

**RELATIONS BETWEEN HOUSEHOLD POVERTY, LAND USE, LAND MANAGEMENT,
SOCIAL NETWORKS AND AGRICULTURAL PRODUCTION IN NYANDO AND MUHORONI
SUB COUNTIES - KENYA**

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Doctor of Philosophy Degree in Geography of Egerton University.**

EGERTON UNIVERSITY

AUGUST, 2023

DECLARATION AND RECOMMENDATION

Declaration

This thesis is my original work and has not been presented in this university or any other for the award of a degree.



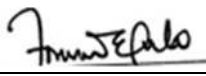
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DEDICATION

To the glory of God, for His infinite grace and mercies in my life.

To my nieces Sarah, Angela, Diana, Maggie, Maya and Myra, and nephews Sean and Hannington;
thank you for your unconditional love and those inspiring moments. May God bless you all
abundantly!

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ABSTRACT

Poverty is a serious and enduring problem in many developing countries with the poor constituting more than half of the Kenyan population. Muhoroni and Nyando sub-Counties in Kisumu County continue to have a high poverty rate despite the declining percentage of Kenyans living below the international poverty line. This study focused on the relations between household poverty, land use, land management, social networks and agricultural production in Nyando and Muhoroni sub counties. A survey research design was used in this study. Systematic random sampling was used to select 250 respondents who participated in the study. The questionnaire was used in data collection, entered into the Statistical Package for Social Sciences (SPSS version 20.0); and analysed both descriptively and inferentially. The Spearman's Rank Order correlation (ρ) was used to establish the relationship between household poverty and land use; the relations between household poverty and land management; the relationship between memberships to social networks and poverty; and the relationship between poverty and agricultural production. The study determined that: A large proportion of the (64 per cent) of the respondents in Muhoroni and Nyando sub-counties are poor. Second, there is a statistically significant but weak positive correlation between household poverty and land use ($\rho = 0.269, p \{0.000\} < 0.01$). Third, there is a statistically significant and moderate positive correlation between land management and household poverty ($\rho = 0.397, p \{0.000\} < 0.01$). Fourth, there is a statistically significant but weak positive correlation between membership in social networks and house poverty ($\rho = 0.233, p \{0.000\} < 0.01$). Finally, there is a statistically significant and moderate positive correlation between agricultural production and house poverty ($\rho = 0.364, p \{0.000\} < 0.01$). The study concluded that: land use patterns in Nyando and Muhoroni sub Counties have significant implications on household poverty. that the adoption of land management practices is a proxy measure pertinent to of household poverty; those social networks are a significant strategy for reducing poverty and that increased agricultural productivity is crucial to household poverty alleviation. Consequently, the study makes the following recommendations. First, policies that target effective land use practices should be formulated. Second, there is a need to encourage households to seek agricultural extension services to keep abreast with current and appropriate and sustainable land management practices. Third, it is pertinent to build the capacity of social networks to enable them better serve members' needs in terms of agriculture and land management. Finally, there is need for collaboration between national and county government of Kisumu in the formulation of technical policies that can foster the adoption of appropriate agricultural technologies and equipment by rural households.

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LIST OF ACRONYMS AND ABBREVIATIONS

ADFB	African Development Bank
CBS	Central Bureau of Statistics
ERS	Economic Recovery Survey
GDP	Gross Domestic Product
FAO	Food and Agriculture Organization
FIDA	International Fund for Agrarian Development
ROK	Republic of Kenya
IFAD	International Fund for Agriculture and Development
KIHBS	Kenya Integrated Household Budget Survey
KNBS	Kenya National Bureau of Statistics
MDGs	Millennium Development Goals
PRSPS	Poverty Reduction Strategy Papers
ROSCAS	Rotating Savings and Credit Associations
SDGs	Sustainable Development Goals
UNDP	United Nations Development Programme
WCED	World Commission on Environment and Development
WMS	Welfare Monitoring Survey

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Poverty affects in various ways a sizeable portion of the global population. These include lack of income, productive assets that secure long-term livelihoods, chronic hunger and malnutrition, and poor access to clean drinking water (Ayoo, 2022). Whereas global poverty rates have decreased significantly in the last 30 years, poverty has increased in a number of countries (Khan et al., 2020). It is estimated that approximately 600 million people still endure abject poverty, while being able to get by on less than \$1.90 every day. More than 430 million of these people live in sub-Saharan Africa, the world's poorest area, with more than 40% of the population living in extreme poverty as of 2018 (Ayoo, 2022; World Bank, 2020). Despite the countries commendable efforts to fight poverty, it remains a major problem. In 2015, world leaders agreed to take drastic measures against extreme poverty, hunger and diseases by adopting the next set of sustainable development Goals (SDGs) (United Nations, 2017). The fact that poverty sets a priority among others indicates a global urgency to help. However, countries have individual obligations to develop strategies and ensure the coordination of the appropriate agencies, stakeholders and resources to achieve this goal.

Research done by Sinnathurai (2013), established that poverty is common in the majority of developing nations in sub Saharan Africa, Asia and Latin America. The population in these nations have been plagued by hunger and poverty for decades (Sinnathurai, 2013). The poverty incidence in sub-Saharan Africa is distinctly high. On average, 40 to 50 per cent of individuals in sub-Saharan Africa live in abject poverty with earnings of 1.90 US dollars a day (World Bank, 2018). However, the population living below 2 US dollars a day, is rather high (66.2 per cent) (Sinnathurai, 2013). Recently however, Africa has recorded progress in terms of poverty reduction. Nonetheless, Nkonya (2018) explains that success rates are still below the requirements of the first Millennium Development Goal that aimed to reduce poverty levels by 50% by 2015.

According to Onyeiwu and Liu (2013), most African countries have acknowledged that poverty levels in their countries are still increasing. Although reports by the African Development Bank

(AFDB) (2007) indicate that the African economy has changed significantly since the mid-1990s, poverty levels in many African countries are still high. One of the goals of the Millennium Development Goal (MDG) states that countries should reduce their poverty levels by half by the end of 2015. However, the African Development Bank (2007) indicated that only a few countries would reach this goal. About 800 million people; half of the continent's population live in abject poverty. However, research by Nkonya (2008) suggests that Africa may not be the poorest continent in the world even though; the number of people suffering is slowly increasing over the years.

In Africa poverty is more pronounced in the rural areas, with a great number of poor individual's dependent upon agriculture for their livelihoods where it is estimated that over 200 million persons in SSA live in extreme poverty (IFAD, 2010). The vast majority are located in Eastern and Southern Africa where the world's poorest population is found (Aor, 2007; Hoeffler, 2011; IFAD, 2010). The risks of such extreme rural poverty is high in Africa. While all other regions in the world have managed to reduce rural poverty between 1988 and 2008, sub-Saharan Africa appears to be stagnant (IFAD 2010). The prevalence of rural poverty across the developing world underscores the importance of agriculture in poverty reduction strategies of these countries since agriculture is the primary source of income for the majority of rural residents (Grewal & Ahmed, 2011). The majority of sub-tropical rural areas are found in sub-Saharan Africa, and Asia, where an estimated 75 per cent of inhabitants are located (Hauser, 2005). According to Swallow et al., (2001), rural Africa, in particular, is a place of rising poverty and stable economic growth, where over the last 10 - 20 years; fuelled by a myriad of powerful processes such as population growth.

The Kenya government has over the years stressed the importance of reducing poverty through job creation, service provision, and economic growth (Kimalu et al., 2002). Between 1980 and 1990, the Kenyan economy was distinguished by notable and consistent growth. Indeed, in the period between 2003 and 2007, economic growth was enhanced after the enactment of the Economic Recovery System (ERS). With this GDP improved from 3 per cent in 2003 to 7 per cent in 2007, against a backdrop of a fairly low annual inflation rate of 3 per cent. The annual growth in the GDP rose from zero to 4 per cent during a similar time (World Bank, 2010). The Kenya National Bureau of Statistics stated that the occurrence of poverty remained elevated between 2005 and 2006 and was estimated to have reduced significantly to 36.1 per cent between 2015 and 2016

(KNBS, 2018). The nationwide trend masked significant areal disparities in poverty levels. Like other countries in Africa, the poor in Kenya are largely concentrated in rural regions (Radeny, 2011). Occurrences of poverty were approximated to be 49 per cent among rural households compared to 34 per cent in urban households in 2005 and 2006. Additionally, as a result of the population growth, it was anticipated that the number of individuals living in poverty would have increased from 13 million in 1997 to roughly 16 million in 2006.

The rural areas of Kenya comprise approximately 65 per cent of the total population. This demographic mostly earns their living from agricultural practices (IFAD, 2011). Recently, the agricultural sector in the country has recorded decreased productivity. Despite the rural regions receiving an adequate amount of rainfall annually, small scale farmers and other individuals in these communities still record incidences of low yields and food insecurity (Kiiru, 2007). The reason behind this prevalence is that small scale farmers lack or fail to use farm inputs that serve to increase productivity. Farmers also lack storage and preservation facilities for their produce (Kiiru, 2007). According to IFAD (2011), there are various reasons why poverty is still prevalent in Kenya. First, Kenya experiences some of the highest population growth rates globally. Indeed, the population has grown three-fold over the past 30 years. The result is that there is an increase in pressure on the country's resources. Secondly, the widening income gap in the country caused the erosion of gains in food, security, education, employment, health and income. There are strong correlations between poverty and environmental degradation, predominantly soil erosion, poor water management, land degradation and declining soil fertility. Lastly, changes brought about by climate change serve to undermine the already fragile base, contributing to the decline in agricultural yields in the past decades.

