

**WOMEN EMPOWERMENT AND ITS CONTRIBUTION TO SUSTAINABLE  
LAND USE MANAGEMENT PRACTICES AMONG FARMERS IN NJORO  
SUB-COUNTY, NAKURU COUNTY, KENYA**

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A Thesis Submitted in Partial Fulfilment of the Requirements for the Award of the Degree of Masters of Science in Environment and Natural Resources Management in the Department of Environment and Natural Resource Management and the School of Science and Technology of Africa Nazarene University

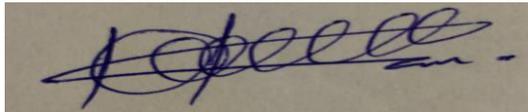
**June 2022**

**DECLARATION**

I declare that this document and the research that it describes are my original work and that they have not been presented in any other university for academic work.

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18S01DMEV004



8/6/2022

This research was conducted under our supervision and is submitted with our approval as University supervisors.

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## **DEDICATION**

I dedicate this master of science thesis to my close relatives who have been instrumental in helping me get this far by providing emotional and financial support, they include: my dear aunt Hodan Siciid for the support she accorded me while here in Kenya, my mother Hodan Mohamed for her encouragement and advise that has made me succeed in my academics, and my father Allahi Mohamud for his assistance.

## **ACKNOWLEDGEMENTS**

I acknowledge the supremacy and the divine providence of Allah for enabling me to get this far in my academic journey. I can confidently say that this is a blessing from God almighty. I appreciate the great teacher and messenger, Prophet Mohammed for teaching me to have a purpose in life, may Allah bless and grant him peace. I am thankful to my supervisors; Dr. Mark Ndunda Mutinda in coming up with this topic and for the good guidance all the way to attain the success and Dr. Sharon Jones for her immense support. I do greatly appreciate my family members for providing for me in many ways, in this group I sincerely remember my mother for her guidance through dark valleys of life and shining light of hope and support, my dearest sister Sua'ad for standing with me when things were not working, and my beloved brothers and sisters. Last but not least I thank the staff and leadership of Nazarene University for providing me with an opportunity of an education.

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## ABSTRACT

Land degradation and decreased agricultural production is a big problem among rural farming communities, this is despite the fact that women in these areas have been empowered to increase production and manage the land resources. The study therefore assessed the level of women empowerment and determined its contribution to sustainable land use management among farmers in Njoro sub-county, Nakuru County, Kenya. Specifically, the following objectives were addressed by the study: (i) to assess the level of women empowerment using the women empowerment in agriculture index (WEAI) among farmers, (ii) to determine the level of sustainable land use management practiced by women farmers, (iii) to determine the contribution of women empowerment to sustainable land use management by farmers, (iv) to compare the levels of land use management practices in three locations in Njoro sub-county. The target population consisted of 659 women managing small scale farms in the rural areas of Njoro sub-county. The *ex-post facto* research design was adopted for this study. The multi-stage sampling procedure was used to select three locations and a sample of 243 women households. A researcher administered structured questionnaire was used to collect information from the women farmers. The data was analysed using descriptive (means, median, mode and frequency distribution) and inferential (regression analysis, chi-square test, and ANOVA) statistics at 95 % level of confidence in a Statistical Package for the Social Sciences (IBM SPSS version 26). The level of women empowerment (WEAI) in Njoro sub-county was found to be low ( $M=.439$ ,  $SD=.196$ ) on a scale of 0 to 1. Sustainable Land Use Management Practices (SLUMP) was found to be ( $M=11.16$ ,  $SD=5.98$ ) on a scale of 0 to 20. The SLUMP levels were found to vary significantly ( $p<.001$ ) within the three locations (Njoro, Kihingo and Nessuit) sampled. Women empowerment contributed positively ( $\beta=.144$ ,  $t=2.25$ ,  $p<.001$ ) to sustainable land use management practices. The research provided a quantitative method of assessing women empowerment in the agricultural areas and research. The findings will assist the stakeholders in national and county governments to formulate policies applicable to the management of the land resources. There is need to improve on the level of empowerment to the women by acting on the five domains of women empowerment. The domains act as a guide in directing interventions during the implementation of the empowerment programmes.

## DEFINITION OF TERMS

**Sustainable Land Management:** (SLM) is the use of land resources such as soils, water, animals and plants for production of goods to meet changing human needs, while assuring the long term productive potential of the land.

**Sustainable Development:** has been defined as development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

**“Nyumba kumi”:** An initiative in Kenya that makes neighbours know more about one another and it consists of ten houses

**Pollution:** means any direct or indirect alteration of the physical, thermal, chemical, biological, or radio-active properties of any part of the environment by discharging, emitting, or depositing wastes so as to affect any beneficial use adversely, to cause a condition which is hazardous or potentially (EMCA, 2000)

**“Public Complaints Committee”** means the Public Complaints Committee established under section 31;

## **ABBREVIATIONS AND ACRONYMS**

CDA- Community Development Agreements.

## **CHAPTER ONE**

### **INTRODUCTION**

#### **1.1 Introduction**

The thesis focuses on the assessment of women empowerment and its contribution to sustainable land use management (SLUM) in Njoro sub-county, Nakuru County, Kenya. The study specifically assessed the level of women empowerment in Njoro sub-county using the modified women empowerment in agriculture index (WEAI) developed by Alkire et al. (2013). The contribution of women empowerment to the application of sustainable land use management practices was then determined using regression analysis. The WEAI is composed of two sub-indices. The first sub-index has five indicators, which include: (i) decision on what to produce, (ii) access to and decision making power about productive resources, (iii) control use of income and access to credit, (iv) leadership in community, and (v) time allocation for work and leisure. The second sub-index measures the level of empowerment in relation to the men in the household. The dependent variable, land use management practices undertaken by the women, was operationalized as an index that combined three domains: cropping systems, land conservation practices and restoration of damaged land areas. These three domains had twenty (20) indicators, that included: minimum tillage, manure application, land mulching with crop wastes, planting on contours, growing of perennial crops, terraces, cut off drains, contouring, grass strips, tree planting, planting of Napier grass, agroforestry, revegetation of damaged lands, and pasture management (Chasek et al., 2015; Cowie et al., 2018; Kust et al., 2018).

This section of the thesis covers the background of the study, statement of the problem, objectives of the research, research questions, significance of the study, limitations of

the study, delimitations of the study, theoretical framework and the conceptual framework of the study.

## **1.2 Background of the Study**

In 2015, the United Nations member states adopted the 17 interlinked global sustainable development goals (SDGs). The sustainable development goal number 5: Achieve gender equality and empower all women and girls, was meant to empower women and reduce inequality between the sexes (United Nations, 2015). The concept of women empowerment can be described as the ability make or express strategic and meaningful choices and decisions related to one's own life (Kabeer, 1999; 2017). It is a multidimensional process, which enables individuals to realize their full potential and power in all spheres of life and involves greater access to resources and knowledge, greater autonomy in decision making, greater control over situations that influence their lives, and frees them from customs, beliefs and practices. The benefits of women empowerment include positive economic outcomes associated with social empowerment (such as supportive community norms) and psychological empowerment (efficacy or self-perception) (Brody et al., 2015; Conger & Kanungo, 1988) and: non-economic domains. Empowering women has been shown to lead to economic benefits for women themselves and for their households and communities (Duflo, 2012; Gates, 2014; Kabeer & Natali, 2013; Klasen, 2018; World Bank, 2011).

Women participation in agricultural projects globally, has been shown to ensure project success and sustainability (United Nations, 2017). During the assessment of the millennium development goals, it was realized that for the projects that had community participation embedded in them during the planning and implementation stages tended to have more success in meeting project goals than the ones where the communities

were passive (World Bank, 2014), indicating a need of involving communities in development projects. Globally, studies in developed countries such as USA, China, Europe and Russia have shown that women empowerment has led to success in the implementation of development projects (Endalcachew, 2016). In developing countries, such as the Philippines the general participation of women in development projects in Manilla has been low at 32 % for over 15 years (UNDP, 2015). The low participation of women in the implementation of community development projects can be attributed to poor gender roles and classification, low levels of income for the women, cultural and traditional norms that deny women rights to own properties, low levels of education, religious beliefs that discriminate women against women. This situation in Manilla has improved with increase in women empowerment in the community (United Nations, 2017).

In Africa, women have been disadvantaged in all spheres of life (Loboso, 2014). They are not allowed to own property such as land, they don't inherit their parents' properties as men do, and they are not given chances to make major decisions in the community as they are not allowed to attend meetings. Women are not allowed in development committee meetings and their ideas are normally brushed off or they are discriminated based on their gender roles (Africa Development Bank, 2017; UN Women, 2016). Even though many governments have been advocating for affirmative action, where a third of the women must be considered in economic development activities, Wema (2015) found the opposite to be the case as the women were undermined and disempowered. This situation was found to vary across the African regions as some areas women were empowered, while in others they were not (OECD, 2018). The situation in South Africa and Liberia is different from other African nations in that

women have received special recognition through various women empowerment programmes (Murunga, 2017) as has been shown in Soweto, where women have transformed a slum into a modern peri-urban settlement by providing cheap labour, solving existing conflicts on resettlement of different ethnic communities, and provision of land (UN Women, 2017).

In Kenya, a number of challenges in women empowerment still exist despite the many programmes that have been initiated, as was shown in 2008 post-election violence, where women and children suffered the most (Murunga, 2017). The lack of involvement of women in development projects normally leads to poor project results (Arthur, 2014). This has caused the government to partner with other organizations to initiate programmes that train women to participate in development projects (Bayeh, 2016). The following factors were identified by Omweri (2015) as limiting women participation in Kenya, they included: level of education, cultural values, lack of finances, lack of information and marital status.

Natural resources provide livelihood to an estimated 1.3 billion subsistence farmers worldwide (FAO, 2011). The unsustainable use of natural resources results in an increasingly stressed environment, which can lead to land degradation. Land degradation is occurring in all parts of the terrestrial world, and is negatively impacting the well-being of at least 3.2 billion people, costing more than 10% of the annual global gross product in loss of biodiversity and ecosystem services (IPBES, 2018). In 2015 the global community in recognition of the need for continued action on land degradation across impacted countries, regions and landscapes, adopted the Sustainable Development Goals (SDGs), with a specific target (15.3) stated as: “to combat

desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land degradation-neutral world by year 2030” (United Nations, 2015).

Sustainable Land Management practices (SLM) can be used to combat land degradation and manage land in its conserved form, where it can provide ecosystem services to the people, SLM practices include: afforestation, intercropping, grass planting (seeding), rain water harvesting, removal of undesired species, grazing enclosures, buffer zones, terraces, contour planting, furrows, (Chasek et al., 2015; Cowie et al., 2018; Kust et al., 2018).

The study therefore aimed at determining the contribution of women empowerment to sustainable land use management in Njoro sub-county, Nakuru County, Kenya.

### **1.3 Statement of the Problem**

Women in the rural areas play a big role in agricultural food production and in the conservation of the environmental resources within their small scale farms. Women empowerment enhances the capacity of the women to make choices that can translate into desired actions and outcomes with the aim of changing their lives and that of their families. Many government and non-governmental projects have been designed to enable women meet these challenges, such as women enterprise fund created to provide credit to women, gender equity, education and health projects. These projects have been instrumental in enhancing the capacities of women to meet their families’ obligation and environmental conservation. These programmes have had big success especially in the business sector in the urban areas but their success in the rural areas and the farming

sector has been questionable, as land degradation has increased and agricultural production has been declining over the years.

In the farming, areas of Njoro sub-county, women empowerment projects have been implemented through women groups and there is evidence to show that the economic and social status of the women has been enhanced (Karogi, 2016; Njogu et al., 2017; Opil, 2019) but the production of agricultural crops and fodder has not improved (Amwine et al., 2017; GOK, 2021; Taiy et al., 2017), and the environmental resources have continued to deteriorate (Mainuri & Owino, 2014; Mainuri, 2018), leading to the critical question: does the empowerment of women have an impact in the management of environmental resources and in the production of food crops in Njoro. This study therefore, aimed at determining the contribution of women empowerment to increasing land productivity and sustaining the land resources in Njoro sub-county.

#### **1.4 Purpose of the Study**

The purpose of the study was to assess the level of women empowerment among small-scale farmers in Njoro sub-county and determine its contribution to sustainable land use management practices.

#### **1.5 Objectives of the Study**

##### **1.5.1 Broad Objective**

The general objective of this study was to determine the levels of women empowerment in agriculture and to assess its contribution to sustainable land use management practices among small-scale farmers in Njoro sub-county, Nakuru, Kenya.

### **1.5.2 Specific Objectives of the Study**

The specific objectives of the study were:

- (i) To assess the level of women empowerment using the women empowerment in agriculture index (WEAI) among farmers in Njoro sub-county, Nakuru County.
- (ii) To determine the level of sustainable land use management practiced by women farmers in Njoro sub-county, Nakuru, Kenya.
- (iii). To determine the contribution of women empowerment to sustainable land use management by farmers in Njoro sub-county, Nakuru
- (iv) To compare the extent of sustainable land use management practices undertaken by farmers in three locations (Njoro, Kihingo and Nessuit) of Njoro sub-county, Nakuru.

### **1.6 Research Hypotheses**

The following were the hypotheses tested for this study:

H<sub>01</sub>: There is no statistically significant difference in the level of women empowerment among farmers in Njoro Sub-county of Nakuru County.

