma County, Western Kenya. More specifically, the study delved into the cultural factors influencing the usage of certain tree species as fuelwood, the cultural norms and beliefs shaping women's role in tree planting, and how women's agency in agroforestry has contributed to household fuelwood security in Kimilili Sub-County.

The study revealed that the selection and utilization of specific fuelwood species were deeply embedded within the sociocultural fabric of the study region. Participants in the study shared insights into the specific qualities they desired in fuelwood species, illustrating their "knowledge of qualities desired" within the local context. These qualities encompassed a range of attributes that were not only functional but also culturally meaningful. The findings demonstrated that

these desired qualities were not predetermined or fixed but rather shaped by the ongoing interactions between individuals and their social environment.

This study also unveiled the intricate interplay between cultural norms, transformative factors, and women's agency in tree planting practices within Kimilili Sub-County. It was established that historical constraints, deeply ingrained as norms and beliefs, have been restricting women's involvement in tree planting and perpetuating rigid gender roles. However, amidst these constraints, the study found an emerging transformative landscape, driven by factors such as shifting family structures, educational empowerment, employment opportunities, religious influences, and fuelwood scarcity. These factors were noted as elemental in reshaping perceptions and practices, allowing women to challenge traditional norms and actively engage in tree planting decision-making. Effectively, the evolving nature of culture underscored that cultural norms are not static but continually shaped by women's actions and interactions. The resulting change consequently influences women's agency in tree planting, with significant effects on household fuelwood security.

However, the study found that the degree of autonomy women have over tree planting and harvesting plays a crucial role in affecting the effective application of agroforestry and the successful resolution of experienced fuelwood problems. The research findings cited cases where women with full autonomy to plant and also harvest trees had more stable fuelwood supplies than those whose autonomy, particularly in harvesting, was limited. The lack of autonomy to harvest was noted as a significant challenge that occasionally led to fuelwood scarcity. This instability in fuelwood supply from trees planted on farms was found to be a result of husbands denying their wives permission to harvest trees. Other challenges that posed considerable

influence on women's ability to ensure sustainable fuelwood availability within their households included factors such as interplanting trees with crops and the resulting timing constraints, as well as high rainfall and limited land sizes. These dynamic challenges underscored the complexities that women face in ensuring fuelwood security.

7.3 Discussion.

This study, framed within structuration theory, offers a nuanced perspective on women's agency in agroforestry and its impact on household fuelwood security. The findings underscore the pivotal role of autonomy in women's success within agroforestry endeavours, precisely those aimed at ensuring fuelwood security. Women endowed with full autonomy in managing the in-between spaces on farms demonstrate significantly greater benefits compared to those with restricted authority. This empowerment enables them to plant and utilize trees in alignment with their own priorities, effectively addressing fuelwood challenges.

However, it's crucial to acknowledge that this autonomy is not entirely divorced from cultural influences, which still heavily favour male dominance. The study illuminates a notable shift in households where evolving beliefs and practical demands lead to a more liberal approach, allowing women greater agency in tree planting and harvesting. These progressive households demonstrate a marked reduction in fuelwood problems compared to those adhering to traditional norms.

For households where women possess semi-autonomous control, the study reveals a complex dynamic. Usage is contingent upon obtaining permission, a decision predominantly influenced by men. Prioritization of needs places fuelwood utilization at a lower rung, especially for trees designated for commercial or construction purposes. This multipurpose tree usage creates a

disconnect between women's preferences and actual utilization, potentially discouraging agroforestry adoption in such settings. During periods of acute fuelwood scarcity, this constrained uptake compels women to resort to previously restricted trees, driven by necessity rather than choice.

In the broader context, structuration theory provides a lens through which to analyse these outcomes. It highlights the interplay between established cultural norms, evolving beliefs, and women's agency in agroforestry practices. This theoretical framework allows us to understand how autonomy, or the lack thereof, shapes the outcomes observed in terms of fuelwood security. It underscores that while autonomy is a critical factor, it operates within the broader structural context of cultural norms, influencing women's ability to engage effectively in agroforestry.

7.4 Conclusions.

In essence, this study reveals that women's agency in agroforestry significantly contributes to household fuelwood security in Kimilili Sub-County. However, this contribution is intricately tied to the degree of autonomy women hold over tree planting and harvesting, which is influenced by cultural dynamics. By unravelling the complex interplay of these cultural elements, the study provides empirical evidence affirming the relevance of structuration theory in this specific context. This enriches the field of development anthropology that emphasises the imperative of tailoring interventions to local nuances. In line this emphasis, the study underscores the significance of context-specific interventions and the need necessity of considering cultural dynamics while designing agroforestry initiatives. Moreover, it offers valuable insights for policy-makers advocating for strategies that empower women in agroforestry practices.

7.5 Recommendations.

From the findings, the following key recommendations were found necessary towards advancing women's agency in agroforestry and, in effect, household fuelwood security.

- First and foremost, agroforestry extension officers stationed within Kimilili Sub-County, in collaboration with local community leaders and village elders, should organize awareness and engagement forums targeting male members of the community. These forums should emphasize the significance of granting women autonomy in decision-making regarding tree planting, harvesting, and utilization within agroforestry practices. Through expert facilitation, these gatherings will assess men's perspectives and generate programs that vividly demonstrate the positive impacts of women's decision-making freedom.
- Non-Governmental Organizations (NGOs) specialized in gender issues as well as local community leaders should conduct targeted community sensitization campaigns. These initiatives should focus on debunking the detrimental effects of entrenched cultural beliefs on tree planting and utilization. By fostering an environment of open dialogue and understanding, these campaigns will reinforce the prevailing cultural shifts, and pave way for women's greater agency in agroforestry.
- It also recommended that during the distribution of trees by agroforestry extension officers, trees with good burning qualities and that are void of men's economic interests, should be propagated. This will not only be useful to women, given their preference for trees with good attributes, but will also contribute to more sustainable and equitable agroforestry practices. By prioritizing tree species like Erythrina abyssinica, which align

with women's preferences and needs, agroforestry initiatives can foster greater agency and autonomy for women in agroforestry and, thus, ensure fuelwood security.