Hoeffler (2011) postulates that the causes and effects of rural poverty among small holder farmers in Kenya, have been subject to a wealth of national and international research. Strong empirical studies of poverty by Barrett et al. (2006) show that very few families come from poverty. In addition, they found no evidence that rural poverty outbursts were associated with agricultural activities, agricultural power and the agricultural environment but more access to individual attributes as exit factors. Brown et al. (2006) identify factors that determine poverty such as location, family size and income; however, they incorporate the farming experience and access to credit as additional factors associated with domestic mobility. Strong economic gains and

worsening poverty tend to coexist, highlighting the complexity of the causes of poverty and the lack of understanding of effective policy remedies. (Radeny, 2011).

From the technocratic, top-down approaches used between 1960 and 1970 to the employment of more participatory approaches in the subsequent years, an account of Kenya's development approaches shows that Kenya has adopted paradigm changes that parallel the movements in global development thinking. Despite the aforementioned efforts, Kenya's new rural development projects continue to have a dismal track record. Interestingly, their poor performance is attributed to inadequate community involvement in all aspects of the process, including conceptualization, management, design, and implementation (Society for International Development, 2004). The poverty gap between the wealthy and the poor is growing as the Kenyan government's efforts to achieve economic growth continue to stutter (Republic of Kenya, 2005; Sachs, 2005; SID, 2004). The rural poor are severely harmed by the deteriorating economic environment. While it lessens their capacity to establish support networks, it also makes them more reliant on such networks to acquire necessary resources and services (Kuehnast & Dudwick, 2004). The apparent vicious spiral merely describes why more and more individuals keep slipping into poverty while those who are currently poor continue to slip into poverty (Republic of Kenya, 2005).

1.2 Statement of the Problem

Muhoroni and Nyando sub-Counties in Kisumu County continue to have a high poverty rate despite the fact that the percentage of Kenyans living below the international poverty line (US\$1.90 per day) has decreased from 46.8% in 2005-06 to 36.1 percent in 2015-16 (World Bank, 2018). These sub-counties are frequently affected by flooding and stagnant agricultural production, both of which have an impact on household poverty and livelihoods. (Onyuro, 2020). Whereas many investigations have been conducted out in Muhoroni and Nyando sub-counties to explain the dynamics of poverty, they are mostly based on the World Bank's income and consumption measures which offer little explanations on the diverse factors that may influence household poverty. The relationships between household poverty, land use and management methods, and agricultural production in Kisumu County are also poorly supported by empirical data. Studies demonstrating the link between land use and land management methods and poverty are also scarce, despite studies discussing land use in the Lake Victoria Basin, where Muhoroni and Nyando sub-counties are located.

Moreover, according to current global development discourse social networks have a significant role in economic development in general and rural development in particular (Kasanga et al., 2020). The Kenya government has also continuously updated its programs and policies in order to promote more socially associated (participatory) methods of rural development in response to these worldwide paradigm shifts (Manyasa, 2009). The twin goals of reducing poverty and fostering economic growth in rural regions have not, however, been successfully attained by many of the rural development programs developed to reflect these trends. This study sought to examine the relations between household poverty, land use and land management, and agricultural production, as well as the links between memberships in social networks and household poverty in Nyando and Muhoroni sub Counties.

1.3 Objectives

1.3.1 Broad Objective

The main objective of this study was to establish the relationship between household poverty, land use and land management and agricultural production and to assess the role of social networks in Poverty alleviation in Muhoroni and Nyando sub-counties in Kenya.

1.3.2 Specific Objectives

- i. To examine the relationship between household poverty on land use practices in Muhoroni and Nyando sub-counties.
- ii. To assess the relationship between household poverty and land management in Muhoroni and Nyando sub-counties.
- iii. To investigate the relationship between the membership to social networks and the alleviation of household poverty in Muhoroni and Nyando sub-counties.
- iv. To examine the linkages between household poverty and agricultural production in Muhoroni and Nyando sub-counties.

1.4 Hypotheses

The following hypotheses were tested for their validity:

H₀₁ There is no significant relationship between household poverty and land use in Muhoroni and Nyando sub-counties

- H₁ There is a significant relationship between household poverty and land use in Muhoroni and Nyando sub-counties
- H₀₂ There is no significant relationship between household poverty and land management in Muhoroni and Nyando sub-counties
- H₁ There is a significant relationship between household poverty and land management in Muhoroni and Nyando sub-counties
- H₀₃ There is no significant relationship between membership to social networks and household poverty Muhoroni and Nyando sub-counties
- H₁ There is a significant relationship between membership to social networks and household poverty Muhoroni and Nyando sub-counties
- H₀₄ There is no significant relationship between household poverty and agricultural production levels in Muhoroni and Nyando sub-counties
- H₁ There is a significant relationship between household poverty and agricultural production levels in Muhoroni and Nyando sub-counties

1.5 Justification for the study

This empirical investigation of the relationships between household poverty, land usage, and land management in Muhoroni and Nyando sub Counties is significant for a number of reasons. The results of this study provide a framework for evaluating and refocusing ongoing efforts to reduce rural poverty in western Kenya. Within the framework of the investment poverty approach, this study explores household poverty dynamics. Given that the Muhoroni and Nyando sub Counties located in Kisumu County have received special attention from the Kenyan government in on-going reforms of the environment, land, domestic water, and irrigation sectors, recommendations derived from the findings may assist planners and other stakeholders in rural development Muhoroni and Nyando sub-Counties in western Kenya in general to formulate more effective interventions. Additionally, since agriculture takes up the majority of land use in developing nations, it has a significant impact on both the environment and human livelihoods.

Additionally, the findings from the investigation into the relationships between social networks and rural poverty in Kenya's Muhoroni and Nyando sub-Counties will add to the body of knowledge on the role of social networks in poverty alleviation, a topic that has hitherto attracted little research attention.

1.6 Scope and Limitations of the study

The focus of this study was on Muhoroni and Nyando, two sub-counties of Kisumu County. The two sub-counties were picked first for their unique agro-ecological traits and then for their disparities in population density. This study employed a cross-sectional design, in which information was gathered all at once. The goal of this study was to ascertain how Kisumu's poverty levels affected land use and management. The study recorded both land management techniques and features of household land use decision-making behaviour. Participation in social networks by households and the association between this factor and poverty were both examined in the study.

The study also examined the levels of agricultural productivity in households and their relationships to poverty in households. Due to time and financial limitations, the data was thus only available to that extent. The collection of data was dragged significantly by climatic conditions like the floods that occurred in the Nyando sub-County, in part because some of the study area's households had to leave and had to be sampled at a later time.

1.7 Definition of terms

The definitions and descriptions of a few of the technical terms and ideas used in this thesis are provided below. It is believed that these definitions and operationalizations would help people comprehend the terminology more easily, especially in the context of the study.

Poverty

The term poverty refers to the state or condition in which individuals, household, or communities lack the financial resources and essentials for a minimum standard of living. As such, their basic human needs cannot be met. In this study poverty is contextualized in reference to the extent to which households in the study area have adequate supply of resources (natural, physical, human, and social) to sustain a level of consumption commensurate with their fundamental needs especially during temporary difficult times.

Household

A household is a small group of persons who share the same living accommodation, who pool some, or all, of their income and wealth and who consume certain types of goods and services collectively, mainly housing and food. (UN, 1993)

Household Labour

This refers to the number of family members who work mostly on the farm full-time.

Household Income

Household income refers to revenue from farming, both crop and non-crop, non-agricultural enterprises (e.g., brewing or trading), off-farm employment, property (e.g., dividends, rent from leased land) and other sources (e.g., remittances and transfers).

Land Use

Land use in this study was defined as the purposeful selection or allocation of various activities on the land for various farm activities. This may include the socioeconomic use of the land, such

as the cultivation of crops and cattle, the harvesting of timber, the construction of homes and businesses, the use of residential and commercial space, and the preservation of open space.

Land management practices

In this study, these practices included soil and water conservation techniques, soil nutrient enhancement and conservation methods, agroforestry, seeds, weeding and the labour required for it, and crop post-harvest management.

Social Capital/ Networks

These are associations and groupings of people that make it possible for individuals related through kinship, friendship, and business, to access resources and work together to accomplish common objectives. These unofficial networks take the shape of spontaneous, unplanned, and unrestricted resource and information exchanges within communities as well as cooperative, coordinated, and reciprocal efforts that help make the most use of the available resources.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The global population is currently faced with the problem of reducing poverty. Although decreasing poverty is a goal shared by all, current techniques are divisive and often unproductive. (Daniel, 2008; Ruijs et al., 2013). Indeed, there are incessant arguments about the nature of policies that may be operational in different geographical settings (Sunderlin et al., 2005). This chapter discusses the empirical findings on different dynamics of poverty; rural poverty and its links with land use and land management. Also discussed in this section are the linkages between social networks in household poverty in addition to the relationship between poverty and agricultural production.

2.2 The Concept of Poverty

Although poverty has been a significant global problem with negative implications on income and wealth over the past century, its definition remains elusive (Cerio, 2019; Kibret, 2020, Varbanov, 2018). It involves people experiencing various degrees of deprivation and encompasses a variety of social circumstances in which people find themselves (Kibret, 2020). Generally, poverty is typified by a lack of resources to satisfy basic needs and the inability to attain a certain standard of living. However, due to its multifaceted nature, various methods have been used to conceptualise poverty.