H<sub>02</sub>: There is no statistically significant difference in the extent to which sustainable land use management is practiced among farmers in Njoro Sub-county of Nakuru County.

H<sub>03</sub>: There is no statistically significant contribution of women empowerment to sustainable land use management in Njoro sub-county, Nakuru County.

H<sub>04</sub>: There is no statistically significant difference in the level of sustainable land use management practices undertaken by farmers in the three locations (Njoro, Kihingo and Nessuit) of Njoro sub-county, Nakuru County.

### **1.7 Significance of the Study**

The significance of a study refers to the statement that involves offering certain descriptions that are of value to the study to a number of individuals or corporations who may be interested with the research findings (Easterby-Smith et al., 2014). The study will provide the participants with information on activities of government and non-governmental institutions meant to empower them. The results of the study will be significant to the stakeholders, as they will provide them with relevant information on how well their funding was meeting the household needs of increased production and conservation of environmental resources. The in-depth study of the beneficiaries' empowerment using WEAI, will provide information to the stakeholders on the effectiveness of their funds in changing the lives of the people. The government agencies who are the policy makers may benefit from the findings of this study as they strive to alleviate poverty in the households and achieve the objectives of vision 2030. The findings of the study will be published in a peer reviewed journal.

### **1.8 Scope of the Study**

A study scope refers to the existing explanation that tries to establish what the study is all about, the existing boundaries within the study that research focus will be based on (Simon, 2011). The study majored in assessing the contribution of women empowerment on the sustainable land use management practices among small scale farmers in Njoro Sub-County, Nakuru County. The study specifically targeted women who were living on their farms and were involved in agricultural production either singly or with their husbands in three sub-locations of Njoro sub- county (Njoro, Nessuit and Kihingo).

### **1.9 Delimitation of the Study**

This study is basically set out to assess the level of women empowerment and how it has affected the management of land resources in Njoro sub-county. The results of the study will be applicable to the rural areas and in settings where women empowerment has been introduced through government and non-governmental institutions. Delimitation refers to known attributes of the study that limit its scope and are controllable by the researcher (Easterby-Smith et al., 2014).

### **1.10 Limitations of the Study**

Sensitive issues such as money matters and personal relationships within the home may make some of the participants to be unwilling to disclose some of the information pertinent to this study. The researcher will explain the academic need for the research and assure the participants that the information they will provide will be used for the academic purposes only and at no point in time will the information be shared without their express permission. Limitations of the study involve existing known challenges that are beyond the control of the researcher (Simon, 2011).

### **1.11 Assumptions of the Study**

Assumption of the study are known general statements that is aimed at provision of accurate or the circumstances in which statistical methods tend to produce acceptable results (Wargo, 2015). A number of past studies explored the factors that affect the success of women empowerment in terms of their economic status as well as poverty reduction. To this effect, several studies highlighted the success factors while others explored the challenges that pose threats to the meeting of the objectives of the uplifting the life styles of the women. The concentration of theses evaluations has been economic stability and agricultural productivity but less so on sustainability of land resources. In

this regard, the researcher hereby having no prior evidence to prove or disapprove builds the study on the assumption that the management of land resources squarely lies on the users of the resources, who are mainly the women. The researcher, further, to limit the scope of the study assumes that no other factors in the lives of the empowered women affect their management of the land.

## **1.12 Theoretical Framework**

The study will be guided by two theories, The Kabeer's framework of women empowerment theory and the Feminist environmentalism theory.

### **1.12.1 Kabeer's Framework of Women Empowerment**

Women's empowerment can be conceptualized based on a framework developed by Naila Kabeer (Kabbeer, 1999). This framework depicts empowerment as a dynamic process, in which women acquire resources that enable them to develop voice – the capacity to articulate preferences – and agency – the capacity to make decisions – to fulfil their own aspirations. These resources include human resources such as schooling attainment, skill development, and self-efficacy; social resources such as participation in organizations, access to peer networks, and access to role models outside the family; and economic resources or material assets such as earnings, property, and land (Kabbeer, 1999).

The Kabeer's women empowerment theory consists of three domains that are combined together by scholars to indicate Resources, Agency and Achievement. In accordance to Kabeer, women empowerment is known to be an expansion of people's ability to make strategic life choices in a context in which there is an ability was previously denied from them (Kabbeer, 2001). She identified resources, agency and achievements as three

interrelated factors which can influence women's empowerment process and the importance women participation in development of projects, which is relevant to the study.

The emphasis in the theory is that resources (human resources, material resources and social resources) are mandated to enable people's ability to make proper decisions and to act so as to take action collectively or individually. The actual occurrence is characterized by the aspect of raising people's consciousness in line with the current situation and creation of social networks for support. Extensively poverty and existing social norms and values can hinder the empowerment process resulting to conflict among family or community members.

The argument that is in line with the identification of empowerment processes is that a series of strategies of projects and community members that are in support with women empowerment in project activities, thus not hindering women's participation. The community development projects implementation procedures and practices, as well as the county government and communities responsibilities in project implementation and planning will be examinable.

The Kabeer's framework of women empowerment theory was found to be applicable to this study in that the measurement of empowerment using the WEAI is based on this theory. The indicators measured by the index were developed with Kabeer theory in mind.

### **1.12.2 The Feminist Environmentalism Theory**

The Feminist environmentalism theory, also referred to as ecofeminism or ecological feminism had its name coined by French feminist Françoise d'Eaubonne in 1974. The

theory was formulated in the 1980s and gained prominence in the 1990s (Gaard, 2011). The theory combines feminist and ecological movements thinking in to one as it looks at the oppression of women and land degradation as related issues with a common denominator of domination by men (Agarwal, 2003). The theory finds connection between women and nature and addresses the parallels between the oppression of nature and the oppression of women. The parallel includes seeing women and nature as property, seeing men as curators of culture and women as curators of nature, and that men dominate women and humans dominate nature. The theory advocates that both women and nature must be respected by men.

The suggested link between women and the environment can be explained as follows: the environment on which women depend for their survival is qualitatively and quantitatively degraded, it will in turn affect other opportunities needed for the management of natural resources and thus, restrict other development options. Women are regarded as the gate keepers of natural resources (land and water) as important resources for agriculture. It is also believed that there is a close relationship between natural resources and women's role of acquiring food and water for their family, therefore women possess more knowledge on the management of land and water than men (Denton, 2002). Despite this expertise, the control over land and water lies in the hands of men. Moreover, women lack representation in the decision-making over land and water due to social and cultural norms. Studies indicate further that, when land gains an economic value, its demand increases and therefore it becomes a scarce resource which is controlled by men (Denton, 2002). It is argued that when land and water are freely available, women can have access to and control over them, however, when the value for land is high women lose the control over land and water (Odgaard,

2003). It is therefore advocated that women should have control over natural resources especially in area where there is high agricultural investment such as Njoro sub county area in Kenya.

### **1.13 Conceptual Framework**

A conceptual framework explains in a descriptive manner the set of ideas or variables to be studied and the associations between them (Svinicki, 2010). The conceptual framework for this study depicted the contribution of women empowerment to sustainable land management among small scale farmers in Njoro sub-county. The dependent variable sustainable land use management, composed of the indicators that are related to rehabilitation, cropping systems and land management practices. The independent variable, women empowerment had the following indicators income, literacy, resources, production, leadership or agency and time and drudgery. These indicators can directly influence the dependent variable as shown in Figure 1.1.

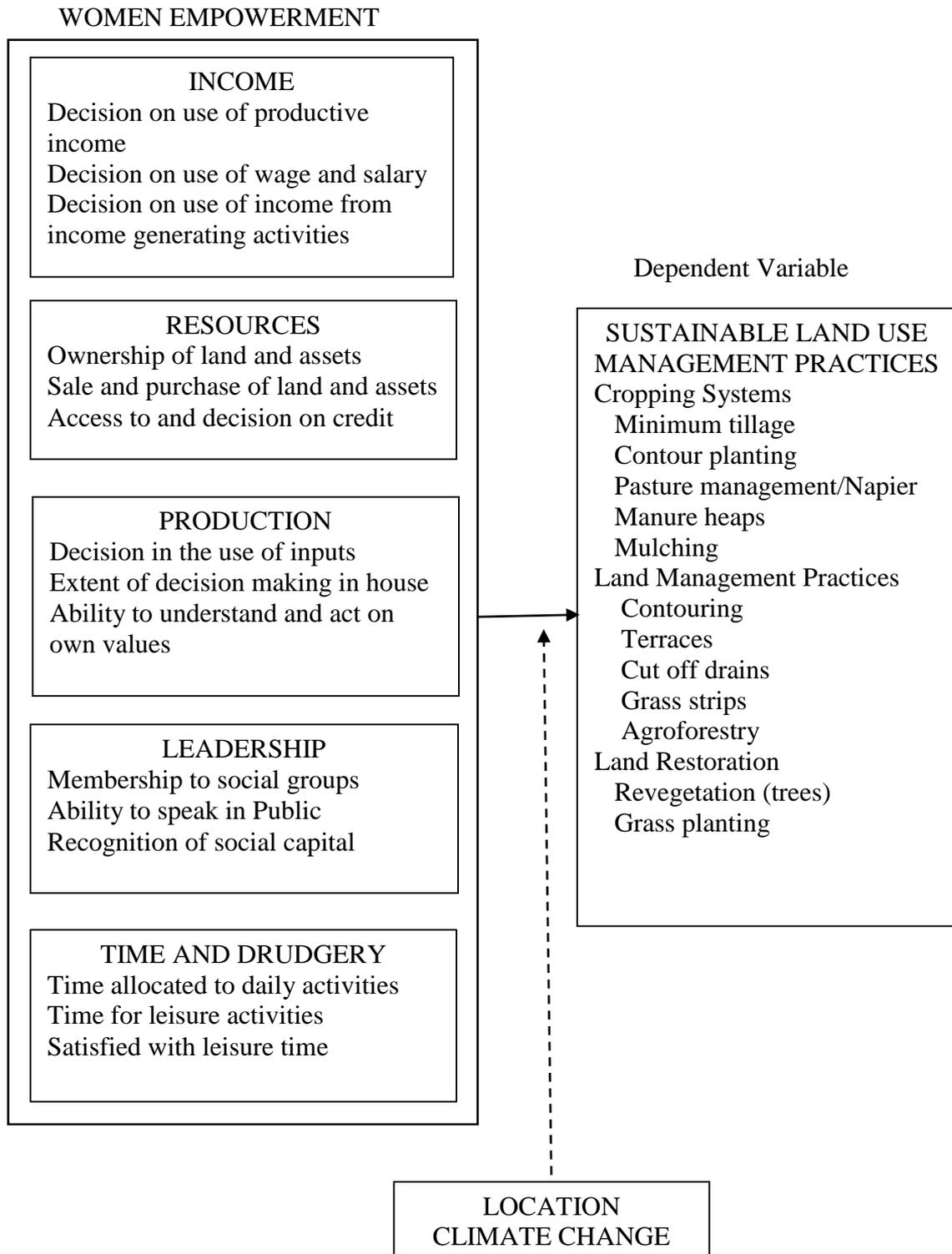


Figure 1.1: Conceptual framework showing the contribution of women empowerment to sustainable land use management among Farming households in Njoro sub-county

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

This chapter lays out the independent and dependent variables, knowledge gap and the summary. It shows the extent of literature on this research captures the uniqueness of the study under consideration. The purpose of this study is to drive the specific issue that would influence the phenomenon under research and hence establish the basis upon which the research would be initiated. The chapter consists of reviews which were reviewed for the purpose of women empowerment and its contribution to sustainable land use management in Njoro Sub – County Nakuru County, Kenya.

#### **2.2 Women Empowerment**

Women's empowerment can be conceptualized based on a framework developed by Naila Kabeer (Kabeer, 1999). This framework depicts empowerment as a dynamic process, in which women acquire resources that enable them to develop voice – the capacity to articulate preferences – and agency – the capacity to make decisions – to fulfil their own aspirations. These resources include human resources such as schooling attainment, skill development, and self-efficacy; social resources such as participation in organizations, access to peer networks, and access to role models outside the family; and economic resources or material assets such as earnings, property, and land (Kabeer, 1999).

The SDG 5 recognizes the value of women empowerment in the process of development. Duflo (2012) indicates that change and progress would be impossible without the inclusion of women in the process. Neglecting the value and role of women leads to unsustainable solutions which are not equally distributed to all citizens. Even

in the 21<sup>st</sup> century women have remained a lower form of gender, often described as the weaker sex. Women earn less than third male counterparts, and are often exposed to danger in terms of domestic violence and disease. Further, their nutritional index remains much lower than that of men. In addition, women often lack the power to cast their ideas and extrapolate their needs democratically, often overshadowed by the men (Hazarika (2011), Varghese (2011), Mandal 2013). This is despite being responsible for many of the activities and roles within the home, caring for the children and sick, farming and producing food and ensuring the wellbeing of all family members.

The term “empowerment” though agreed upon as a general definition of strengthening has gained much debate in terms of conceptualization especially between social and political scientists. Panigrahy (2006) Duflo (2012) define empowerment as an active process rather than a state, which in itself is multi-dimensional and often directed at ensuring that women achieve and reach their full potential. It implies that power becomes decentralized and is distributed in a manner that allows those who could not make decisions to not only participate but also to equally gain as much power as their counterparts. Kondal (2014) Tandon (2016) agrees stating that empowerment is the process of regaining and giving back freedoms: freedom of choice, freedom to make decisions, freedom to access resources and services among others. When women have the freedom of choice and the ability to make decisions, they are more open to new opportunities and invest more in new ideas and concepts often bringing about faster and more equitable development.