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APPENDICES

APPENDIX I: CONSENT FORM

My name is **Leysley Nasimiyu Nyongesa**, a master's student in Anthropology from the University of Nairobi, Institute of Anthropology, Gender and African studies. In fulfilment of the faculty's requirement to conduct research relevant to the area of study, I am conducting research on women's agency in agroforestry and its contribution to household fuelwood security in this sub-county. This study will seek to identify the cultural factors influencing the preference and usage of trees as fuelwood in this sub-county as well as the cultural beliefs and norms shaping women's role in tree planting.

To accomplish this task, you have been purposively selected as one of the key respondents. Participation in this study is voluntary and your choice not to participate will not be penalized. Your answers will strictly be confidential in that your names or addresses will not be recorded. You will be free to withdraw from the study at any time or refuse to answer any questions that you deem too personal. Due to the academic nature of the study, no monetary compensation will be issued out to participants. However, your participation will be very helpful in this study and subsequent academic researches. Honest answers will greatly be appreciated since there is no right or wrong answer in this study. The interview takes approximately forty minutes to complete.

In case of any questions regarding the study, you may contact me through telephone number: 0702188865 or email address: nasimiyu@students.uonbi.ac.ke.

Statement of consent

I have read the information above (or it has been read to me) and I consent voluntarily to be a participant in this study.

Signature…….. Date……

Thank you for your participation.

APPENDIX II: IN-DEPTH INTERVIEW GUIDE

Respondent number: _____

Ward: _____

Date: _____

Section one: Socio-demographic characteristics

Respondent age: _____

Respondent gender: _____

Respondent education level: _____

Respondent marital status: _____

Source of income: _____

Section two: Cultural factors influencing the preference and usage of trees as fuelwood.

i. What is your main source of cooking energy at home?
ii. Where do you get it from? How far is the source from the homestead? (Probe: *cost or collection time and frequency).*
iii. Are there tree species preferred for fuelwood? Name them? (Probe: *beliefs about value of using certain trees for fuelwood)*
iv. How do you decide on the type of trees to be used for fuelwood? (Probe: *the tree varieties available, who makes decision, who controls the cutting and usage of trees for fuelwood, cultural demands for usage of specific trees for fuelwood)*

Section three: Cultural beliefs and norms shaping women's role in tree planting.

i. How do cultural beliefs influence tree planting by women? (Probe *why*)
ii. To what extent are the beliefs rigid or flexible to change?

iii. Does the community abide to these cultural beliefs? (Probe: *levels of adherence and consequences of deviation*)
iv. What factors have influenced change in cultural beliefs? (Probe: *employment, migration pattern, education or religion*)
v. How have these changes influenced tree planting by women?

Section four: Fuelwood availability.

i. What is the main use of the trees on farm?
ii. What is the main use of by-products from the trees on farm?
iii. Have you ever experienced fuelwood scarcities? (Probe: *possible causes*)
iv. In your opinion, what factors influence fuelwood scarcities?
v. How do you solve the scarcity? (Probe: *mechanism or coping strategies used*)
vi. Has agroforestry helped in managing the challenges to fuelwood availability? What challenges have been managed?

Thank you for participating

APPENDIX III. FOCUS GROUP DISCUSSION GUIDE

Section one: Socio-demographic characteristics

Gender of the group: _____

Age: _____

Level of education: _____

Marital status: _____

Section two: Cultural factors influencing the preference and usage of trees as fuelwood.

i. Could you please tell me what drives women on deciding the types of trees that as are used for fuelwood?
ii. What types of trees are used and where are they found?
iii. Do you have freedom in planting and harvesting trees? (*Probe for levels of freedom*)
iv. What types of trees have you planted?

Section three: Cultural beliefs and norms shaping women's role in tree planting.

v. Are there cultural beliefs that inhibit women from planting trees?
vi. What is your take on these beliefs?
vii. Will a change in the beliefs on planting trees affect your uptake of agroforestry?

Section four: Fuelwood availability.

viii. What is the usefulness of practicing agroforestry?
ix. Where does a majority of fuelwood come from?
x. What is the frequency of fuelwood shortages?
xi. In your opinion, what causes fuelwood shortages?
xii. What is your opinion on planting trees for fuelwood provision?

xiii. Will those planted trees solve fuelwood problems experienced from time to time? (*Probe how*).

Thank you for participating

APPENDIX IV: KEY INFORMANT INTERVIEW GUIDE.

Background characteristics

Gender: _____

Institution: _____

Position/portfolio: _____

Years of service: _____

Questions

i. What agroforestry trees are grown in this sub-county? What are the main purposes of the planted trees? Rate them in accordance with the given priorities.
ii. If fuelwood use is not ranked first, is fuelwood readily available from these planted trees?
iii. If not readily available, what are the other sources of fuelwood?
iv. In your opinion, do women perceive agroforestry as a beneficial source of fuelwood?
v. What are some of the tree species preferred by women for fuelwood in this sub-county?
vi. Why are they preferred?
vii. Among the preferred trees, which ones have you actually planted?
viii. If some are planted, state whether the state of affairs has been this way or whether it has been propagated by a change in cultural beliefs.
ix. If the state of affairs has been influenced by changes in cultural beliefs, name the changes.
x. If none has been planted, what cultural beliefs have influenced this state?

Thank you for participating