Currently, extreme/absolute poverty is determined by the World Bank's daily income index, which refers to those individuals whose earnings are lower than USD 1.90 (World Bank, 2018). In the past, poverty has been classified in four categories including absolute poverty, income, relative poverty and relative inequality (UNESCO, 2016). The absolute poverty measure relates to well-being. It is considered as an indicator showing the number of people or portion of the population with inadequate income required to acquire goods and services (Wijekoon et al., 2021). According to Nargizza (2022), almost one-fourth of the world's population remains just under the official poverty threshold, making them unable to provide for themselves due to the low revenues earned. Unlike the absolute poverty measures that were predominantly based on monetary measures, proponents of relative poverty put forward a new concept of poverty that broadened the meaning

of wellbeing. According to the relative income poverty measure, poverty is "the economic indicator that correlates to the prevalent way of life" and is represented by the mean or median value of national income. An individual or family considered poor is one that makes less than that amount of money since they lack the means to carry on living in that way (Wijekoon et al., 2021). Additional components that portrayed deprivation such as social justice, equity and dignity, were deemed suitable in comprehending and measuring the poverty dynamics, in contrast to a solitary, absolute, money-related dimension. In other words, poverty was increasingly becoming multidimensional in nature. The relative poverty assessment approach was predominant in the 1990s (Azibo et al., 2019).

These categorizations of poverty have several shortcomings. First, is the utilisation of income as a pointer to well-being. Higher earnings do not always imply better living conditions. Some rural residents, despite having lower earnings, are more capable of meeting their essential needs compared to city dwellers with higher incomes. For example, the cost of living tends to be higher in urban settings than it is in rural areas, and in some rural civilizations, access to food and water may be more expensive than in urban settings. Additionally, the use of household participants tends to include expenses or consumption incidents before the reference period), whether income is recorded in actual figures or durations, the number of time frames and width of each interval, and the presence of several households with undetermined zero incomes, other factors to consider are whether income is captured in exact amounts or intervals. Countries are becoming more interested in establishing a multidimensional official poverty index (MPI). This reflects an increasing recognition of the limitations of income poverty measurements as standalone indicators.

There is growing interest among many countries to create a multidimensional official poverty index (MPI). This is largely because of the weaknesses associated with the money-metric approach and the complexity of poverty. This consensus has been achieved as a result of numerous initiatives and international accords. The Sustainable Development Goals (SDGs) have replaced the Millennium Development Goals (MDGs), which included the various facets of deprivation at the core of poverty and their interactions (Alkire et al., 2021). The Multidimensional Poverty Index (MPI), created by the Oxford Poverty and Human Development Initiative (OPHI), ranks and contrasts nations using information at the household and individual levels about people's health (child mortality and nutrition), education (years of schooling and school attendance), and

possession of household assets (Alkire & Santos 2010). Academics can now use a variety of methods and tools to represent poverty's many characteristics, mostly because definitions and measurements have been expanded to include additional factors. To supplement bigger, survey-based analyses, researchers are increasingly using micro-level qualitative methodologies, such as focus groups and local community surveys, to gather data addressing contextual aspects of livelihoods (Datt, 2019; Gallardo, 2020).

The MPI, was later changed to the Global Multidimensional Index (GMI) but this too has been criticized for leaving out crucial indicators and aspects of human deprivation. It has also been criticised for failing to assess poverty at the individual level, using arbitrary cut-off points, and not conducting adequately balanced participatory research that takes the perspectives of the poor into account (Beck et al., 2020). Moreover, The Global MPI focuses on people's circumstances and conditions of living for the most part. Many of the weighted indicators are real-world accomplishments. Despite the fact that the Global MPI focuses on actual human achievements (conditions or stages of existence), there is still a gap in poverty assessment. There is no apparent link between the weighted indicators and other human achievements not covered by the Global MPI, such as impotence, insecurity, shame, and loneliness. Furthermore, even in the aspects that it measures, the Global MPI is insufficient (Gweshengwe, 2021).

The use of assets as measures of wealth and poverty has garnered more attention (Howland & Brockington, 2021). One of the most popular techniques in poverty measurement is the creation of asset indexes, in which differences in household wealth are assessed using various combinations of assets owned. The bundles are weighted using principal component analyses (also known as factor analyses or multiple correspondence analyses), which search for structures and trends in asset ownership data. These indices have the advantage of making data gathering easier because only a few variables are required. Recent methods have made an effort to use the fewest number of variables possible. Asset indexes can be used to categorize and contrast populations (Howland & Brockington, 2021). To evaluate the reliability of new poverty proxies like data from mobile phones, asset indices are also employed (Warmouth et al., 2019). Asset indexes also have the ability to spot statistically significant patterns. The question of whether these values reflect wealth as it is understood locally remains unanswered. These listings are based on the idea that ownership of different assets might serve as sensitive and important regional indicators of wealth disparities.

Third-generation poverty analytical tools, also known as asset-based approaches in poverty studies, allow for the differentiation of such stochastic and structural changes and the comprehension of the fundamental reasons for persistent poverty (Carter & Barrett, 2006). Asset-based methodologies have been used in several studies to examine the intricacies of poverty in sub-Saharan Africa (Adato et al., 2006; Barrett et al., 2006; Onemolease & Akioya, 2020). Different perspectives are in support of asset-based approaches to understanding poverty. First, it might be argued that both consumption and income poverty analyses are static and may not be helpful in capturing the external factors that affect the poor and their responses to economic misfortune. This is because poverty is a dynamic notion (Lawson et al., 2006). Second, having assets reduces the risk that households would experience poverty as a result of macroeconomic downturns.

Asset-based policies have come under fire for lacking a solid empirical foundation. A further issue made by Johnston and Abreu (2016) is that asset indices are predicated on the idea that assets and wealth are correlated. However, this fundamental assumption is likely to be falsified if indices are used to cover large geographic areas and long periods of time. This is due to the likelihood that differences in local values and cultural preferences on the assets wealth should be invested in will change at these larger scales, as well as variances in infrastructure provision (determining the availability of energy and building materials). When examining the dynamics of poverty, Radeny (2011) advises that policy benefits be considered. First, when classifying those who are perpetually poor and vulnerable, the dynamics of poverty reveals the heterogeneous nature of poverty. Governments frequently use set social indices to concentrate on the poor. However, different approaches may be more appropriate depending on the targeted households' specific poverty characteristics. Second, understanding the dynamics of poverty helps to understand the fundamental problems with poverty eradication and the reasons why some households continue to live in poverty. Understanding the genuine signs of poverty is essential to developing effective solutions for the poor. Third, comprehending the factors that have contributed to some households' longer-term welfare increases than others would aid in the creation of policies that support equity.

Recent research efforts on poverty in developing countries have tended to rely on the use of panel survey data (Adato et al., 2006; Suri et al., 2009). Transient poverty is a significant factor in overall

poverty, according to the panel's researchers on sub-Saharan Africa's poverty. The two dynamic kinds of poverty, stochastic and structural, cannot be distinguished by expenditure or income in poverty studies based on household living standards. The most impoverished families' living conditions may differ depending on their experiences (Carter & Barrett, 2006).

2.3 The State of Global Poverty and Rural Poverty

Extreme poverty has significantly declined worldwide during the previous 2 decades. The proportion of people worldwide surviving on less than \$1.90 per day has decreased, from 35.6 per cent in 1990 to 10% in 2015 (Lakner et al., 2019; World Bank 2018). To "end" extreme poverty by 2030, must involve the joint efforts by global development players, bilateral development organizations, and nations across the world. Two key characteristics associated with poverty stand out: first, those who live in poverty are predominantly young, and illiterate. And second the rural areas bear the brunt of the menace. Despite representing only 48% of the global population, rural areas are home to four of every five individuals who live below the international poverty line. Rural poverty grew between 2015 and 2018. The proportion of rural poor people in the overall population of the increased by more than 2 percentage points over that time (World Bank, 2018). Young people make up a large portion of the world's poor. Children under 15 comprise half of the world's poor in 2018 despite making up only a quarter of the population (World Bank, 2018).

In the African continent, the SSA region has the highest percentage of children and young people among the world's destitute. A contrasting picture, with the poor predominating among the elderly, can only be seen in high-income economies. Women are disproportionately poor around the globe and in the majority of countries. Female poverty is low in Europe and Central Asia, Latin America and the Caribbean, and other high-income economies, but high in East Asia and the Pacific, South Asia, and Sub-Saharan Africa, with the biggest disparities among children (Castaneda et al., 2020). In 2018, 35% of poor adults aged 15 and over had no formal education (compared to only 9% of nonpoor adults), and another 35% of global poor adults had only little formal education (including those who completed primary education). If indices are used to cover large geographic areas and long periods of time, this basic premise is likely to be falsified because lower educational attainment is more prevalent in rural areas among both poor and non-poor people (Castaneda et al., 2020). This is due to the likelihood that there will be more variation at these larger sizes in

terms of local values and cultural preferences regarding the assets that wealth should be invested in, as well as infrastructure provision (which determines the availability of electricity and building materials).

When examining the dynamics of poverty, Radeny (2011) recommends using policy. First, the dynamics of poverty classifies those who are perpetually poor and vulnerable while illustrating the heterogeneous character of poverty. Using set social indices, governments frequently concentrate on the impoverished. Nevertheless, the most important factor determining the appropriate strategies may vary depending on the specifics of the targeted households' poverty. The dynamics of poverty also shed light on the fundamental problems that plague efforts to eradicate poverty and explain why some households continue to live in poverty. A true understanding of the symptoms of poverty is necessary to develop effective strategies for the impoverished. Third, knowing the factors that have contributed to some households' longer-term welfare increases than others can assist policymakers create more equitable practices.