### **2.3 Land Degradation**

Land degradation has been highlighted as one of the greatest threats to the future of development and the survival of the human race. Because of the effect and intensity with which land resource changes affect society, land degradation has drawn the interest

of many scientists, scholars, academics and development experts (Tadesse, 2001). Land resources are the gateway to basic needs, and especially access to food and nutrition, without which no other activities would be possible. Agriculture intensification, poor conservation measures and poor application of equipment and tools in land use have often been blamed for the increasing prospects of land degradation. With an increasing population, and the demand for food becoming higher land degradation is now an intense subject that affects not just the third world but also developing nations (Warren 2002; Bai et al., 2008). The UN report indicates that land is being degraded at an unprecedented rate of 12million hectares per year. For an environmentally sustainable system of production, there is need to not only create awareness on proper use of land and conservation measures but also increase adoption of new land use methods that are designed for sustainability.

Land degradation has two interdependent aspects. On the one hand, land is directly related to food production with degradation, land produces much less health and biological content is much lower, which often leads to lower productivity, which then translates to increased costs of food. Families and communities that rely on farming and agriculture are highly affected, where income decreases and often small scale farmers are led to destitution (Gisladottir & Stocking, 2005). On the other hand, with land degradation, and low farm productivity, farmers are forced to work harder and explore other means of increasing productivity. These include increasing planting seasons, reducing space between crops and even opting for more intensive agriculture methods. All these though unhealthy for the environment, often seem as the easiest quick fix to the problem of low productivity due to land degradation. Farmers therefore have to work harder for much less due to land degradation.

## **2.4 Women and Land Degradations**

In his study Conacher (2001) suggested that primary land users within the homestead are often the women. They are involved in cultivating, planting, weeding and even the final harvesting of the crop. They interact with the land on a daily basis and have a closer relationship than their counterparts the men. However, the same women are often not given the opportunity to make decisions and choices with regard to the land. In some cases, they even lack the opportunity to own the land which they work on. Collantes et al. (2018), Okpara et al. (2019) international agencies and projects often focus attention to land owners when training and disseminating information on land use and conservation. While theoretically this is an ideal system, it lacks sustainability whereby the same individuals with the knowledge do not work closely or even interact on a daily basis with the land. The projects therefore fall short in terms of sustainability. On the other hand, the few projects which according to Blaikie and Brookfield (2015) have focused attention on the women who work on the land, do not provide tools for empowerment which are vital in terms of bringing women to the decision making table. The women therefore get the knowledge, have the information but cannot implement any form of change. Dankelman and Davidson (2013), Crossland et al. (2018) conclude therefore that the first step towards change is to design and bring into focus the need for women empowerment that is the process of power change and a shift in dynamics so that women are able to implement changes by making decisions on land use.

It is important to look at land degradation not just from the land use aspect but also from the point of view that it affects the different genders differently. When land is degraded, rural women are the most likely to be highly affected. They spend more time and energy toiling on land for lower productivity (Sachs 2018, Davidson 2019). This

not only affects their own productivity but also the health of the women and their economic power. Statutory and customary regulations also play a major role in degrading and excluding women as land stewards. Theoretically, women's right to property access and use is protected and highlighted in many national and international policies. In Kenya Ogunlela and Mukhtar (2009), Adeniyi (2010) and Mukasa and Salami (2016) show that the government and international agencies have gone a step further to not only state but also attempt to practically apply gender equality to land access and use. However, majority of the time such access and rights are affected by cultural beliefs and norms which tend to discriminate based on sex. The SDG 5 indicators provide for women's access to land tenure and security as well as access to the use of agricultural land as they deem fit for their own development. Despite such progress, women's access to land and the ability to use land freely for their own benefit, the ability to make decisions with regard to land use remains limited and in some cases completely non-existent.

## **2.5 Women and Agriculture**

Agriculture is the most common and easiest vehicle for communities to fight poverty and underdevelopment. However, in many countries including Kenya the productivity and performance of this sector remains limited. There are many reasons that are offered for this including land degradation, poor equipment, poor investment in resource rich areas and poor access to markets which limits the income from such activities. However, Wekesah et al. (2019) highlight that in the recent times a new focus has been given to the issue of gender and productivity. Many farming communities show the highest levels of gender discrimination and segregation. Communities relying on agriculture provide poor access and low decision making power to women who are the main beneficiaries and stakeholders in agriculture. Farnworth et al. (2013), Njuki et al.

(2013) from cultivation to marketing, women play a crucial role in the advancement of agriculture. Women farmers represent at least 50% of the total population of farmers both in East Asia and Africa. However, this number is thought to be larger as records in both continents have not been consistent and valid over the years. Unlike their male counterparts women play a crucial role in not just the farming but also the care and progress of the home in their role as home makers.

In his analysis Patil and Babus (2018) highlighted the roles of women to include as farmers themselves (often farming in family land owned by male relatives or as a lease land), as day labourers (unpaid in the family land) or as day labourers (paid and employed in externally owned land). Even though they have access to land, and are intimately involved in agricultural production their full potential is often limited by the socio-cultural boundaries. They may understand the environment within which they are operating, have access to the right information but lack the ability to apply such information on their own because of social and cultural ethics. (Enete et al., 2002). Mehra and Rojas (2008) indicates that with access to land becoming limited due to increased population and poor land use practices, the decision making power for the women and even access to land resources is quickly becoming non-existent in some communities. As populations increase and rural–urban migration becomes more common, women have become poorer and poorer in farming communities.

Furthermore, policy makers and development agencies focus on the most visible roles in farming, often investing technology and policies that improve performance and ease the activities for the labourers. Brooks et al. (2013) shows that invisible roles played by women mostly are largely ignored. These include weeding, seeding and collection of

products from the farms. Focus is given to transformation and preparation of land often done by the men. Other invisible activities include the food processing to ensure it's ready for the market. This may include selection and separation of various products from the farm. All these are largely ignored in the investment and policy making yet they are indeed quite crucial to the success of the farm. From cash crop family farming, the role of women can no longer be ignored. Proper use of land and environmental conservation activities need to put women at the centre if indeed any success or sustainability is to be seen from the same. Failure to do this has led to decreased sustainability and poor participation in the same. Understanding that women are crucial players in land use and agriculture is the first step towards gendered environmental conservation.

## **2.6 Environmental Conservation and Rehabilitation**

In the past decade, increased population and increased climatic change, has increased the interest and demand for environmental conservation. International agencies, national governments and individual communities have been driven to critically reverse the changes to the environment. Munarim and Ghisi (2016) define environmental conservation as the sum of activities that are employed by the human race to rehabilitate the environment. It is the sum of activities directed at saving the environment from loss of species, destruction of the ecosystem mainly due to poor use of environmental resources and pollution.

Kelbessa (2005) draws attention away from the technological and scientific aspects of environmental conservation and rehabilitation. He insists that it is time that interest is drawn to the behavioural aspects of environmental conservation. To understand how to encourage and bring about environmental change, one needs to understand the factors

that influence behaviour including: locus of control, responsibility, knowledge and attitude. In order to effectively influence change, individuals must believe they can effect such change and also have access to the resource. Without proper access to the resource in this case and, they are less likely to effectively bring about proper change (Büscher et al., 2014; Truong & Clayton, 2020).

The drive of environmental protection is one that has lasted decades. Each generation has adapted not just to the use but also the care of the environment. () highlights the three waves of environmental conservation that have lasted the past fifty years. The first wave he states, centered on environmental conservation. Having gained popularity in the first world countries, the first wave called for the setting apart of refuge centres and conservation centres for the protection of specific land pieces, species and wildlife considered to be endangered. This first wave however focused on the saving of specific aspects of the environment, protecting them and allowing for the reinstating of these areas. De- Shalit (2005) states that even with specific areas being protected, much of the environment remained in trouble. This gave birth to the second wave of environmental protection, calling upon the protection of commonly held resources. It was born from the new understanding of the relationship between public health and environmental conditions. The current wave is centered on the ecological sustainability, which is revival of environmental resources and long term protection of natural systems.

## **2.7 Environmental Conservation and Gender**

Gender awareness has brought to light the need to couple the needs of gender, gender roles and environmental awareness as well as conservation. Tindall et al. (2003), Jackson (2013) suggest that majority of the time, social inequality has for decades been

a part and parcel of environmental conservation. It is important to remember that the environment itself does not exist without social constructions. Social roles, cultural knowledge and beliefs determine the nature of use, decision making and changes that are implemented. Tenouri (2020) indicates that whenever technology and equipment changes are required for purposes of environmental protection, men are the main focus of such projects. Projects rely on women not for decision making but mainly to bring about color and friendliness to the environment. This has relegated women to the position where they are representatives and victims rather than equal participants of the process of environmental protection. As victims, women often have different and more severe effects where in environmental poverty. Where access to environmental resources has been limited, it can quickly become non-existent following poor use. Labor becomes more intensive taking up much time and energy and often bringing negative effects to the health of individual women (Masika, 2002).

Agarwal (2000) hypothesizes that women are brought up as nurturers and caregivers and therefore show much more concern for environmental health. They are more receptive to ideas of change, especially where short term sacrifice maybe required to bring about rehabilitation and environmental health. Denton (2002), Rönnbäck *et al.* (2007) and Fischer and Chettal (2013) give an example of mangrove restoration along the Kenyan coast. The project itself has shown much positivity and gained popularity in international circles. However, he critically shows that early stages where sacrifice did not equal the immediate benefits, majority of the project participants (more than 90%) were women only. Armed with the right knowledge and training, women are often more willing to not only implement change but also educate others on the importance and value of such change (Zhang et al., 2020). However, the participation of women in

the process of environmental rehabilitation and conservation faces many challenges. The top among them is the inability of the women to access environmental resources. All resources and especially land are often beyond the reach of women. In some cases, access is limited to simple use rather than ownership and leasing which then allows for decision making (Timoti et al., 2017). Women also lack access to economic resources which would make implementation of change much easier. Financial resources, banking services and loans are often very challenging to the women. Women are often viewed as simple labor providers rather than individuals who have a close relationship and ability to implement environmental change. As immediate users of land, often relying on the resources to care for their families, women are the first and most effective actors in environmental protection (Pola, 2019).

## **2.8 Knowledge Gap**

Even with the recognition of the value of women in improving land use and decreasing land degradation, little is being done towards making this a reality. The Rio conventions on biodiversity and climate change are an ideal example. Only one section mentions the role of women and their participation in land protection. Many countries have made theoretical attempts with little practical results in terms of involving women in the process of land protection. The failure of many gendered projects comes not from the actual implementation but rather the design of such projects. Academics and scientists have focused attention towards improving the participation of women in land protection. Focus has been given to challenges encountered in access to resources and the use of the same land resources. Policies have been designed to grant women the rights to access and make use of land resources. However, there remains a crucial gap that is yet to be addressed and this directs itself to empowerment. While policies and theoretical frameworks recognize the vital importance of women, the women

themselves lack the power and ability to access the land resources and make decisions for the use of such resources. Empowerment calls for the women themselves to discover their role, value and ability to fully participate in the process of decision making. Data on the process of increasing the capacity of women to make choices participate in decisions and transform the land use remains limited. This is especially the case in third world countries such as Kenya where research has been limited and socio-cultural beliefs influence gender roles.

## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

#### **3.1 Introduction**

This chapter outlines the research procedure that will be used in the study. The sections covered: research design, research site, target population, study sample size, sampling procedure, data collection instruments, pilot testing of research instruments, instruments reliability and validity, data collection procedures, data analysis, legal and ethical considerations and a summary of the data analysis procedures.

#### **3.2 Research Design**

The study employed the *ex-post-facto* research design, involving causal comparative (Trochim & Donnelly, 2008). An *ex post facto* study or after-the-fact research is a category of research design in which the investigation starts after the fact that it has occurred without interference from the researcher (Salkind, 2010). The *ex-post-facto* research can be described as a systematic empirical inquiry in which the researcher does not have direct control of independent variables (which can be behaviour, events or treatments) because their manifestation has already occurred or because they cannot be manipulated or changed. The prediction of the causes are done on the basis of the actions that have already occurred. The design was deemed appropriate for this study because the manifestation of the independent variable (women empowerment) had already occurred without any manipulation. The contribution of the independent variable on the dependent variable (sustainable land use management) was then determined.

### **3.3 Research Site**

The selection of the research site was essential as it influenced the usefulness of the information produced (Kombo & Tromp). This study was conducted within Njoro Sub-County in Nakuru County, Kenya. The main economic activities in the area were crop production, dairy farming, forestry and microenterprises. The major crops grown included hybrid maize, wheat and potatoes. The farmers kept improved dairy breeds and produced milk which they sold to dairies located at Egerton and Njoro towns. Agro based industries were found in Njoro and Mau Narok towns, these included Njoro canning factory which processes vegetables. The participants were small scale farmers who practiced mixed farming (crop production and keep few animals). The products were used for household subsistence and the extra were sold commercially in the local markets. The location of Njoro Sub County is shown in Figure 3.1.