The number of research on poverty that have been undertaken utilizing panel survey data from developing countries globally has gradually increased (Adato et al., 2006; Suri et al., 2009). According to the panel's experts on poverty in sub-Saharan Africa, transient poverty significantly contributes to overall poverty. The two dynamic forms of poverty—stochastic and structural—cannot be distinguished in poverty studies based on household living standards using expenditures or income. The smallest families emerging from poverty may have various living conditions due on their experiences (Carter & Barrett, 2006).

It is possible that a few families first struggled with poverty as a result of ill luck (Radeny, 2011). Their escaping poverty represents a restoration to a standard of living (stochastic poverty transition). In other circumstances, the transformation could be brought on by the acquisition of assets (a change in the structure of poverty). The experiences of disadvantaged families who become impoverished may also vary. Some households may experience a return to an unanticipated standard of living after a brief period of luck as a result of the move back into poverty. It can signify a structural adjustment for other households as a result of property loss. Studying the factors that contribute to poverty is crucial to bridging the gap between these two forms of destitution.

Participatory approaches are becoming more prevalent in studies of poverty (Krishna, 2010). The term "participation methods" refers to a variety of techniques for situational analysis, such as data gathering techniques for determining the scope of a person's or a group's social, political, economic, and cultural environment. More specifically, during the past few years, innovative participation strategies have been established that produce comparative outcomes of poverty in terms of occurrence and temporary poverty as measures of expenditure (Alkire & Foster, 2009; De Weerd, 2010).

The regional causes of poverty and the geographic distribution of poverty are of growing relevance to policymakers and researchers. According to studies, poverty and income levels fluctuate across the board, particularly in the context of the developing world (Okwi et al., 2007). This study demonstrates the wide regional variations in poverty levels, suggesting that the explanation of regional variations in poverty may depend significantly on the geographic landscapes. For instance, in Kenya, wealth disparity and poverty are geographically diverse, with significant differences across populations native to various geographical regions (Okwi et al., 2007).

Despite the tremendous reduction in global poverty, development has been uneven between sub-regions and countries. The regional changes in poverty levels between 1990 and 2015 indicate that the per centage change in poverty reduction levels varies by location, from as low as 28% in Sub-Saharan Africa (SSA) to as high as 93% in Eastern Asia (Kofinti, 2020; UN, 2015). Despite the fact that Western Asia reduced poverty by less than half (40%) between 1990 and 2015, the incidence of poverty in the region was only 5% and 3% respectively, which is not alarming when compared to other regions. With the exception of SSA, the remainder of the sub-regions saw a more than a half-per centage-point decline in poverty levels between 1990 and 2015. Poverty disparities exist not just at the sub-regional level, but also between SSA nations (Fosu, 2017; Kofinti, 2020). The most significant cause of the rise in poverty levels during the 24 years was in the sub-Saharan region of Africa. Records from the World Bank (2009) tabulate an increase from 211 million to 388 million individuals. In Latin America and the Caribbean, there was virtually no change in poverty levels during the period.

According to the World Bank (2016), 900 million people are trapped in extreme poverty around the world. Bangladesh has 39.6 million (24.3%) poor people, India has 273 million (21.9%) Nepal has 6.8 million (25.2%) poor people, Bhutan has 0.06 million (8.2%) poor people, Sri Lanka has 0.847 million (4.1%) poor people and Pakistan has 46 million (24.3%) poor people. Poverty continues to shift its centre of gravity across regions in response to policy initiatives. China was the epicentre in 1981, but by 1990, it had shifted to India, and it was steadily spreading across the Arabian Peninsula. The gravity of poverty shifted to the African continent in 2015. Projected estimations put South Sudan as one of the countries afflicted by high poverty rates (Khurram & Hassan, 2019).

The prevalence of household poverty among developing nations underscores the significance of agriculture in these countries' poverty alleviation programs, as most rural people are dependent on agriculture both directly and indirectly. IFAD (2011), noted that countries in the Pacific and Asia would need a rise in farm use expenses, a 23% upsurge in fertilizer use, and a 24% increase in investments in agriculture to reduce poverty (\$ 2 per day). The prospects for poverty alleviation in the developing world by 2050, are especially troubling (Grewal et al., 2012). This is because, by 2050, the world's population is projected to grow from 2.3 billion to 9.0 billion. A large portion of this population expansion will occur in developing nations. The number of people living in developed countries is anticipated to increase from 1.23 billion to 1.28 billion. Millions of individuals who live over the poverty line will also be vulnerable to shocks from outside sources, like a sudden decline in food availability, an increase in food prices, or a rise in unemployment.

The United Nations (2009) report expressed concern that global poverty in third world countries may increase as employment opportunities are lost due to the global financial crisis (GFC). Because of the GFC, the rate of economic progress in most developing nations was adversely affected by the decline in demand in developed countries. Hunger is also a significant cause of poverty and is prevalent in developing countries. Studies by FAO (2009), suggest that the world's hungry individuals increased from 141 million to 963 million between 1992 and 2008 respectively. This is because the resultant decline from the GFC posed severe challenges to government spending on social security and social stability. Progressive unemployment can remove the

progress made in recent years to create better work opportunities for all so that extreme poverty can be reduced.

According to IFAD (2011), women are the primary caregivers in many rural communities. Besides, they also do a lot of agricultural work and produce most of the subsistence crops in developing countries. Their income is always invested in domestic well-being. Their working hours are longer than men's, and, in many places, women spend more time and energy in their time and at home to obtain water and fuel, with significant consequences for women's time — poverty and health. Although they have made a significant contribution to the pursuit of agriculture and other domestic monetary undertakings, women's financial responsibilities remain mostly unseen and unknown rarely documented in public policy.

There is debate on whether gender inequality may result in women becoming increasingly poor. A recent study analysing gender gaps in household income of 13 countries in sub-Saharan Africa, Latin America, and Asia found that in almost all cases, women's hourly wages tended to be between 50 and 100 per cent less than their male colleagues (IFAD, 2011). The inequalities at domestic and social levels can be attributed to small, low-skilled, stable, or limited employment opportunities for women. Besides, girls have limited access to education and skills development opportunities, especially beyond primary education. Despite the lack of consensus in the competitive value for comparing male and female families' income levels as an indicator of poverty and gender disparity, numerous studies are examining this issue in different fields. This is not surprising given the diversity of women's families in terms of structure, lifestyle, and income. A female-led home is particularly at risk in many cases; it can be better for the community with a partner or son sending money to the city. Whatever the headship of a household is, poverty among women is primarily related to property management (including financial assets) and how decisions are made at home depending on the gender roles at home and the social and economic characteristics of the household and its members. Most of the time, rural women have few valuable

assets (especially land) or have little security and control. They have limited access to education, health care, and financial services.

2.4 The Poverty Situation in Kenya

Kenya has had mixed results in the fight against poverty in the last few decades. According to official Kenyan poverty statistics, the incidence of poverty was 36 per cent in 2015/16, a decrease of only 11 per cent over the previous decade from 2005/06. (KNBS, 2016). The Kenya National Bureau of Statistics (KIHBS) estimates that the poverty rate in rural areas was much greater (4%) than in peri-urban and core-urban districts at 28% and 29% respectively. In 2010, the rate of economic growth in Kenya increased to 4.2%, and it has remained over 2.5% year since 2013 (World Bank, 2018). Despite this ongoing economic growth, a sizeable portion of Kenya's population continues to live in poverty. Major obstacles to Kenya's poverty reduction in the previous ten years were population growth of 10 million, or 28 per cent, between 2005 and 2015; political upheaval in 2007; the negative effects of the global food, fuel, and financial crises; and climate change. (Njagi & Nyukuri, 2022)

African countries are still struggling with poverty. Indeed, the rate of rural poverty remains fairly high (51%). Additionally, the total number of poor people has seen an upward trend since 1993 (Radeny, 2012, World Bank, 2008). As a result, poverty reduction has been prioritised on the African continent. Development efforts in Kenya, have consistently emphasized reducing poverty through job creation, the expansion of the economy and the establishment of social amenities (Mwabu et al., 2002).

It is observed that a number of technical, historical, and practical issues, including lack of stakeholder participation in the formulation of plans to reduce poverty and foster development, have contributed to the failure of attempts to combat poverty. The local poor people feel excluded and alienated from these poverty reduction initiatives as a result of the lack of participation; some of them were even unaware of the resources available to fight poverty (Nyakundi, 2005). Moreover, the existing approaches have not addressed their worries (Swallow, 2005).

The Welfare Monitoring Surveys (WMS), which were conducted in 1992, 1994, 1997, and 2000, and the Kenya Integrated Household Budget Survey, which was conducted in 2005/06, are two

initiatives designed to enhance the assessment of poverty in Kenya. In a significant part, the above surveys have been used to examine Kenyan poverty using the human consumption index (RoK, 2007). Additionally, participatory methods have been applied in Kenya as well, and they have aided in delivering more in-depth knowledge of people's circumstances as well as the shortcomings, indignities, and sufferings that are frequently endured by the underprivileged. These have strengthened the notion that poverty is complex and that many people have varied perspectives on it (IPAR, 2000).

Kenya's poverty eradication strategies have been criticized for several reasons: First, they report the prevalence of poverty in a manner that obscures the variances by population, region, gender or group. Second, they report incidents of poverty, but do not explain the causes of poverty; Third, they do not provide material on the value or number of public facilities assigned to particular regions and groups. Fourth, the focus is on income and expenditure poverty; Fifth, they undermine the important issues of the poor and ultimately, the poor consultation on a particular regional level among others (Swallow, 2003).

Emerton et al. (2001) noted that matters related to resources, ecological assets and services have not been sufficiently tackled inside the PRSP discourse. The results from this paper concluded that environmental resources had contributed considerably to GDP, income generation and the creation of employment opportunities; Second, that there are serious consequences associated with the destruction and loss of biodiversity and ecosystems and which should be addressed effectively. Third, the environmental sector typically received minimal funding; consequently, it is necessary to pool additional funding from both conventional and non-conventional sources. In their efforts to survive, poor people frequently overuse resources, which degrades the environment. However, according to Mariara (2002) and Mukui (2005), it is possible to prioritize the preservation of natural resources in a way that ensures the sustainability of ecosystems.

Elhadi et al. (2012) investigated factors that contributed to poverty rates among livestock herders and farmers in Kenya's aristocratic regions. The study applied a logistical model to examine the link between farmer's poverty levels and other descriptive variables. The findings revealed that possession of animal pens, availability of alternative sources of revenue; household size and distance to markets were the major factors that determined poverty levels. Onyeiwu et al. (2013)

on the other hand looked into the factors that affect income and poverty levels in the rural regions of Kenya. For this work, the researchers utilised data from socioeconomic surveys on the basis of which they performed analyses using panel regressions. The study found that quality of education was affecting household income. Additionally, results showed that the household size, each holding area and the price of a home-owned property were important factors in the income. The results also suggested that agricultural activities had no impact on household poverty. In addition, sources of income from farms have provided better opportunities for eradicating household poverty. On the other hand, Geda et al. (2005) researched the rate of poverty in Kenya and established that involvement in agricultural activities is related to both rural and urban poverty.

Mariara - Kukubo (2002) examined the links between household property rights and poverty, amongst herdsmen in the Kajiado district in Kenya. Probit and OLS model was used to examine the factors that impact the levels of poverty amongst herders. Results from the research showed that access to education, wealth, and property rights are crucial to poverty alleviation. Another study by Githinji (2011) on the causes of rural poverty among Kenyan households found out that the education level of the household head had an influence on a household's poverty status. The study also showed that the availability of markets, reduced the probability of households becoming poor. Okwi et al. (2007) sought to explain the role of geographic influences on household poverty in rural regions of Kenya. They suggested that population characteristics and physical factors comprising soil, altitude, slope and the type of land use were crucial in describing the effects of poverty.

The results also indicate that areas with extended rainfall seasons experienced declining poverty levels compared to regions with brief rainfall seasons. While data from the above studies helped to describe the characteristics of the poor, where they live and their levels of poverty, this information fails to address some pertinent issues including the links between household poverty, land use, land management and agricultural production including the role of social networks in poverty reduction, especially in Kenya.

2.5 The Poverty Environment Nexus

International organisations and policymakers have long been interested in the relationships between household poverty and environmental conditions in developing countries (Angelson,

1997). The link between environmental degradation and poverty has been widely acknowledged since the 1970s (World Bank, 1992). Poverty is a direct cause of and a contributing factor in the world's environmental problems, according to the Brundtland Commission (World Commission on Environment & Development, 1987). According to the idea of the poverty-environment hypothesis, economic growth is necessary to break the cycle of poverty and environmental deterioration, and policies that support economic growth frequently have positive effects on the environment as well. When a result, when economic growth increases, poverty decreases, supporting environmental protection (UNDP, 1998).

The Brundtland Commission's report brought attention to a worrying dynamic in which many regions are caught in a destructive cycle where poor people are forced to overuse environmental resources for their daily survival. The struggle to survive is then made more difficult as a result of this exploitation (WCED 1987). Due to harsh conditions, people who are poor are usually forced to continue harming the environment (Cleaver & Schreiber 1994; Durning 1989; Ekbom & Bojo 1999; WCED, 1987).

Although the relationship between poverty and the environment is still a topic of controversy, research conducted to understand this relationship has produced conflicting results (Lele, 1991; Leach & Mearns; 1992; Reardon & Vosti, 1995). The 'vicious cycle' connecting poverty and environmental deterioration is frequently the focus of literature examining the connection between poverty and the environment. This cycle takes its cues from Malthusian ideas, in which impoverished farmers expand their agricultural operations into vulnerable marginal regions as a result of population expansion and poverty, leading to deterioration. In consequence, this reduces yields and makes farmers' poverty worse (Dasgupta & Maler 1994).

Both in rural and urban contexts, the environment has a significant impact on the health and economic prospects of those living in poverty. In many places, the bulk of the poor live in rural areas and rely on natural systems either directly or indirectly for income. Extremely poor people frequently lack access to land and must rely on a variety of natural resources, including fisheries and soil, to survive and earn a living (Pillai et al., 2000). Although there is a wealth of literature on the subject, it is clear that these relationships are complex and are influenced by both macro and micro factors, including policy interventions, market dynamics, local institutions, gender

dynamics, land distribution, resource entitlements, and more (Ekbom & Bojo 1999; Leach & Mearns 1991; Roe 1998). Furthermore, there are differences not only between nations but also within regions in the particular ways that the poor depend on natural resources and are impacted by environmental changes. The amount of data supporting and refuting various ideas further makes it difficult to draw clear conclusions from these correlations.

The arguments for the relationship between poverty and the environment presented above combine neo-Malthusian analysis, which emphasises the negative relationship between population growth and environmental degradation, and neo-liberal analysis, which links underdevelopment to distorted markets that then cause poverty and environmental decline (Yaro & Hesselberg, 2010). By studying how external forces affect internal institutions and industrial processes, this hypothesis also integrates components of political ecology. Low agricultural output is attributed to underdevelopment due to insufficient incentives and services (World Bank 1991; Yaro, 2010).

The idea that poor communities employ low-tech and environmentally hazardous land use practises has traditionally been the focus of research on poverty in rural areas (Chomitz, 2007, Guedes, 2010; Reardon & Vosti, 1995;) points out that most of the research on the connection between poverty and the environment attempts to explain how household behaviour and population affect the environment, frequently resulting in the expansion of frontiers. In the literature, there are primarily two points of view addressing how poverty and the environment interact. The first perspective emphasises the antagonistic feedback loop between poor people's lives and environmental protection by attributing environmental degradation to underprivileged communities. Despite being contested (Brondzio et al., 2009; Lambin et al., 2001), this viewpoint sees poverty as the main socioeconomic factor contributing to environmental decline.

The second viewpoint contends that historical forces, including capitalist expansion, have forced the poor to live in "marginal" areas of deterioration (Fearnside, 2008). Alternative frameworks, such as those put out by political ecologists, recognise the possibility that environmental preservation can unintentionally keep local populations in a state of limited socioeconomic development in some situations (Brondzio, 2007).

According to Rujis et al. (2008), developing nations exhibit particularly strong interactions between the environment and poverty. The health of the environment and the accessibility of natural resources are key factors in the economic prosperity of many households, particularly those in rural areas. Resources from agriculture, forestry, and fisheries account for a sizeable amount of the national revenue and an even larger portion of the working population in low-income nations. Additionally, the time spent collecting water and firewood, time that could be spent engaging in agricultural activities, is frequently a high opportunity cost associated with the use of natural resources. When there are demands to protect biodiversity, agricultural production may suffer. Poor water quality can result in frequent infections.

The relationship between resource management and poverty is significant for a number of reasons. Deforestation-related erosion, agricultural chemical contamination of drinking water, groundwater depletion, and overfishing of near-shore fish species are a few common objections (Dasgupta et al., 2005; Ruijs et al., 2008). These circumstances have a direct effect on the income levels of the poor. Furthermore, there may be serious economic repercussions when national governments and international donors put pressure on rural populations to change their environmental consumption habits. Resource degradation can also be caused by the question of communal ownership and management, which is sometimes incorrectly referred to as the "tragedy of the commons" (Bromley 1991).

In areas where population pressure on these resources is increasing, the livelihoods of rurally destitute people are frequently disproportionately reliant on land, water, forests, and fisheries (Barret et al., 2004). Resource deterioration is unavoidable when social norms or institutions prevent the exclusion of new claims on fragile natural resources. In some circumstances, farmers may be encouraged to make investments in soil fertility augmentation and erosion prevention via effective land management that enforces usage rights (Barrett et al., 2004).

The interactions between poverty and the environment are intricate and mutually beneficial. This study intended to further knowledge by examining the linked relationships between household poverty, land usage, land management, social capital, and agricultural productivity in Nyando and Muhoroni sub-counties.

2.6 Poverty and Land Use

Since the 1970s, the scientific community across the world has become very interested in land-use & land-cover (LULC) change, making it a top research priority (Munthali et al., 2019). Land resources are the foundation of human living on a global scale, as they offer basic requirements such as food, water, energy, clothes, and shelter. Land can be used for a variety of purposes, including agricultural production, human settlement, and environmental conservation in order to preserve it for future generations, and it can meet the livelihood needs of a varied range of local people. All of these land uses compete for space in a fixed land area that is always changing. Furthermore, it is a limited resource that is getting increasingly scarce over time. In order to balance the diverse uses, the resulting rivalry and rising forces at work necessitate government action through land use regulation (Kateiya et al., 2021).

The conception of land use is not only a local environmental matter but a cause of global concern (Foley et al., 2005). Global modifications of forests, farms, water bodies and air are propelled by the desire for the provision of food, water, and shelter for over 6 billion persons. Globally, agricultural land and increased urbanisation have been, supplemented by marked increases in the use of water, energy and fertilisers, the result of which is the considerable loss of biodiversity. In addition to causing households to alter an increasing amount of the world's resources, changes in land use have also made ecosystems less capable of supporting food production, preserving clean water supplies and forests, controlling the climate, and slowing the spread of contagious illnesses.