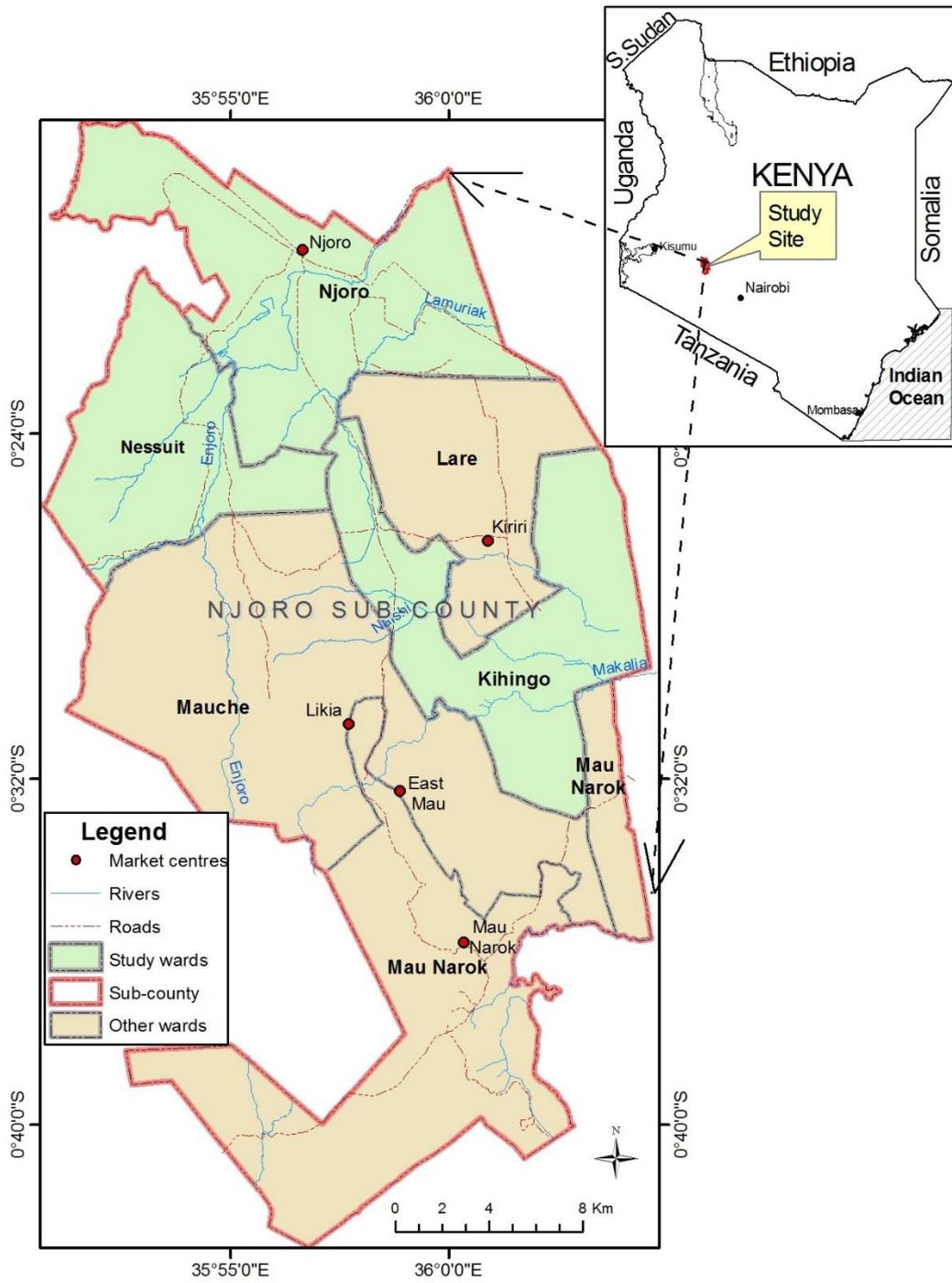


Figure 3.1: Map showing the location of Njoro Sub-county and the three study sites

### **3.4 Target Population**

The target population for this study was the small scale farmers within the Njoro sub-county. The population consisted of women who were living on their farm with or without their husbands. Njoro sub-county has an area of 202.4 Km<sup>2</sup> with a population of 98,376 people and 27,163 households. (KNBS, 2019) The households that formed the sampling frame were estimated to be 659 households (Personal communication with Chief and *Nyumba Kumi Initiative*). These were households that had a farm area and had a woman as one of the household heads.

### **3.5 Study Sample**

A sample is a selected set of participants from a population, which adequately represents the population from which it was drawn and therefore true inferences about the population can be made from the results obtained (Mukherjee, 2019).

#### **3.5.1 Study Sample Size**

The households that were having a woman as one of the household heads and with a farm within the three locations (Njoro, Kihingo and Nessuit) in Njoro sub-county formed the sampling frame. The sampling frame consisted of 659 small scale farmer distributed in the three locations. The study sample size was determined using the Krejcie and Morgan (1970) Table (in Appendix C), based on the population of 659 was found to be 243 farms.

#### **3.5.2 Sampling Procedure**

Multi-stage sampling procedure was used to select small scale farmers from three locations in Njoro sub-county. In the first stage of sampling, three locations (Njoro, Kihingo and Nessuit) were randomly selected using a *table of random numbers* (in

Appendix D). In the second stage 243 small scale farmers with women as a head of the household.

### **3.6 Data Collection**

This section explains the process that was used to collect data from the household heads. This is a systematic process of gathering observations or measurements on the qualitative and quantitative information of the study variables. During the process care was taken to collect good data that is clean, consistent and reliable to enable the evaluation of the outcome (Tan, 2018).

#### **3.6.1 Data Collection Instruments**

A researcher-administered structured questionnaire (Tan, 2018) was used to collect information from the women household heads within the study area. The questionnaire (Appendix B) is divided into three sections: section one had questions related to the characteristics of the respondents, section two had questions on the independent variables, which was an index developed by Alkire et al. (2013). The index, Women Empowerment in Agriculture Index (WEAI) is a multi-indicator variable involving the following five domains, these include: (i) resources which captures information on indicators of resource ownership, access to resources, decision making power of women on productive resources (which include: land, livestock, agricultural equipment, consumer durables and credit), (ii) income, this domain had indicators which will capture whether the income to the household is used solely by the women or jointly, the degree of input by the women in making decisions about the use of income generated from productive and income generating activities of the household, (iii) the domain of leadership of the women in community, measured by the indicator of membership in economic or social groups, whether the women were comfortable

speaking in public, and social capital as a resource. The groups as social capital include membership to agricultural producers or marketing, water users groups, credit or microfinance, forest users, mutual help or insurance (burial), trade and business associations, civic or charitable groups, local government (chiefs groups), religious, and other women related groups, (iv) the domain of time within the 24 hour period allocated to productive and domestic tasks, and satisfaction with time available for leisure, (v) the domain of women empowerment and gender parity, which was indicated by education and training, access to health services, and access to extension services.

The third section elicited information on the level of sustainable land use management practices undertaken by the households. The section covered three domains: cropping system, land conservation practices and land restoration practices. The level of household participation in the practice will be measured on a four-point scale as follows: 0= not practiced by the household, 1= slightly practiced, 2= moderately practiced and 3= highly practiced by the household. The indicators included: minimum tillage, manure application, mulching, planting on contours, growing perennial crops, terraces, cut off drains, planting bamboos on slopes, contouring, afforestation, grass strips, planting Napier grass, agroforestry, and revegetation (trees and grasses).

### **3.6.2 Pilot Testing of Research Instruments**

A pilot-test was conducted on 24 households (10 % of the sample size) outside the target population, this was done in Lare location, which was adjacent to Njoro and Nessuit location. According to Creswell (2014), pilot-testing involves trying out a questionnaire on a small group of individuals to get an idea of how they react to it before the final version is created. The pilot testing enabled the researcher to fine-tune the questionnaire for objectivity and efficiency of the process.

### **3.6.3 Instrument Reliability**

Instrument Reliability is defined as the extent to which an instrument consistently measures what it is supposed to measure. Reliability concerns the degree to which the scores are free from random measurement errors. Cronbach's alpha was used to estimate internal consistency of multi-item indicators by determining how items of the instrument were related to each other and to the entire instrument. A Cronbach's alpha of 0.7 was taken to be enough to confirm whether variables are reliable (Sekaran & Bougie, 2009). Field (2009) argues that a Cronbach's alpha value equal or greater than 0.5 is regarded to be an indication of reliability. Therefore, the study considered coefficient alpha greater than 0.6 to indicate the reliability of the research instrument.

### **3.6.4 Instrument Validity**

The content validity was established during wide reading, discussions and deliberations with peers, and colleagues within the University. The experts were consulted to provide guidance on the content of the instruments; that is ensuring that all the research objectives had been addressed by the questions or information sought in the instruments. The manner of construction of the instrument was checked to ensure that the questions were not misinterpreted and only relevant information was obtained. The findings from the pre-test study were used to improve on the instruments, thus enhancing their validity. This approach is supported by Mugenda and Mugenda (2003).

### **3.6.5 Data Collection Procedure**

A letter of approval of the research was obtained from Africa Nazarene University (ANU). A research permit was obtained from National Commission for Science, Technology and Innovation (NACOSTI) to conduct the research. The researcher then informed the Chief and members of the *Nyumba Kumi* initiative in the field for

permission to visit the households. The enumerators were then trained and given questionnaires to interview the household heads.

### 3.7 Data Analysis

The collected data was processed and analysed using the Statistical Package for the Social Sciences (IBM SPSS version 26). The descriptive and inferential statistics were used (Table 3.1). Descriptive statistics (mean, median, mode and frequency distributions) will be conducted to describe the study variables. Inferential statistics; t-test were used to compare the two strata, while regression analysis was used to determine any existing relationships between dependent and independent variables (Mugenda & Mugenda, 1999). The regression model used is stated:

$$Y = \alpha + b_1 X_1 + b_2 X_2 + \dots + b_n X_n$$

For this study, the equation was:  $Y = \alpha + b_1 X_1 + b_2 X_2 + b_3 X_3 + b_4 X_4$

Where Y is dependent variable, which is sustainable land use management practices (SLUMP)

$\alpha$  is a constant.

$b_1, b_2, b_3, b_4, b_5$  are coefficients.

$X_1$  is independent variable 1, which is income.

$X_2$  is independent variable 2, which is resources.

$X_3$  is independent variable 3, which is production,

$X_4$  is independent variable 4, leadership,

$X_5$  is independent variable 5, time and drudgery.

### **3.8 Legal and Ethical Considerations**

Considering laws and ethics of people, participants of the research will be respected and the respondent will give out information in a voluntary manner. Gatara (2010) defined ethical issues in research to mean the “moral principles” or behavioural codes regarding the respect of the rights of the research participants by the researcher. The researcher will avoid making up other data than those obtained from the field activities. All works cited in the study will be given appropriate credit and referenced. The researcher will acquire all legal documents needed to carry out research in Kenya and submit same where necessary. The researcher will maintain objectivity in all the phases of the study in order to get accurate and reliable data. Finally, upon completion of the study, the researcher will share the research findings with the relevant users who may be interested in utilizing the research findings.

**Table 3.1: Summary of Data Analysis and Statistical Tools**

<b>Objectives</b>	<b>Variables</b>	<b>Method of Data Analysis</b>
(i) To assess the level of women empowerment using the women empowerment in agriculture index (WEAI) among farmers in Njoro sub-county, Nakuru County.	Independent variable: women empowerment Dependent: sustainable land use management	Descriptive statistics t-test
(ii) To determine the level of sustainable land use management practiced by women farmers in Njoro sub-county, Nakuru, Kenya.	Independent variable: women empowerment Dependent: sustainable land use management	Descriptive statistics t-test
(iii) To determine the contribution of women empowerment to sustainable land use management by farmers in Njoro sub-county, Nakuru	Independent variable: women empowerment Dependent: sustainable land use management	Descriptive statistics Regression Analysis
(iv) To compare the level of sustainable land use management practices undertaken by farmers in three locations (Njoro, Kihingo and Nessuit) of Njoro sub-county, Nakuru.	Independent variable: Sustainable land use Management practices Dependent: locations	Descriptive statistics Regression Analysis ANOVA

## CHAPTER FOUR

### DATA ANALYSIS AND FINDINGS

#### 4.1 Introduction

Chapter four of this thesis deals with data analysis and the findings of the study. The chapter is divided into the following sections: (i) response rate (ii) characteristics of the participants, (iii) women empowerment in Njoro, (iii) sustainable land use management practices in Njoro, (iv) contribution of women empowerment to sustainable land use management, (v) group comparisons in Njoro sub-county.

#### 4.2 Response Rate

The sample size for this study was calculated as 243. The respondents that responded to the interview were 243, giving a 100% response rate.

#### 4.3 Characteristics of the Respondents

The characteristics of the participants for this study are presented in the following sections: age of respondents, gender of respondents, marital status, formal education, household number and land size owned by the respondents.

##### 4.3.1 Location of Households Interviewed

The location of the households was noted during the interview and the frequency distribution of the results are given in Table 4.1

**Table 4.1: Locality of the Farms**

<b>Location</b>	<b>Frequency</b>	<b>Percent</b>
Kihingo	136	56.0
Nessuit	62	25.5
Njoro	45	18.5
<b>Total</b>	<b>243</b>	<b>100.0</b>

The majority (56 %) of the participants were from Kihingo, followed by Nessuit (25.5 %) and finally Njoro (18.5 %).

#### 4.3.1 Age of Respondents

Respondents were asked to indicate their year of birth, which was then used to calculate the exact age. The descriptive statistics and frequency distribution were calculated and are represented in the Table 4.1.

**Table 4.1: Age of Respondents**

Age Categories	Frequency	Percent
20-30	39	16.0
31-40	92	37.9
41-50	54	22.2
51-60	27	11.1
61-70	22	9.1
71-80	9	3.7
<b>Total</b>	<b>243</b>	<b>100.0</b>

Mean  $42.7 \pm 8.2$ , Median 39, Mode 37, Std. Dev 12.88, minimum 22, Maximum 77

The majority (71.1 %) of the respondents were below 50 years old, while 28.9 % were above 60 years old. The average age for the respondents was ( $M=41.9$ ,  $SD=14.46$ ), while the minimum age was 20 and the maximum age was 81 years old. Achi-square test was performed on the age data to determine the equality of the categories.

**Table 4.2: Chi-square Test for the Equality of the Age Groups**

Age Categories	Observed N	Expected N	Residual	Statistics
20-30	39	40.5	-1.5	$\chi=107.49$ $df=5$ $P<.001$
31-40	92	40.5	51.5	
41-50	54	40.5	13.5	
51-60	27	40.5	-13.5	
61-70	22	40.5	-18.5	
71-80	9	40.5	-31.5	
Total	243			

The chi-square test (Table 4.2) revealed statistical ( $p < .001$ ) significant differences among the different age categories of the participants. The age category of (31-40 years) was statistically significantly ( $\chi^2=107.49$ ,  $df = 5$ ,  $p < .001$ ) higher than the other categories, indicating that the majority of the women were in this age bracket.

### 4.3.2 Ethnic Representation of the Women Participants

The study had four different ethnic communities represented as shown in Table 4.3.

**Table 4.3: Ethnicity**

<b>Ethnic Communities</b>	<b>Frequency</b>	<b>Percent</b>
Kikuyu	173	71.2
Kalenjin	62	25.5
Kisii	6	2.5
Kamba	2	.8
<b>Total</b>	<b>243</b>	<b>100.0</b>

The majority (71.2 %) of the women were from the Kikuyu community, followed by the Kalenjin community (25.5 %), Kisii (2.5 %) and finally Kamba (0.8 %).

### 4.3.3. Marital Status of the Women

The participants were asked to state their marital status. Four categories emerged in the study area and their frequency distribution are presented in Table 4.4.

**Table 4.4: Marital Status of Respondents**

<b>Marital Status</b>	<b>Frequency</b>	<b>Percent</b>
Married	170	70.0
Single	39	16.0
Widowed	29	11.9
Divorced	5	2.1
<b>Total</b>	<b>243</b>	<b>100.0</b>

The majority (73.3 %) of the household heads were married, 13.8 % were single, 12 % widowed and 0.9 % were divorced.

#### 4.3.4 Formal Education

The highest level of formal education attained by the women was determined by asking the participants to indicate the highest level in formal education they had attained. The information was analysed and the frequency distribution is presented in Table 4.4.

**Table 4.5: Highest Level of Formal Education Attained by the Household Head**

<b>Level of Formal Education</b>	<b>Frequency</b>	<b>Percent</b>
Never Went to School (illiterate)	12	4.9
Lower Primary (1-4)	22	9.1
Upper Primary (5-8)	156	64.2
KCSE (Form 4)	47	19.3
Teacher (P1)	1	0.4
College (Diploma)	3	1.2
Master and Above	2	0.8
<b>Total</b>	<b>243</b>	<b>100.0</b>

The majority (65.3 %) of the household heads had attained the form four level of formal education, indicating a reasonable level of understanding. Only 10.7 % were illiterate.

#### 4.3.5 Household Number

The respondents were asked to state the number of people living in their households. The information was analysed and the descriptive statistics and frequency distribution are shown in Table 4.6.

**Table 4.6: Number of People Living in a Household**

<b>Number</b>	<b>Frequency</b>	<b>Percent</b>
1.00	5	2.1
2.00	19	7.8
3.00	18	7.4
4.00	39	16.0
5.00	40	16.5
6.00	16	6.6
7.00	36	14.8
8.00	21	8.6
9.00	25	10.3
10.00 and Above	24	9.9
<b>Total</b>	<b>243</b>	<b>100.0</b>

Mean  $5.9 \pm 0.16$ , Median 6, Mode 5, Std. Dev 2.5, Minimum 1, Maximum 13

The average number of people living in the households was ( $M=5.9$ ,  $SD=2.5$ ), and ranged between 1 and 13. Majority (56.4 %) of the households had less than 6 members of the family.

#### **4.4 Level of Women Empowerment Among Farmers Njoro Sub-County**

The first objective of this study was to assess the level of women empowerment using the women empowerment in agriculture index (WEAI) among farmers in Njoro sub-county, Nakuru County.

The independent variable women empowerment was conceptualized as a multi-indicator index, women empowerment in agriculture index (WEAI) developed by Alkire et al. (2013). The index is composed of five domains, that include: household resources, household production, household income, time allocated for work and leisure by the women and women leadership or agency.

#### 4.4.1 Household Resources Domain

The first domain of the WEAI is termed as household resources and has three main indicators, which include: ownership of land and assets; decisions regarding the purchase, sale or transfer of land and assets; and decision made on the access and use of credit.

The first indicator for the household resources domain, ownership of resources was measured by asking the women to state whether the household land and assets were solely owned by the women, or jointly with their spouse or were solely owned by their husbands. The responses were rated on a 0-2 score, with 0 indicating ownership by husband alone, 1 indicating joint ownership and 3 indicating sole ownership by the women depicting higher empowerment. The resource ownership was then combined to show the level of ownership of the household land and assets. The descriptive statistics are given in Table 4.7.

**Table 4.7: Descriptive Statistics of the Indicator Ownership of Household Resources**

Resources Owned by Household	Women Assessment		
	Sum	Mean	Std. Dev
1 Agricultural land	72	.296	.457
2 Non-agricultural land	70	.288	.453
3 Large and small livestock	71	.292	.455
4 Fish ponds	0	.000	.000
5 Farm equipment	78	.321	.467
6 House/stores	79	.325	.469
7 Household durables (table, bed, cooker)	96	.390	.488
8 Means of transport	81	.333	.472
9 Cell phone	243	1.00	.000
<b>Ownership of resources index</b>	<b>87</b>	<b>.360</b>	<b>.345</b>

The women ownership of land an asset was found to be ( $M=.360$ ,  $SD=.345$ ) on a scale of 0 to 1. The contribution of land and asset ownership to the empowerment of women in Njoro was found to be low.

The second indicator for household resources deals with the determination of who makes the decision regarding the purchase, sale or transfer of land and assts. The indicator was assessed by having the women report who makes the decision in the home regarding this indicator on a scale of 0-2, 0= when husband makes decision alone, 1=when they jointly make the decision and 3= when the decision is solely made by the women (indicating a higher level of empowerment). The descriptive statistics are shown in Table 4.8.

**Table 4.8: Descriptive Statistics of the Indicator Decision Regarding Land and Assets Transactions**

		Descriptive Statistics		
		Total	Mean	SD
Land and Assets				
1	Decision in the purchase of land	72	.296	.457
2	Decision in the sale of land	70	.288	.453
3	Decision in the transfer of land	71	.292	.455
4	Decision in the purchase of assets	79	.325	.469
5	Decision in the sale of assets	95	.390	.488
6	Decision in the transfer of assets	81	.333	.472
<b>Transactions of land and assets index</b>		<b>78</b>	<b>.321</b>	<b>.444</b>

Women decision in the transaction of land and assets (purchase, sale and transfer) was found to be ( $M=.321$ ,  $SD=.444$ ). the involvement of women in making decision on the transactions of land and assets was found to have a low contribution to the empowerment of women.

The third indicator for household resources is the assessment of household decision making on the access and utilization of credit. Two items were used for this indicator and their descriptive statistics are shown in Table 4.9.

**Table 4.9: Descriptive Statistics for the Items Forming the Indicator Decision On Credit Acquisition by the Household**

Decisions	Descriptive Statistics		
	Total	Mean	SD
1 Decision access (obtain) credit	70	.288	.453
2 Decision on the use of acquired credit	106	.436	.496
<b>Decision on Credit</b>	<b>88</b>	<b>.362</b>	<b>.441</b>

The women decision in the acquisition and use of acquired credit was found to be (M=.362, SD=.441) on a scale of 0 to 1. The contribution of this indicator, decision on credit transaction to the empowerment of women was found to be low.

The index of household resources was then developed from the three indicators (ownership of land and assets, transactions on land and assets, decision on credit acquisition and use), they were summed up and averaged and the descriptive statistics are presented in Table 4.10.

**Table 4.10: Descriptive Statistics for the Index of Women Resources Index**

Indicators	Total	Mean	SD
1 Land and assets ownership	87	.360	.345
2 Land and assets transactions	78	.321	.444
3 Acquisition and use of credit	88	.362	.441
<b>Index of women resources</b>	<b>84</b>	<b>.348</b>	<b>.401</b>

The index of women resources was found to be (M=.348, SD=.401). the contribution of this indicator to the overall WEAI was found to be low.

#### 4.4.2 Household Production Domain

The second domain of the WEAI is household production. The domain has three indicators, as follows: the decision on the use of inputs, extent of decision and the ability to make independent decision.

The first indicator of the household production, the household decision in the use of inputs, was operationalized using question items that determined who made the decision in the use of household inputs in agricultural production. The answers were scored using 0-2 score, where 0 was score for husband only indicating a zero level of empowerment, 1 = where the decisions were made jointly by the man and the wife and 2 where the decision was made solely by the woman alone, indicating a higher level of empowerment. The descriptive statistics for this indicator is shown in Table 4.11.

**Table 4.11: Descriptive Statistics of the Household Decision Indicator on Agricultural Production**

	Use of Inputs in Production	Descriptive Statistics		
		Total	Mean	SD
1	Growing of Cash crops	83	.382	.487
2	Wheat	86	.353	.479
3	Potatoes	139	.572	.495
4	Growing of food crops	88	.362	.481
5	Maize	141	.580	.494
6	Beans	159	.654	.476
7	Potatoes	86	.363	.479
8	Cabbages	87	.368	.480
9	Livestock raising	78	.321	.467
10	Dairy animals	78	.321	.467
11	Sheep and Goats	80	.329	.470
12	Poultry	129	.530	.500
	<b>Index of Household Decision on Agricultural Production</b>	<b>103</b>	<b>.426</b>	<b>.414</b>

The index of women decision in agricultural production was found to be ( $M=.426$ ,  $SD=.414$ ) on a scale of 0 to 1. The contribution of women decision in agricultural production to women empowerment was low.

The second indicator of the household decision making on agricultural production was the extent of decision making by women in the household on agricultural production activities if they wanted to. The descriptive statistics of the indicator items are shown in Table 4.12.

**Table 4.12: Descriptive Statistics of the Indicator Items for Extent of Household Decision Making on Agricultural Production**

	Production Activities	Extent of making personal decision		
		Total	Mean	SD
1	Agricultural production	410	1.71	1.04
2	Inputs to buy	410	1.71	1.04
3	Type of crops to grow	496	2.04	1.08
4	Collaboration in field	401	1.65	1.04
5	What to take to market	441	1.81	1.08
6	When to take to market	474	1.95	1.19
7	Who to take to market	441	1.81	1.08
8	Engage in livestock raising	379	1.55	1.13
9	Cut and carry grass to animal	367	1.46	1.00
10	Take animal to grazing	330	1.36	.991
11	Take animals to water	372	1.53	1.08
12	Milking of animals	372	1.53	1.08
	<b>Extent of Decision Making</b>	<b>407</b>	<b>1.67</b>	<b>.895</b>

The extent to which the women can make personal decisions on agricultural production activities in the household if she wanted to was measured on a scale of 0 to 3 (0= no decision made, 1=some decision, 2= moderate decision, and 3= highest extent of decision made). The extent of women decision making was found to be ( $M=1.67$ ,

SD=.895). The contribution of extent of decision making by the women to empowerment was found to be moderate.

The third indicator for the household decision making in agricultural production activities was the personal ability in understanding the motivation for their decisions making in agricultural production activities. The descriptive statistics for the indicator items are shown in Table 4.13.

**Table 4.13: Descriptive Statistics for the Indicator Items for Personal Ability and Motivation in Decision Making for Agricultural Production Activities**

Agricultural Production Activity	Decision based on		
	Total	Mean	SD
1 Agricultural production	203	.836	.371
2 Inputs to buy	203	.836	.371
3 Type of crops to grow	217	.893	.800
4 What to take to market	203	.835	.371
5 Who to do the marketing	209	.860	.347
6 When to take to the market	204	.839	.367
7e Livestock raising	205	.843	.363
8 Take animals to grazing	194	.798	.402
9 Cut grass	182	.749	.434
10 Milking	94	.386	.488
11 Take animals to water	68	.279	.448
<b>Personal Ability and Motivation</b>	<b>180</b>	<b>.741</b>	<b>.299</b>

The personal ability and motivation in making decisions about agricultural production by women was found to be (M=.741, SD= .299). The contribution of this indicator ability and motivation to the empowerment of women was found to be high.

The index of agricultural production was then computed by adding and averaging the three indicators (production activities, extent of decision making, and personal ability and motivation) forming this index, the descriptive statistics of the indicators and index are summarized in Table 4.14

**Table 4.14: Descriptive Statistics for the Index of Women Decisions in Agricultural Production**

<b>Indicators</b>	<b>Total</b>	<b>Mean</b>	<b>SD</b>
1 Agricultural production decision	103	.426	.414
2 Extent of decision making	407	1.67	.895
3 Personal ability and motivation	180	.741	.299
<b>Indicator of Agricultural production</b>	<b>231</b>	<b>.948</b>	<b>.374</b>

The indicator of women involvement in agricultural production decisions in the household was developed based on the three indicators (agricultural production decisions, extent of decision making and personal ability and motivation in decision making). The indicator was found to be (M=.948, SD=.374), which had a high contribution to the WEAI.