Given that almost all rural poor households engage in agriculture, land is one of the most valuable resources at their disposal. The management of agricultural land, including choices about how to stop land degradation or allocate resources to more eco-friendly farming methods, is essential to the livelihood plans of rural impoverished smallholders. According to Barbier and Hochard (2018), these land use decisions were mostly influenced by profitability. Other elements, like secure land access or tenure, family size, gender distribution and educational attainment, holding size, and the dependability of extension services, may also be crucial. A large portion of the land has been altered by land-use activities, whether they have altered the natural environment that humans use or the management methods used on properties that humans own. Landscapes are altered more

significantly when households cut tropical forests, engage in subsistence farming, increase agricultural output, or engage in increased urban development (Foley, 2005).

One of the key requirements for efficient land use and management is knowledge of the patterns of current land use and cover and changes in those patterns over time (Etefa et al., 2018). In fact, determining the spatial and temporal state of a region's land use and cover has proven crucial to understanding how human activities affect the ecosystem (Etefa et al., 2018). Patterns of land use and land cover change in response to shifting needs for natural resources. Studies indicate that despite evidence of changes in land use and cover dating back more than a thousand years, the human strain on the earth's natural finite resources is more intense than it has ever been at this point in history (Yesuph & Dagneu, 2019).

However, since the development process encompasses the utilisation of natural resources for household livelihoods, it has become evident over in the recent past that for any policy on poverty reduction to become viable, it must lend itself to environmental issues and ensure efficient and balanced exploitation of the dwindling environmental resources. The above sentiments are especially true for Africa where a vast number of poor individuals live in rural areas, and their livelihoods are hinged primarily on the exploitation of various ecosystems including land, water, and forest resources (AFDB, 2007). Most of the economies in SSA have an agricultural base that comprises two-thirds of the African population in terms of the subsistence sector (Diagana, 2003). Besides, most farmers are small-scale farmers with 0.5 to 2 hectares, earning less than US \$ 1 per day. According to Nkonya (2008), the state of agriculture in Africa directly influences economic development, poverty eradication, and social welfare.

Indeed, as Africa's population continues to grow at a rapid rate (3% per annum), it is putting the global growth rate on hold, as well as its global agricultural potential. Stephens et al. (2011) argue that the poorest people in Africa mostly rely on the land, where agricultural productivity is practised. In part, as a result, about one-third of agricultural land is severely degraded, with the population steadily rising in sub-Saharan Africa (World Bank, 2000). Damage to the environment only exacerbates the existing poverty situation, by discouraging small scale farmers who already lack capital from investing in maintaining, and improving, the land upon which their future life depends (Barrett, 1996,2001; Reardon & Vosti 1995). The resulting deterioration of natural

resources contributes to the reduction in agricultural productivity, exacerbating the natural poverty trap that homeowners will not easily escape because the expansion of agricultural practices in marginal and poor regions has increased dramatically (Barbier, 2012). Indeed, farmers in developing countries tend to increase land use activities to fulfil the growing food requirements without employing appropriate land management systems and with insufficient or no external input (Barbier, 2012). The resultant effect is the decline in soil organic matter as well as a reduction in nutrients that have contributed to the deterioration or decline in crop yields in many African states. In some instances, the rate of nutrient depletion is so adverse that even vigorous processes, such as increasing the use of fertiliser or compost or reducing soil erosion, would not be sufficient to counteract nutrient deficiencies (Diagana, 2003).

The United Nations Environment Program (UNEP, 2007), states that both environmental degradation and the fight against poverty are global problems with many similarities, but they are often treated separately. Economic development, rapid urbanization, and rapid rural population growth are the critical factors behind the unprecedented change in the way land is used. Additionally, unsustainable land use is propelling land degradation which enhances the long-term loss of ecosystem function. This may require continuous input and preservation to restore the environment (Coombes et al., 2011). The symptoms of degradation include nutrient deficiencies, water scarcity, soil erosion, loss of biodiversity and the disruption of biodiversity cycles. This is an issue of global and environmental development adopted by the UN Convention to Combat Desertification, Biological and Climate Change Conventions, and the Millennium Goals (UNCED, 1992; UNEP, 2007).

Reduced soil fertility and other biological resources are believed to have reduced agricultural productivity in much of Africa (Nkonya et al., 2008). Conversely, the degradation of land is also a significant root of agricultural inefficiency in the region. Studies approximate that about two-thirds of agricultural land in Africa was damaged between 1945 and 1990, with a severe decline (including a significant loss of production) in about one-fifth of the farmland (Nkonya et al., 2008). The most vital sources of degradation are soil erosion and water erosion, resulting in overcrowding, reduced crop production without adequate soil cover or conservation use, decreased resource utilization, and limited use of soil nutrients. Studies have shown that soil degradation caused by soil erosion is blamed on the decline in agricultural productivity in Africa,

predominantly affecting the land on which poor farmers depend (Nkonya et al., 2008; Sanchez et al., 1997). Research conducted over a couple of years shows a dramatic change in our comprehension of poverty and land use and land-use change and cover. Indeed, research has identified the presence of persistent poverty issues, whereby households, communities, districts, and countries are trapped in vicious cycles of poverty that propagates poor living standards (Coombes et al., 2011).

Although the important role of land to poor farmers has been highlighted and widely documented (Binswanger, 1995; De Janvry et al., 2001), few studies exist on land use-poverty cycles where poor land holdings limit growth prospects for poor farmers. Besides, the vital role of the different types of land and land use and the links to land reform and poverty needs to be studied further. This is because, like most natural ecosystems, land use processes are very multifaceted. The dynamic nature of these processes arises primarily from the presence of various temporal and energetic structures. A better comprehension of these communication networks is critical to the sustained advancement of rural populations.

Although those responsible for formulating policies in Africa have limited access to financial resources, they are responsible for making key decisions regarding the future of land use activities and poverty reduction strategies (Okwi et al., 2006). Regrettably, information relating to land use and household poverty is often unavailable because information on the ecosystems can be obtained while that on poverty is not readily accessible (Okwi et al., 2006). As a result, decisions are made in a void, resulting in an inadequate understanding of poverty and land use patterns. While studies relating household poverty and land use practices are largely limited, research on land-use patterns in Kisumu County, home to the Nyando and Muhoroni sub-Counties, has been conducted extensively (Mahiri, 2003; Nkonya et al., 2004; Swallow et al., 2001; URT, 2003;). Additionally, there is not enough data to determine the size and importance of the two variables.

In Kisumu County, research by Yanda et al. (2001) using land use mapping and erosion risk assessments identified a number of activities that had an impact on the shift in land use (Makalle et al., 2008). These included raising animals, mining, producing charcoal, and farming. However, this is a biased view that ignores the causal connections that explain how poverty and the environment interact in different ecosystems and instead links human activities to land-use change.

In order to fill this knowledge gap, Yanda et al. (2001) argued for thorough and consistent social and economic surveys. Doing so the authors argued, would will help us to better understand the common household activities that influence changes in land cover and associated processes in Kisumu County. In order to achieve this goal, this study examined the relationship between household poverty and land usage in Muhoroni and Nyando sub counties in an effort to add to the body of knowledge. Particularly, respondents in Nyando and Muhoroni sub Counties of Kisumu County perceived land use activities as crop and animal production, residential and commercial properties, and other off farm revenue activities. more pervasive than in any comparable period of time (Yesuph & Dagneu, 2019).

2.7 The Relationship Between Household Poverty and Land Management

Countries in sub-Saharan Africa have recorded alarming incidents of land degradation over the past decade, equivalent to 22 per cent of the global damages attributed to land degradation, which adds up to \$300 billion (Nkonya et al., 2016). Land degradation is also responsible for production risks, majorly experienced by small-scale farmers because they rely on smaller inputs that fail to mask the negative effects of land dereliction (Moussa et al., 2016; Nkonya et al., 2016). About half of the number of farmers in the sub-Saharan region neither use inorganic nor organic fertilizers as part of their farm inputs. Farmers who use organic fertilizers and inorganic fertilizers are nearly 25 and 19% respectively. These results support the study of Pender (2009) which also revealed that farmers do not actively employ external inputs in their farming activities. Only 3% of farmers in this region use affordable inputs like organic fertilizers to enhance their productivity. Nkonya (2018) explain that this situation is worrying because these inputs are also significant in reducing climate-related production dangers.

African nations have been susceptible to the twin pressures of resource degradation and poverty. This phenomenon has been propelled by several factors consist of, including elevated population growth rates and overreliance on agriculture that is predisposed to the effects of climate change, fragile ecosystems, increased rates of erosion and environmental degradation (FAO, 2011; Terr Africa, 2011). According to FAO, (2010) nearly two billion hectares of land worldwide is extremely degraded and some expanses of land are beyond rehabilitation. Ezeaku and Davidson (2008) explain that approximately 16%, more than 494.4 million, of African land is degraded. They further explain that economic losses through lack of production from these hectares are

equivalent to \$65 million. For this reason, it is feasible to develop and integrate sustainable land management practices (SLMPs).

Activities that constitute land management are actions that rely on suitable strategies in certain situations to increase the productivity of the land. This includes strategies like regulated grazing, the use of water and soil preservation measures, as well as forestry and agroforestry techniques (FAO, 2009). Land management does, in fact, include the proper procedures that enable land users or owners to maximize the social and economic benefits that can be derived from their property while maintaining the biological functions of the soil. The adoption of profitable land management strategies is notably low despite the overwhelming evidence that doing so is advantageous for agriculture (Mekonnen, 2009).