#### **4.4.3 Household Income Domain**

The third domain of the WEAI was the household income domain. The domain had three indicators depicting sole or joint control over the use of income and expenses on agricultural production. The descriptive statistics of the indicators of income are shown in Table 4.15.

**Table 4.15: Descriptive Statistics for the Indicators of the Use Household Income Decision Making**

Use of Income	Who makes the decision?		
	Total	Mean	SD
1 Use of income generated from farm production	87	.358	.480
2 Use of income from wage or salary employment	97	.399	.490
3 Use of income generated form income generating activities (IGA)	95	.390	.498
<b>Household Income Decision Making</b>	<b>93</b>	<b>.382</b>	<b>.463</b>

#### 4.4.4 Household Leadership (or Agency) Domain

The fourth domain of the WEAI was the leadership in the community or agency. This domain was operationalized by use of three indicators, that included: membership to social groups, recognizing the value of social capital and being comfortable speaking in public over community issues. The first indicator assessed the number of membership to social groups. The descriptive statistics of household membership to social groups are shown in Table 4.16.

**Table 4.16: Descriptive Statistics of the Indicator Household Membership to Social Groups**

Groups	Membership		
	Total	Mean	SD
1 Agricultural production groups	141	.580	.494
2 Forest users groups	104	.428	.495
3 Water users groups	110	.425	.498
4 Credit or Microfinance groups	152	.625	.484
5 Mutual help or insurance groups (including burial groups)	159	.654	.476
6 Trade and business associations	137	.563	.495
7 Civic and charitable groups	127	.522	.500
8 Local government groups (chief)	212	.872	.334
9 Religious groups	226	.930	.255
10 Trade and business associations	109	.448	.498
<b>Women membership to groups</b>	<b>147</b>	<b>.607</b>	<b>.287</b>

The second indicator for the household leadership or agency was the indicator depicting the ease in which the women could speak in public about community issues. The comfortability in speaking was assessed and the descriptive statistics are shown in Table 4.17.

**Table 4.17: Descriptive Statistics for the Indicator of Ease in Speaking in Public**

	<b>Groups</b>	<b>Descriptive Statistics</b>		
		<b>Total</b>	<b>Mean</b>	<b>SD</b>
1	Ease in speaking on infrastructure (roads, small wells)	12	.049	.217
2	Protest the misbehaviour of the authorities	9	.037	.189
3	Speak about proper payment of wages for public works	9	.037	.189
4	Speaking in Groups leadership	31	.127	.334
	Speaking in Religious groups	60	.249	.432
	<b>Index of Ease of Public Speaking</b>	<b>24</b>	<b>.099</b>	<b>.206</b>

The indicator, ease of speaking in public was found to be (M=.099, SD=.206). The contribution of this indicator to the WEAI was found to be low.

The indicator of women leadership or agency was then created by summing up the three indicator items (membership to social groups, speaking of the value of social capital, and ease of women speaking in public) and averaging them. The descriptive statistics for the indicator and indicator items are shown in Table 4.18.

**Table 4.18: Descriptive Statistics for the Index of Women Leadership (Agency) Index**

	<b>Indicators</b>	<b>Total</b>	<b>Mean</b>	<b>SD</b>
1	Membership to groups	147	.607	.287
2	Speaking in public	24	.099	.206
3	Speaking on value of social capital	24	.099	.206
	<b>Women Leadership (Agency)</b>	<b>85</b>	<b>.269</b>	<b>.167</b>

The indicator of women leadership or agency was found to be (M=.269, SD=.157). The contribution of this indicator to WEAI was found to be low.

#### **4.4.5 Household Time Allocation Domain**

The fifth domain of the WEAI was the Household time allocation for agricultural production and domestic tasks and the satisfaction with the time available for leisure.

The domain had two indicators, which included: time spent on primary and secondary work related activities in a 24-hour period and the satisfaction with the time allocated for leisure pursuits.

The first indicator of the household time allocation for agricultural and domestic tasks was the subjective assessment by the women of the adequacy of time allocated for leisure pursuits. The indicator items were scored as dummy variables (or 0,1 variables). The descriptive statistics of the indicator items for time allocated for leisure pursuits are given in Table 4.19.

**Table 4.19: Descriptive Statistics of the Women Satisfaction with Time Allocated for Leisure**

	Indicator items for Leisure	Descriptive Statistics		
		Total	Mean	SD
1	Visiting neighbours	22	.090	.287
2	Listening to radio	209	.860	.347
3	Watching TV	87	.358	.480
4	Seeing movies	16	.055	.248
5	Doing Sports	14	.057	.233
6	Meeting with friends	128	.526	.500
7	Relaxing in bed	140	.576	.495
8	Health related activities	87	.358	.480
9	Beauty (hair and body)	113	.465	.499
10	Massage	54	.222	.416
	<b>Leisure allocation</b>	<b>87</b>	<b>.358</b>	<b>.157</b>

The indicator adequacy of leisure pursuits by the women was found to be (M=.368, SD=.157). The contribution of this indicator to WEAI was found to be low.

The quantitative assessment of the time allocated by women for work related activities in a 24-hour period are summarized in Table 4.20 using descriptive statistics.

**Table 4.20: Descriptive Statistics of the Women Satisfaction with Time Allocated for Leisure**

	Indicator items for work related activities	Descriptive Statistics		
		Total	Mean	SD
1	Time allocated to work in a 24hr day	2098	8.6	2.41
2	Adequacy of workload (below 10.5 hrs. /day)	35	.44	.351
3	Leisure related activities	87	.358	.157
	<b>Time allocation</b>	<b>81</b>	<b>.251</b>	<b>.184</b>

Time allocation for work and leisure by the women was found to be (M=.251, SD=.184).

#### 4.4.6 Women Empowerment Index (WEAI) for Njoro Sub-County

The index of women empowerment in agriculture index (WEAI) for the women living in Njoro sub-county was finally developed by combining the five domains already described. The descriptive statistics for the index are contained in Table 4.21.

**Table 4.21: Descriptive Statics for the Domains of the Women Empowerment Index (WEAI) in Njoro**

Domains	Descriptive Statistics			
	Total	Mean	SD	Alpha
Household Resources	84	.348	.401	
Household Agricultural Production	230	.948	.374	
Household Income	93	.382	.463	
Household Leadership (Agency)	65	.269	.167	
Household Time Allocation	61	.251	.184	
<b>WEAI</b>	<b>106</b>	<b>.439</b>	<b>.196</b>	

The WEAI for Njoro women was found to be (M=.439, SD= .196) on a scale of 0 to 1, this was taken to be low level of empowerment. The indicator that contributed the most to this index was household agricultural production (M=.948, SD=.374), followed by household income (M=.382, SD=.463), household resources (M=.348, SD=.401), leadership or agency (M=.269, SD= .167), and finally time allocation (M=.251, SD=.184). The index was divided into ten categories and the descriptive statistics were calculated and are shown in Table 4.22.

**Table 4.22: Categories of the WEAI for Njoro Women**

Categories	Description	Frequency	Percent
.01-.10		4	1.6
.11-.20		12	4.9
..21-30		38	15.6
.31-.40		88	36.2
.41-.50		22	9.1
.51-.60		20	8.2
.61-.70		21	8.6
.71-.80		30	12.3
.81-.90		5	2.1
.91-1.0		3	1.2
<b>Total</b>		<b>243</b>	<b>100.0</b>

Mean .439±.012, Median .358, Mode .310, SD .196, minimum .05, maximum .99

The chi-square for the equality of categories was conducted for WEAI and the results are presented in Table 4.23.

**Table 4.23: Chi-square Test for Equality of Categories for the WEAI**

Categories	Description	Observed	Expected	Residual	Statistics
		N	N		
.01- .10	Extremely low	4	24.3	-20.3	$\chi^2=234.65$ $df=9$ $p<.001$
.11- .20		12	24.3	-12.3	
.21- .30		38	24.3	13.7	
.31- .40		88	24.3	63.7	
.41- .50	Medium	22	24.3	-2.3	
.51- .60		20	24.3	-4.3	
.61- .70		21	24.3	-3.3	
.71- .80		30	24.3	5.7	
.81- .90	Extremely high	5	24.3	-19.3	
.91- 1.0		3	24.3	-21.3	
<b>Total</b>		<b>243</b>			

The chi-square test (Table 4.23) revealed statistical ( $p < .001$ ) significant differences among the different WEAI categories of the participants. The WEAI category of (.31-.40) was found to be statistically significantly ( $\chi^2=234.65, df = 9, p < .001$ ) higher than the other categories, indicating that the majority of the women empowerment were at this level (below the medium level).

#### **4.5 Household Sustainable Land Use Management Practices**

The second objective for this study was to determine the level of sustainable land use management practices undertaken by women in Njoro sub-county. The dependent variable for this study was the sustainable land use management practices (SLUMP) undertaken by small scale farmers in Njoro sub-county. The variable was conceptualized as a multi-indicator index composed of the number of sustainable land use practices undertaken by a farmer. The farmers were asked to state the different sustainable land use management practices they used on their farms and this was verified by the researcher through physical observation of the practice. The practices included 20 different practices listed in Table 4.24: intercropping, minimum tillage, manure preparation and application, mulching, planting on contours, growing perennial crops, rain water harvesting, terraces, cut off drains, gabions, contouring, afforestation, grass strips, Napier grass planting, restoration/revegetation, grazing management, weed control, enclosures, riparian zones protection and agroforestry (a mixture of annual crops and woody perennial).

The women were asked to state the SLUM practices they had or practiced on their land out of the list of 20 identified for them. The information was converted into to a dummy or a 0, 1 variable. The household that was found to be applying a given SLUM practice

was given a score of one (1) for the particular practice and a score of zero (0) for not having the practice.

The individual woman's practices were then summed together and analyzed to show the level of land use management practice on a scale of 0 to 1. The sum total, the mean and standard deviation of the calculated scores for each woman, the sustainable land use management practices are shown in Table 4.24.

**Table 4.24: Descriptive Statistics for SLUM Practices Women Farmers are Involved in Njoro Sub-county**

Sustainable Land Use Management Practices	Descriptive Statistics		
	Sum	Mean	Std. dev
Manure composting and application	184	.757	.429
Intercropping	183	.753	.432
Minimum tillage	178	.732	.443
Weed control	169	.695	.461
Grassed fallows /trash lines	154	.633	.482
Grazing management	152	.625	.484
Napier grass planting	151	.621	.486
Fodder plots (enclosures)	151	.621	.486
Mulching	149	.613	.488
Restoration/revegetation	147	.604	.489
Planting on contours	146	.648	.478
Growing perennial crop	141	.580	.494
Agroforestry practices	136	.633	.490
Grass strips	133	.547	.498
Contour planting	125	.514	.500
Rain water harvesting	123	.506	.500
Cut off drains	109	.484	.500
Contour furrows	91	.404	.491
Terraces on farms	68	.279	.449

A ranked list of all the twenty (20) sustainable land use management practices undertaken by women farmers in Njoro sub-county are shown in Table 4.24 The SLUM practice undertaken by most women was manure composting and application

(M=.757), on a scale of 0 to 1, while making terraces on the farm was least used practice (M=.279).

The index of level of sustainable land use management practice for women farmers in Njoro sub-county was determined by adding the scores for each practice undertaken by the farmer, this created an index with a scale of 0 to 20, 0 indicating no use and 20 indicating a high level of use by the household. The descriptive statistics and the frequency distribution for the index are shown in Table 4.25.

**Table 4.25: Descriptive Statistics and Frequency Distribution of the SLUM Index**

<b>Index of SLUM Practice</b>	<b>Frequency</b>	<b>Percent</b>
0-2	35	14.4
3-5	11	4.5
6-8	30	12.3
9-11	28	11.5
12-14	59	24.3
15-17	52	21.4
18-20	28	11.5
<b>Total</b>	<b>243</b>	<b>100.0</b>

Mean  $11.16 \pm .38$ , Median 13, mode 0, SD 5.98, minimum 0, maximum 20

The mean of the dependent variable, Sustainable land use management practices for women in Njoro sub-county was found to be (M=11.6, SD=5.9) on a scale of 0 to 20.

A chi-square test for the equality of the categories was conducted and the results are given in Table 4.26.

**Table 4.26: Chi-square Test for the Equality of Categories for the SLUM Index**

<b>Index Categories</b>	<b>Observed N</b>	<b>Expected N</b>	<b>Residual</b>	<b>Statistics</b>
0-2	35	34.7	.3	$\chi^2=45.03$ $df=6$ $p<.001$
3-5	11	34.7	-23.7	
6-8	30	34.7	-4.7	
9-11	28	34.7	-6.7	
12-14	59	34.7	24.3	
15-17	52	34.7	17.3	
18-20	28	34.7	-6.7	
Total	243			

The chi-square test revealed statistical ( $p < .001$ ) significant differences among the different categories of household level of sustainable land use management practices.

The category of medium (12-14) was statistically significantly ( $\chi^2=45.03$ ,  $df = 6$ ,  $p < .001$ ) higher than the other categories, indicating that the majority of the households had a medium level of SLUM practices in Njoro sub-county.