The adoption of land management strategies has been linked to a number of difficulties. Despite a wealth of literature on a variety of topics, including infrastructure and the availability of financial, physical, biophysical, and human capital, most studies have struggled with disagreement. For instance, Pender and Kerr (1998) found that the availability of human capital may hinder soil conservation efforts due to the growth in the cost of labour used for other extracurricular activities (Pender & Kerr, 1998). Results also revealed that household heads' levels of education increased understanding of the value of relevant technology and enabled households to obtain services, despite obstacles such as the lack of financing that may prevent the adoption of land management methods (Benin, 2006; Nkonya et al., 2004; Pender et al., 2004) established in studies in Uganda and Ethiopia respectively, that the level of education was an important contributor to the increased use of fertilizer among households.

Additionally, the availability of household labour influenced the levels and dynamics of farmland management. Pender and Kerr (1998) indicated that the availability of male household labour had a positive correlation with a household's ability to apply significant investments in the conservation of water and soil in India. Similarly, Jagger and Pender (2006) noted that the increased household labour enhanced the utilisation of extensive land management practices in Uganda. They also established that the availability of female household labour increased the use of fertiliser. Place et al. (2002) carried out a study in the western region of Kenya and established

that female headed households were less likely to rely on fertilizer for their agricultural practices. Instead, these households mostly rely on compost manure.

Land tenure and security has been invoked as important in influencing the adoption of land management practices (Mekonnen, 2009). Studies have shown that households that lack ownership of land is a major hindrance to the adoption of sustainable land management approaches thereby influencing investment in land management practices especially in developing nations (Mekonnen, 2009). Conversely, it has been argued that traditional land tenure systems are sufficient in promoting the uptake of sustainable land management and land (Deininger 2003; Migot-Adholla et al., 1991; Toulmin & Quan 2000).

Many studies have argued that households with greater access to markets and facilities have the inbuilt potential of earning higher prices for their products hence increased opportunities for investment in the land and the production of more valuable products. Additionally, households are likely to benefit from decreased interest rates leading to higher profits (Binswanger & McIntire 1987; Pender et al., 2006). However, land management activities which demand high inputs in terms of human labour may be compromised because labour costs tend to be higher with market access.

Finally, other factors that have been found responsible for the increased implementation of land management methods include land size and geographical location (Adimassu et al., 2012). The characteristics of land such as size have created controversy in the literature because of the negative impact of the subdivision of land on its management (Sklenicka et al., 2014). There have been arguments stating that the subdivision of land raises the costs of farm inputs the result of which is the hindrance in investment (Lisec et al., 2014). Conversely, the subdivision of land enables the farmers with dispersed pieces of land to benefit as a result of the reduction of risk, crop planning and access to varied agroecosystems (Sikor et al., 2009).

Reducing poverty levels and ensuring land management are objectives for the majority of African countries. However, there is insufficient proof to explain the link between poverty and land use in Africa. Certainly, drafting policies aimed at achieving these objectives requires sufficient comprehension of the relationship. Moreover, most studies have tended to focus on the

individualities of the household heads as determinants of the adoption of land management practices in Africa. This study will endeavour to contribute to the literature by focussing on the linkages between land management and household poverty management in Muhoroni and Nyando sub-counties in Western Kenya

2.8 Social Networks and their Role in Household Poverty Alleviation

The economic problems that affect many nations in sub-Saharan Africa have gotten to crisis levels (Okunmadeya et al., 2007). A notable feature crisis has been the overwhelming impact of poverty on the vast rural population, subjecting it to unprecedented economic and social decline. Many rural areas have lost the ability to feed their communities, pushing them, in some cases, to near-famine or famine situations. The situation is exacerbated by the increasing inability of most African states to respond effectively and adequately to the agrarian crisis (Grooneratne & Mbilinyi 1992). Yusuf (2018) argues that this catastrophe led to the creation of several approaches and policies at the local level in several third world countries. As a result, further degeneration and disintegration of the rural communities have been prevented. Olawuyi and Olawuyi (2015) noted that despite the vast nature of the initiatives in several African countries, their numerous dimensions such as their contribution towards providing survival and sustenance for the rural population.

Okunmadeya (2007) observes that social capital is one of the approaches preferred in the current social sciences. For the past decade, the social capital approach was evoked in social science research to elucidate the vast phenomena such as institutional performance, political participation, institutional performance, corruption, health, the economic success of countries, and efficiency in public services. All these different perceptions of social networks are significantly dissimilar in their application and origin. Nonetheless, Omonona and Kuku (2013) agree that they all have a common emphasis on employing progressive externalities for individuals within a group, helping them attain a competitive advantage in their respective fields.

Despite the existence of an emphasis on the various perspectives regarding social capital, a consensus on the definition of the term and its concept is lacking. Conversely, Putnam (1995) concludes that there is an agreement regarding the interpretation of social norms and social

networks. Earlier, Putnam (1993) suggested that social capital was important and had observable effects on several aspects of people's lives. Examples of the quantifiable outcomes include better health, improved longevity, lower crime rates, low rates of child abuse, better child care, improved of equality in income levels, and higher educational achievement. The Organisation for Economic Co-operation and Development OECD describes social capital as linkages of shared customs, values, and perceptions that enable cooperation in or between groups (Cote & Healy, 2001). The most common definition depicts social capital as the elements of a social organisation including norms, social trust, and social networks, which expedite cooperation and coordination for mutual benefit. Despite several definitions, the major features of social capital include social networks, social norms, and social trust.

A point of consensus, as suggested by Putnam (1995), is that from various perspectives, emphasis should be on the concept of networks that promote quality relations, which act as a reserve for collective actions in various instances (national, communal, and individual). Nevertheless, Coleman (1990) suggests that social capital should be described using its function. He contends that social capital is not a single article but entails several units with similar characteristics. These characteristics have aspects of a social structure that facilitate particular activities for individuals within the social structure (Coleman (1990)).

Research by Coleman (1990) suggests that social capital exists in various forms. First, it manifests in terms of the responsibilities and beliefs which are dependent on the credibility of the social environment. Second, social capital can be the ability of the transfer of information through the social structure to form a basis for action. Finally, it can be the presence of norms that are complemented by appropriate sanctions. It encompasses learned preferences, socio-cultural norms and values, social competence, local knowledge, institutions, local knowledge of the environment, human capital, human health and life expectance, social cohesion, and social and cultural integrity. Thus, social capital has several functions. It accommodates significant factors of commercial production, providing a foundation for collective action within the society. Additionally, social capital is a primary input to social capital accumulation.

In recent times, social capital has gained popularity in the formulation of development policies (Sabatini, 2006). Studies have established that social capital is pertinent to poverty alleviation

(Okunmadeya et al., 2007; Yusuf, 2008), conflict resolution (Schafft & Brown, 2000), and transfer of vital knowledge (Isham & Kabkonen, 1999; Okunmadeya et al., 2007; Yusuf, 2008) in addition to improving agricultural output (Adepoju et al., 2011; Aker, 2007; Liverpool et al., 2011; Liverpool & Winter-Nelson, 2010; Okunmadeya et al., 2007).

The impression given is that formal and informal social networks help individuals with both collective and independent activities. As a result, social networks promote active participation in processes like local decision making, monitoring of government projects, or securing informal insurance from other community members. These networks have also been identified as a solution to the susceptibilities of countries, regions, households, and individuals. These vulnerabilities are an indication that communities are defenceless and prone to insecurity, and are exposed to risks, shocks, and stress' (Sabatini, 2006).

The role of social networks in determining consumption, production, and trade is one area under consideration in development studies (Barrett, 2005). Recent studies have shown that households' participation in social networks is important and has a significant impact on household expenditure and incomes. A survey by Birungi (2007) agrees that methods that incorporate social capital into social networks, norms, and trust reduce poverty. Further, social capital might enhance other limited resources like farm tools and equipment, farm inputs that would otherwise be procured from the market, credit amongst others, reducing the number of individuals who fall below the poverty level mark. Putnam (1995) observes that in rural households, social capital will accord each farmer a chance of doing their independent farm work without using a lot of money by providing them with tools or equipment for the project. Therefore, the concept of social capital cannot be ignored in the development or growth of an economy, which makes it a multi-dimensional concept.

With these recognized benefits of social capital in the development process, the dominant theme in most development plans in Kenya has been the encouragement of community participation for progress' According to Jacobson (2012), Kenya has a history of official cooperative movements for smallholder farmers within sub-Saharan Africa. Indeed, Kenya is renowned for having a history of official cooperative movements for smallholder farmers. Place et al. (2004) describes various, less formal self-help groups recently formed in Kenya's rural areas. These groups are mostly

composed of women. They engage in several practices such as asset building, income generation, social and cultural functions, and commodity marketing (Coppock et al., 2006). Collective action is also accessible while creating a positive force aimed at refining risk management practices in rural areas across developing countries. Jacobson (2012) explains that group action can potentially contribute to the creation of social capital. In turn, the result is positive on human welfare, hallmarked by income generation in rural communities.

Jonny et al. (2014) state that both inaccessibility to credit facilities and limitations of collateral, pose a major hindrance in the acquisition of commercial loans by the rural poor, In such circumstances, relatives and acquaintances serve as alternatives sources of credit for on-lending to those in need (Kim, 2011). Moreover, such social networks are useful in providing individuals with inputs for their practices and markets for their produce, promoting facilitate diversification into new activities. In recent years, social scientists have explored the implications of social networks on issues such as agricultural technology adoption labour market functions, academic achievement, and contribution to retirement ideologies (Banerjee et al., 2012; Maertens & Barrett, 2012; Saez & Duflo, 2003). Little research focuses on social network responsibilities or other forms of social capital in promoting diversification to increase networks in the rural sectors (Baird & Gray, 2014; Schwarze & Zeller, 2005; Smith et al., 2001;).