#### **4.6 Contribution of Women Empowerment to Sustainable Land Use Management**

The third objective of this study was to determine the extent of the contribution of women empowerment to sustainable land use management practices undertaken by small-scale farmers in Njoro sub-county.

##### **4.6.1 Contribution of WEAI on the SLUM Practices**

The independent variable was the women empowerment of small scale farmers in Njoro, while sustainable land use management practices was the dependent variable.

The contribution of women empowerment on Sustainable land use management practices was determined by the use of simple linear regression. The results of the regression model are shown in Table 4.27.

**Table 4.27: Regression Model Summary for Women Empowerment and Sustainable Land Use Management Practices**

<b>R</b>	<b>R Square</b>	<b>Adjusted R Square</b>	<b>Std. Error of the Estimate</b>
.244	.121	.117	5.53

The model indicates an adjusted  $R^2$  value of .117; meaning that the independent variable women empowerment explained approximately 11.7 % of the variation in the dependent variable sustainable land use management practices undertaken by women.

The  $F$  test for the regression model are shown in the ANOVA Table 4.28.

**Table 4.28: ANOVA Table for the Regression Testing the Fit of the Model**

	<b>Sum of Squares</b>	<b>df</b>	<b>Mean Square</b>	<b>F</b>	<b>p</b>
Regression	178.700	1	178.700	5.081	.025 <sup>b</sup>
Residual	8475.382	241	35.168		
Total	8654.082	242			

The overall regression model was found to be significant ( $F(1, 241) = 5.08, p=.025$ ).

The regression coefficients of the model showing the *beta*, *t* statistics and the collinearity statistics are shown in Table 4.29.

**Table 4.29: Regression Coefficients for WEAI and Sustainable Land Use Management**

	<b>Unstandardized Coefficients</b>		<b>Standardized Coefficients</b>	<b>t</b>	<b>p.</b>	<b>Collinearity Statistics</b>
	<b>B</b>	<b>Std. Error</b>	<b>Beta</b>			
(Constant)	9.249	.933		9.917	.001	
WEAI	4.364	1.936	.144	2.254	.025	1.000

The regression analysis shows that WEAI had statistically significant ( $\beta = .144$ ,  $t = 2.254$ ,  $p = .025$ ) contribution to the Sustainable land use management practices undertaken by women farmers in Njoro sub-county.

#### 4.7 Level of Sustainable Land Use Management Practices in Njoro, Kihingo and Nessuit Location

The fourth objective of this study was to compare the levels of sustainable land use management practices in three locations (Njoro, Kihingo and Nessuit) in Njoro sub-county. The independent variable (or factor Location) was described in 4.3.1 The dependent variable, sustainable land use management practices has been described in section 4.5.

The comparison of the different level of SLUMP in the three locations was by comparing the means of the three locations using analysis of variance (ANOVA). The descriptive statistics of SLUMP for the three locations (Njoro, Kihingo, and Nessuit) are shown in Table 4.30.

**Table 4.30: Descriptive Statistics for SLUMP in the Three Locations**

	<b>n</b>	<b>Mean</b>	<b>Standard. Deviation</b>	<b>Std. Error</b>	<b>Minimum</b>	<b>Maximum</b>
Njoro	45	14.02	4.73	.705	.00	20.00
Kihingo	136	9.47	6.31	.541	.00	20.00
Nessuit	62	12.82	4.72	.600	6.00	20.00
<b>Total</b>	<b>243</b>	<b>11.16</b>	<b>5.98</b>	<b>.383</b>	<b>.00</b>	<b>20.00</b>

The three SLUMP means for the three locations Njoro (M=14.2), Kihingo (M=9.47) and Nessuit (M=12.8) were found to be different. The differences in the three means

were tested using the ANOVA for the equality of means and the results are given in Table 4.31

**Table 4.31: ANOVA for the Equality of Means**

	Sum of Squares	<i>df</i>	Mean Square	<i>F</i>	<i>p.</i>
Between Groups	928.174	2	464.087	14.417	.001
Within Groups	7725.909	240	32.191		
Total	8654.082	242			

The ANOVA test for the three means was found to be statistically significant ( $F(1, 240) = 14.41, p=.001$ ), indicating that at least one of the three means was significantly different from the others. The multiple mean comparisons using Tukey HSD are shown in Table 4.32.

**Table 4.32: Multiple Mean Comparisons for SLUMP Using Tukey HSD**

<b>(I) Locality</b>	<b>(J) Locality</b>	<b>Mean Difference</b>		
		<b>(I-J)</b>	<b>Std. Error</b>	<b><i>p</i></b>
Njoro	Kihingo	4.55	.975	.001
	Nessuit	1.19	1.111	.528

The mean differences for the sustainable land use management practices for Njoro and Kihingo were significant statistically ( $p<.001$ ) with a mean difference of 4.5, while the mean difference between Njoro and Nessuit was not significant ( $p >.05$ ).

## **CHAPTER FIVE**

### **DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS**

#### **5.1 Introduction**

This chapter presents the summary of the study, discussion of the results, conclusions of the study and the recommendations made.

#### **5.2 Summary of the Study**

This study aimed at assessing the contribution of women empowerment on sustainable land use management practices undertaken by farmers in Njoro sub-county. Five domains of the independent variable women empowerment in agriculture index (household resources, agricultural production, household income, women time allocation and women leadership or agency) were considered. Twenty sustainable land use management practices undertaken by farmers in Njoro sub-county were considered for the dependent variable.

In achieving the study objectives, primary data was used, which was collected using a structured questionnaire that was organized according to the key thematic areas corresponding to specific objectives of the study. The study then utilized descriptive and inferential statistics to analyse the data.

The results indicated that women empowerment among women small-scale farmers in Njoro sub-county was found to be low. The level of sustainable land use practices undertaken by farmers was of medium level and varied within the three locations covered in this study. Women empowerment had statistically significant contribution to the implementation of sustainable land use management practices in Njoro sub-county.

### **5.3 Discussions**

The findings for this study are discussed in this section based on the specific objectives of the study as stated in section 1.4 of this thesis.

#### **5.3.1 Women Empowerment in Agriculture Among Women Farmers**

The women empowerment in agriculture was determined using the women empowerment in agriculture index (WEAI) developed by Alkire (2013). The level of women empowerment among women small-scale farmers in Njoro sub-county was found to be low. The levels of the different dimensions for the Njoro women were comparable to the ones found in Nigeria by Kehinde et al. (2021). The five domains (5-DE) considered by this index of women empowerment (household resources, agricultural production, household income, women leadership or agency and time allocation for work and leisure), only women involvement in agricultural production was found to be of a higher level compared to the other four domains. This is a common observation in situations found in East Africa in that the women tend to be more involved in agricultural production, though they don't own the enabling resources needed for production (Miedema et al., 2018).

The levels of women empowerment can be enhanced through social support, land rights, legal rights, land entitlements (Aziz et al., 2020; Goldman et al., 2016).

#### **5.3.2 Level of Sustainable Land Use Management Practices for Women Farmers in Njoro Sub-County**

The level of sustainable land use management practices (SLUMP) for women farmers in Njoro sub-county was found to be of medium level. The variable was measured by considering twenty (20) practices undertaken by farmers. The practices that were found

to be common were manure composting and application, intercropping and minimum tillage. Studies have shown that when power to women was enhanced through inclusion in the various organs of decision making within the different areas of the agricultural management, this enhanced their land use planning and the application of management practices that were sustainable (Mbawala & Yihuan, 2018). Aziz et al. (2021) in their study of women empowerment in Pakistan, they found that when women in agricultural areas were empowered, they increased their application of land use management practices and this improved their food security.

### **5.3.3 Contribution of Women Empowerment to Sustainable Land Use Management Practices**

Women empowerment in agriculture was found to contribute positively to the use of sustainable land use management practices among farmers in Njoro sub-county. The application of sustainable land use management practices by farmers requires collective action in the form of cooperation among multiple stakeholders and coordination of different activities, which are enhanced by empowerment of the women (Kim, 2021).

## **5.4 Conclusions**

The following conclusions were made from this study:

- (i) The level of women empowerment using the WEAI in Njoro sub-county was found to be low
- (ii) The level of sustainable land use management practices undertaken by women farmers in Njoro sub-county were found to be of medium level and they levels varied within the three locations (Njoro, Kihingo, and Nessuit).
- (iii) Women empowerment contributed positively to the levels of sustainable land use management practices in Njoro sub-county.

- (iv) The levels of sustainable land use management practices undertaken by women farmers in Njoro sub-county were found to vary significantly among the three locations (Njoro, Kihingo and Nessuit) studied.

### **5.5 Recommendations**

Based on the findings of the study, the following recommendation was made:

Women empowerment is a valid and important concept which needs to be considered when managing agricultural land resources. The five domains of women empowerment (WEAI) can be targeted for development by policy makers.

### **5.6 Recommendations for Further Research**

In future comparison of the different indices used in assessing women empowerment need to be done and a comprehensive index be developed and recommended for use among rural women and development projects.

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## APPENDICES

### Appendix A: Participants Letter

**Dear Participant,**

#### **RE: REQUEST FOR YOUR PARTICIPATION IN SURVEY**

My name is Hafsa Ahmed Mohamed and I am a Master of Science student in the Department of Environment and Natural Resources at the Africa Nazarene University. Currently I am conducting a research study entitled “*Women Empowerment and its contribution to sustainable land use management in Njoro, Nakuru County, Kenya*” You have been identified and selected for this study. The purpose of this letter is to request you to participate in this study by providing the information about your household. The information obtained is strictly for academic purpose and shall be treated with utmost confidentiality.

Thank you,

**Hafsa Ahmed Mohamed**  
(18S01DMEV004)  
Researcher.

## Appendix B: Household Questionnaire

My name is Hafsa Ahmed Mohamed (18S01DMEV004) and I am a Master of Science student in the Department of Environment and Natural Resources at the Africa Nazarene University. conducting a research study entitled “*Women Empowerment and its contribution to land use management in Njoro, Nakuru County, Kenya*” You have been identified and selected for this study. The purpose of this interview schedule is to request you to participate in this study by providing information sought. The information obtained is strictly for academic purpose and shall be treated with utmost confidentiality.

### Instructions

Please answer all questions appropriately and tick () all that apply

### Part I: Demographic Information

Age: \_\_\_\_\_

Marital Status: \_\_\_\_\_ (Married/ Single/ Widow/ Divorced/

Ethnicity (tribe): \_\_\_\_\_

Household number: \_\_\_\_\_

Number of children: Boys \_\_\_\_\_ Ages \_\_\_\_\_

Number of children: Girls \_\_\_\_\_ Ages \_\_\_\_\_

Number of adults: men \_\_\_\_\_ age \_\_\_\_\_

Number of adult: women \_\_\_\_\_ ages \_\_\_\_\_

Education level: Kindly indicate your highest and partner’s academic qualification

Highest academic level	Myself	Partner
Never went to school		
Lower primary (1-4)		
Upper primary (5-8)		
K.C.S.E (form 4)		
A’ Level		
Teacher (P1)		
College (diploma)		
Undergraduate degree		
Masters and above		
Other (specify)		

Professional training: \_\_\_\_\_

Type of enterprise involved in: \_\_\_\_\_

Give some details of the enterprise: \_\_\_\_\_

Experience in business (no of years in same business): \_\_\_\_\_

Income

Amount per month (self): \_\_\_\_\_ source:

Amount per month (spouse): \_\_\_\_\_ source: \_\_\_\_\_

Other income sources: \_\_\_\_\_ (Yes/No)

Explain the sources: \_\_\_\_\_

Amount of income from other sources: \_\_\_\_\_

Residence (homestead):

Ownership of house: \_\_\_\_\_ (own house/ rental house)

Type of house:

Material used: \_\_\_\_\_ (wooden, mud, stone)

Number of rooms: \_\_\_\_\_

Distance from town: \_\_\_\_\_

## Women Empowerment Index (WEI)

### FIRST DOMAIN: RESOURCES

Ownership, access to land and assets and decision in the acquisition and use credit

#### 1. Who owns land and assets in the household? (sole ownership or joint)

	Land and Assets	Husband only	Joint ownership	Sole ownership
	Agricultural land			
	Non-agricultural			
	Large and small livestock			
	Fish ponds			
	Farm equipment (tractor, implements)			
	House / Store			
	Household durables (table, bed, cooker)			
	Means of transport			
	Livestock			
	Cell phones			

#### 2. Who makes decision regarding the purchase, sale or transfer of land and assets?

	Land and assets	Who makes the decisions?		
		Husband only	Joint decisions (man and wife)	Sole decisions (wife only)
a	Decision in the purchase of agricultural land			
	Decision in the sale of non-agricultural land			
	Decision in the transfer of land			
	Decision in the purchase of assets			
	Decision in the sale of assets			
	Decision in the transfer of assets			

## 3. Who makes decision to access (obtain) and utilize credit in the household?

	Autonomy	Who makes the decisions?		
		Husband only	Joint decisions (man and wife)	Sole decisions (wife only)
a	Decision access (obtain) credit			
	Decision on the use of acquired credit			

**DOMAIN TWO: PRODUCTION**

Who makes decision in the household about agricultural production of food and cash crop farming. Whether it is sole decision of the woman, sole decision of the husband or joint decision of both the wife and the husband,

1. Who makes the decision in the household to use agricultural inputs in farm production. inputs Decision on agricultural production of food and cash crop

Determine how the man and wife (dual-adult) make decision either sole or joint decision making

	Use of inputs in	Who makes the decision?		
		Husband only	Joint decisions (man and wife)	Sole decisions (wife only)
a	Growing of Cash crops			
	Wheat			
	Potatoes			
b	Growing of food crops			
	Maize			
	Beans			
	Potatoes			
	Cabbages			
c	Livestock raising			
	Dairy animals			
	Sheep and Goats			
	Poultry			

2. The extent to which the women can make personal decisions about the following household activities related to agricultural production if she wanted to

	Production Activities	Extent of making personal decision by women			
		None	low extent	moderate	High extent
1	Agricultural production				
2	Inputs to buy				
3	Type of crops to grow				
4	Collaboration in field				
5	What to take to market				
6	When to take to market				
7	Who to take to market				
8	Engage in livestock raising				
9	Cut and carry grass to animal				
10	Take animal to grazing				
11	Take animals to water				
12	Milking of animals				

3. Personal ability in understanding of the situation and how you (woman) balance different motivation such as to avoid punishment from husband or social disapproval and to act on own values.

My action in (name the activity\*) decision is based on:

- (i) I will get into problem with someone
- (ii) Other don't look poorly of me
- (iii) I think it is the right thing to do

Scale of the extent: 1=Never true, 2= Not very true, 3=Somewhat true, 4= Always true

	Activity	Decision based on (women, husband, jointly)	Scale of extent			
			1	2	3	4:
1	Agricultural production					
2	Inputs to buy					
3	Type of crops to grow					
4	What to take to market					
5	Who to do the marketing					
6	When to take to the market					
7e	Livestock raising					
8	Cut grass					
9	Milking					
10	Take animals to grazing					
11	Take animals to water					

**DOMAIN THREE: INCOME**

Sale or joint control over use of income and expenditure. The degree of input into decisions about use of income generated from productive income generating activities (IGA).

	Use of income	Who makes the decision?		
1	Use of income generated from farm production	Woman only	Joint decision	Husband only
2	Use of income from wage or salary employment			
3	Use of income generated from income generating activities (IGA)			

**DOMAIN FOUR: LEADERSHIP (AGENCY)**

Leadership in the community, which can be measured by;

- (i) Membership in economic and social groups
- (ii) Comfortable in speaking in public
- (iii) Recognizing social capital as a resource

## 1. Membership to social groups

	Groups	Membership
1	Agricultural production groups	
2	Forest users groups	
3	Water users groups	
4	Credit or Microfinance groups	
5	Mutual help or insurance groups (including burial groups)	
6	Trade and business associations	
7	Civic and charitable groups	
8	Local government groups (chief)	
9	Religious groups	

## 2. Comfortable speaking in public about community issues

	Groups	Speak in public	Extent
1	Ease in speaking on infrastructure (roads, small wells)		
2	Protest the misbehavior of the authorities		
3	Speak about proper payment of wages for public works		
4	Groups leadership		

## DOMAIN FIVE: TIME

The allocation of time to productive and domestic tasks and the satisfaction with time available for leisure activities. The indicators for this domain include: the time spent on primary and secondary activities in a 24-hour period.

Two activities (primary and secondary) can be conducted simultaneously (such as taking care of the baby while cooking). This will be taken as the amount of time spent in work related tasks in primary activity plus 50 % of the time in work related tasks for secondary activities.

When the woman works more than 10.5 hours per day it can be interpreted that she does not have enough time for leisure and has an excess work-load

	Indicator	Primary Time (hours)	Secondary (50% of primary)	Total Time
	<b>Primary functions</b>			
	Digging (farm work)			
	Feed animals			
	Water animals			
	Farm work (digging, planting, harvesting, chemical)			
	Kitchen work (cooking, washing utensils, preparation of food)			
	House chores (sweeping, wash floor)			
	Washing clothes for family			
	Shopping (market. Shop)			
	Marketing of products			
	Purchasing of inputs			
	<b>Secondary (done with primary) such as cooking and watching baby. Are calculated as 50% of the primary</b>			
	Watch baby and cook			

2 Satisfaction with the available time for leisure: are you satisfied with your leisure time

	Indicator of leisure	Adequate (1)	Inadequate (0)
1	Visiting neighbor		
2	Listening to radio		
3	Watching TV		
4	Seeing movies		
5	Doing Sports		
6	Meeting with friends		
7	Relaxing in bed		
8	Health related activities		
9	Beauty (hair and body)		
10	Massage		

1. Women empowerment in knowledge

Activity	Yes /No	If yes, how much	
Computer literacy			
Communication (phone and credit)			
Health services (family planning)			
Commanded by spouse			
Drive family car			

2. Access to extension services (

Activity	Yes /No
Access to training	
Access to agricultural information	
Access to agricultural technologies	
Access to credit	
Access to inputs	

### Sustainable Land use management practices undertaken by the households in their fields

Indicate how much of the following practices are undertaken by

Land use management Practices	Not done	Slightly done	Moderately done	Much done
Cropping systems				
Minimum tillage				
Manure application				
Mulching with crop waste				
Planting on the contours				
Growing of perennial crops (bananas, sweet potatoes,				
Land conservation practices				
Terraces				
Cut off drains				
Planting bamboos on slopes				
Contouring				
Afforestation				
Grass strips				
Napier grass				
Agroforestry (crops and trees)				
Re-vegetation of damaged fields				
Grazing management				
Removal of weeds from pasture				

### Appendix C: Sample Size Determination Table

Table for Determining Sample Size using Kjerchie and Morgan (1970) for a Finite Population

<i>N</i>	<i>S</i>	<i>N</i>	<i>S</i>	<i>N</i>	<i>S</i>
10	10	220	140	1200	291
15	14	230	144	1300	297
20	19	240	148	1400	302
25	24	250	152	1500	306
30	28	260	155	1600	310
35	32	270	159	1700	313
40	36	280	162	1800	317
45	40	290	165	1900	320
50	44	300	169	2000	322
55	48	320	175	2200	327
60	52	340	181	2400	331
65	56	360	186	2600	335
70	59	380	191	2800	338
75	63	400	196	3000	341
80	66	420	201	3500	346
85	70	440	205	4000	351
90	73	460	210	4500	354
95	76	480	214	5000	357
100	80	500	217	6000	361
110	86	550	226	7000	364
120	92	600	234	8000	367
130	97	650	242	9000	368
140	103	700	248	10000	370
150	108	750	254	15000	375
160	113	800	260	20000	377
170	118	850	265	30000	379
180	123	900	269	40000	380
190	127	950	274	50000	381
200	132	1000	278	75000	382
210	136	1100	285	100000	384

Note.—*N* is population size. *S* is sample size.

Source: Krejcie & Morgan, 1970

## Appendix D: Table of Random Numbers

Table of Random Numbers

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
1	8	0	9	4	2	5	2	5	8	2	4	7	1	3	4	7	7	4	3	3	3	6	2	0	1	8	9	7	2	1	3	4
2	3	5	6	3	2	1	9	8	8	2	1	1	9	0	4	5	2	6	1	8	2	7	5	1	2	6	2	7	1	0	9	5
3	1	3	3	0	6	3	3	1	3	7	5	3	9	6	9	3	8	7	3	8	6	8	1	5	1	5	3	8	8	5	4	3
4	3	5	6	5	0	0	1	6	2	2	4	3	6	4	3	2	4	7	9	6	6	0	9	5	5	2	8	3	1	6	2	0
5	7	8	5	0	5	9	2	6	5	5	8	8	7	3	1	1	2	1	9	2	4	5	4	5	3	5	3	0	5	5	8	9
6	4	4	9	0	5	4	1	7	9	7	2	7	6	1	5	3	5	9	0	1	4	8	7	8	9	9	8	0	9	8	7	7
7	6	6	4	5	9	1	0	4	9	3	1	8	8	8	1	9	7	5	3	7	2	7	8	5	9	3	7	3	2	4	4	5
8	9	6	2	6	5	9	9	5	1	2	1	5	9	7	5	3	9	2	2	3	5	6	5	8	2	9	4	4	2	8	9	9
9	4	6	6	5	4	8	2	0	7	5	5	4	0	6	1	2	9	6	8	3	4	2	5	1	9	1	3	8	1	7	0	9
10	6	4	9	8	7	5	1	9	0	4	7	4	7	8	1	8	6	8	3	2	9	6	8	3	9	8	7	2	4	0	9	0
11	6	7	2	2	9	8	6	9	9	3	6	1	7	8	7	5	4	8	8	3	1	3	1	5	9	6	7	9	8	8	3	4
12	9	7	4	8	5	9	3	2	5	1	1	5	2	7	2	1	0	0	3	3	9	3	0	3	9	7	1	3	4	0	1	2
13	5	6	4	1	1	4	1	7	1	4	1	9	7	4	3	4	8	1	6	5	7	3	6	8	1	2	1	8	5	0	3	9
14	7	4	4	4	9	2	0	0	8	8	4	0	5	8	8	2	4	3	9	8	3	9	0	4	9	1	9	9	9	3	3	6
15	8	2	7	9	3	0	1	9	4	6	7	2	3	7	4	3	3	9	7	9	4	6	8	9	9	0	2	1	6	9	9	0
16	0	1	6	1	7	6	1	7	1	0	2	4	2	3	8	7	2	8	9	1	6	6	7	7	1	5	8	5	2	4	8	2
17	7	3	8	8	9	7	5	9	7	5	5	5	6	6	2	4	9	9	7	7	2	0	0	8	5	5	9	6	9	7	4	0
18	7	8	3	0	4	7	1	4	3	6	9	5	2	9	1	9	1	8	0	4	4	0	4	4	1	0	3	4	2	5	9	7
19	9	8	8	7	4	2	1	6	6	5	2	6	4	5	3	5	8	4	3	0	5	2	7	0	9	8	0	5	0	7	8	8
20	1	2	6	1	2	5	1	6	8	5	6	9	2	3	1	0	3	9	3	9	8	7	0	3	9	8	4	1	0	3	5	3
21	3	9	4	7	4	9	3	7	7	6	3	4	2	5	4	3	6	2	3	9	7	4	5	5	2	0	5	5	7	7	9	5
22	4	5	5	0	8	1	0	3	1	2	5	0	2	3	0	4	1	1	3	8	9	7	8	8	9	1	4	4	4	5	2	6
23	1	3	4	4	9	6	9	7	2	3	8	3	6	9	7	6	6	2	5	1	4	2	0	1	2	0	3	8	6	5	5	2
24	8	9	7	6	5	8	2	3	8	4	8	7	0	4	5	0	3	1	0	6	9	1	6	6	2	7	1	7	7	6	0	1
25	7	7	1	0	9	9	4	3	6	9	7	8	8	2	7	3	9	7	1	4	9	7	0	0	1	5	6	6	2	8	8	9
26	6	9	5	9	6	0	0	8	8	4	4	2	2	2	8	2	1	5	2	4	2	5	1	7	5	8	1	8	0	0	8	1
27	7	9	4	1	2	3	1	2	2	4	3	1	6	7	0	2	9	9	8	4	3	4	6	9	3	0	8	5	4	7	6	2
28	2	2	8	4	0	8	9	6	9	1	0	7	5	5	4	2	7	3	1	9	3	7	8	2	1	0	6	8	9	5	7	4
29	9	5	9	4	7	4	1	6	9	3	6	5	6	0	4	5	1	1	8	3	5	9	1	6	9	5	9	9	1	1	4	3
30	4	6	1	3	8	5	4	9	6	3	6	9	3	2	0	8	5	1	0	9	9	6	8	0	1	1	6	8	6	1	3	3

Source: Forthofer, R.N., Lee, E.S., & Hernandez, M. (2007) *Biostatistics* (Second Edition). Academic Press.

## Appendix E: Photos from the Field



Photo 1: A typical field in Njoro with trees on the boundary. The field is ploughed waiting for planting



Photo 2: A ploughed field



Photo 3: A farm with a greenhouse and a poultry house



Photo 4: A small scale farm in Njoro location



Photo 5: A small scale farm in Nessuit



Photo 6: A farm in Kihingo



Photo 7: A farm in Kihingo planted with vegetables



Photo 8: ploughed farm



Photo 9: Kihingo





Photo: A field being ploughed using a tractor mounted with a mouldboard plough



Photo: A woman harvesting vegetables in her kitchen garden



Photo: A recently planted field



Farm planted with wheat



A ploughed farm





Farm after compost application

## Appendix F: Research Permit from ANU



21<sup>st</sup> February 2022

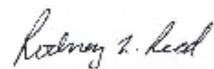
**RE: TO WHOM IT MAY CONCERN**

---

Xafsa Mohamed (18S01DMEV004) is a bonafide student at Africa Nazarene University. He has finished his course work and has defended his thesis proposal entitled: -

*"Women empowerment and its contribution to sustainable land use management in Njoro Sub-County, Nakuru County, Kenya*

Any assistance accorded to him to facilitate data collection and finish his thesis is highly welcomed.



**Prof. Rodney Reed**  
**DVC Academic & Student Affairs**

Appendix G: NACOSTI Research Permit

  
REPUBLIC OF KENYA

  
**NATIONAL COMMISSION FOR  
SCIENCE, TECHNOLOGY & INNOVATION**

RefNo: 484068 Date of Issue: 04/April/2022

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**This is to Certify that Miss.. Hafsa Ahmed Mohamed of Africa Nazarene University, has been licensed to conduct research in Nakuru on the topic: WOMEN EMPOWERMENT AND ITS CONTRIBUTION TO SUSTAINABLE LAND USE MANGEMENT IN NJORO SUB COUNTY NAKURU, KENYA. for the period ending : 04/April/2023.**

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