Social capital has been viewed as a means of empowering individuals by connecting them to a variety of social groups, organizations, and structural networks (Islam & Alam, 2018; Taga, 2013). Research shows that forming relationships with significant community members and government officials improves one's potential for problem solving and resource development (Taga, 2013). One factor that contributes to poverty is a lack of engagement with prominent people. They benefit from personal and ethnic relationships since they provide access to a variety of possibilities and financial resources (Taga, 2013). A study by Sun et al. (2009) showed that people in China who exhibited low level individual participation in social networks were 2.12 times more likely to be impoverished than those with large social networks. This is because a person can utilize their social networks to share resources, identify and gain opportunities, enhance their livelihood, launch entrepreneurial projects, or question dominant notions, social networks can be regarded an asset base (Gilchrist & Kyprianou, 2011).

Furthermore, for the poor, the social network is a vital survival mechanism. Poor people can borrow and exchange products and services inside their networks while building trust among their networks. For instance, in a study of the impact of collective action in Eastern Kenya, Mutonyi (2019) noted that the welfare of smallholder farmers was improved by collective action through marketing farmer organizations, which acted as an institutional innovation that lowered transaction costs and enhanced market coordination by addressing the difficulties of imperfect markets and transaction failures. The smallholder farmers gained access to input and output markets by collective action, which led to increased household income, asset ownership, and poverty reduction.

Although Kenya is acknowledged to have a long history of social capital/networks in the form of formal cooperative movements involving smallholder farmers, evidence demonstrates the efficacy of these groups in poverty alleviation through efficient land use land management practices has seldom been explored. This study endeavoured to contribute to the knowledge base to help bridge this gap.

2.9 Household Poverty and Agricultural Production

Agriculture is considered to be the backbone of many economies in developing countries, and contributing significantly to the activities of many African nations (Agriculture, 2010, Aliber et al., 2007) compared to developed nations where agriculture is widely commercialised and mechanised, and its role in improving household livelihoods is very insignificant (World Bank, 2014). Indeed, recent studies have shown the significance of this relationship evidently (Durward, 2003; Kuyah et al., 2006; Thirtle et al., 2003). Poulton and Dorward (2003) argue that growth in the agricultural sector provides many resultant activities that are linked to agriculture. Despite growing attempts to transform their economies and attention on diverse sectors such as manufacturing and mining, agriculture remains the cornerstone of national development particularly in developing nations.

In developing countries, increasing agricultural productivity is often associated with poverty elimination more than equal growth in other industries. This assertion is typically based on conjecture rather than empirical data (Warr & Suphannachart, 2021). Indeed, the significance of agriculture in poverty reduction, especially in African nations, is well recognised by scholars

(Chirwa, 2011; Dunga, 2014). Households especially in sub-Saharan Africa are increasingly relying on subsistence agriculture for their livelihoods. However, the empirical evidence for this interaction is unclear. Agricultural growth has long been characterised as being favourable to the poor and pertinent to poverty reduction, however, the empirical proof of these relationships is still limited (Janvry & Sadoulet, 2009). A large number of studies have attempted to establish the link between agricultural production and the poverty situation in developing nations. Despite this, policymakers and academics are not fully convinced of these relationships and there has been renewed interest in the topic over the years because of the emphasis on the importance of combating poverty by various national and international organizations.

Studies have suggested that the agricultural sector expansion, as observed in sub-Saharan Africa, industrial sector expansion, and witnessed in East Asia, or services sector expansion, as seen in the United States and Latin America, are the sectoral expansions that can most effectively reduce poverty (Hasan & Quibria, 2004). A cross-country data collection that distinguished between agricultural and non-agricultural growth was examined by Christiaensen et al. (2011). In a \$1 per day poverty level, agricultural growth was significantly more effective at reducing poverty than non-agricultural growth, as long as the nation was "not too unequal." Contrarily, in regions where extractive non-agricultural sectors had a smaller impact, notably Sub-Saharan Africa, the converse was true for those living in poverty at a \$2 per day income level. These results imply that at least some non-agricultural sectors (excluding extractive industries) contributed more to poverty reduction than agriculture at a \$2 per day poverty threshold because "non-agriculture" is such a broad term.

These results were supported by Ligon and Sadoulet (2018), who distinguished between agricultural and non-agriculture but did not disaggregate the latter using a pooled time-series and cross-country dataset. The authors' conclusions emphasized the heterogeneity of the findings across nations, but among the poorest individuals in the poorest nations, the estimated income effect of agricultural growth outweighed that of non-agriculture by a factor of three. This difference, however, gradually disappeared at higher levels of average income, both within and between nations. The significant results of Ligon and Sadoulet (2018) show that agricultural expansion has a greater impact on alleviating poverty in the poorest nations than in other sectors,

but that this differential effect decreases as average incomes rise. Higher GDP levels are used to calculate the prevalence of poverty.

Multiple pathways, including the real income effect, the establishment of rural farm and non-farm jobs and related multiplier effects, and the effects of food prices, have been proposed by Schneider and Gugerty (2011) as ways to boost agricultural production and decrease poverty. Additionally, Schneider and Gugerty (2011) postulated that barriers to technological adoption, beginning asset endowments, and market access restrictions may prohibit impoverished people from fully benefiting from increases in agricultural output. A study by Datt and Ravallion (1998) observed that India's poverty gap was greatly impacted by the output per unit of land. According to the study, which looked at the benefits of farm production, higher yields dramatically lower poverty by raising average living standards. The study also established that even a minor impact of agricultural growth on food costs can have considerable effects on lowering poverty. Studies conducted in Bangladesh by Woden (1999) and in Indonesia by Thorbecke and Jung (1996) revealed the importance of agricultural expansion for both rural and urban areas in developing nations. Empirical data, suggests that lower poverty headcounts in Sub-Saharan Africa and South Asia are connected with greater rates of agricultural labor productivity relative to modern sector productivity, but not in Latin America (Hanmer & Nashchold, 2000).

Ravallion and Chen (2007), note that agricultural growth has a significant impact on explaining China's decline in poverty. Their research also confirms that, as compared to development in non-farm activities, agricultural and rural growth is more pro-poor. Self and Grabowski (2007) discovered in a cross-country study that agricultural productivity is essential for generating growth and raising wellbeing. Agriculture land and labor productivity were employed by Janvry and Sadoulet (2009) to examine their effects on lowering rural poverty. They discovered that increasing agricultural labor productivity and yield is strongly associated with reducing poverty, but the degree to which this is true varies greatly among locations. Their findings suggest that the influence of agricultural growth in alleviating poverty is greater in impoverished nations than in rich countries. They also discovered that, due to the substantial growth linking effect on other economic sectors, agricultural production can indirectly affect poverty. All these studies highlight the importance of agricultural growth for the underprivileged. In developing nations, there is

compelling evidence that agricultural productivity is rising and poverty is declining. Majority of these researches use partial productivities and look at how they affect reducing poverty.

For two key reasons, the increase in agricultural production has been a major source of concern for Kenyan officials and experts. In Kenya, 60% of jobs are related to agriculture, and 65% of exports come from this industry (Birch, 2018). Additionally, it provides 51% to GDP, creates 60% of the jobs, and produces 65% of the nation's exports (World Bank, 2018). Smallholder farming dominates the sector, producing 78% of all agricultural output and 70% of all commercial output on farms of 0.2 to 3 hectares (World Bank, 2015). According to Birch (2018), productivity is key to reducing poverty because the bulk of the poor are employed in agriculture. The agriculture industry made the most contribution to eradicating poverty between 2005 and 2015 (World Bank, 2018).

The challenge for developing countries is to identify specific agricultural and rural development needs and opportunities in order to more effectively target interventions for successful intensification. While overall agricultural growth is undoubtedly a powerful engine for both economic growth and poverty reduction, this is where developing countries face a challenge. Understanding the resources available to rural households and the variables affecting resource allocation decisions is necessary for this process. Typically, the biophysical and socioeconomic environment in which rural households operate causes changes in agricultural productivity. The goal of this study was to add actual data to the body of knowledge about how well agricultural output may reduce poverty, particularly in Kenya's rural areas.

2.10 Theoretical Framework

Several theoretical frameworks have been used in the analysis of the connections between poverty and the environment. Most of the literature suggests that poverty can bring about environmental degradation; whereas other studies indicate that environmental degradation is a major cause of low production hence increases the levels of poverty. Nonetheless, the overall unanimity in the literature is that poverty results in the limitation on incentives to curb land degradation (Kukubo-Mariara, 2002). Four theories are presented and described with the view of showing their relevance to the study

2.10.1 Kuznets Curve

The environmental Kuznets' curve which is a significant paradigm amongst economists, postulates a probable association between poverty and environmental dilapidation, (Mosley & Gray, 2005). Kuznets, a macroeconomist, suggested that there was a relationship between income inequality and development (Stern, 2004). He hypothesised that Least Developed Countries exhibited increased levels of income equality, as they transitioned past a period of rising inequalities in their incomes as their economies became more advanced then becoming more even again in a post-industrial period.

Kuznets' environmental curve suggests that at the initial stages of development, pollution tends to be low, thereby increasing with rapid industrialisation, and then declining again with mature economies. Several studies for instance indicate that with air pollution, there is a manifestation of an increase and decline in emissions which closely reflects a sturdy growth in per capita incomes (Omoju et al., 2016; Wang & Song, 2017). The idea of heightened prosperity resulting in greater environmental management is reinforced by economic literature during the time-choice (Mosely, 2005). Kuznets theory postulates that once the basic human needs have been fulfilled, people can focus on higher needs and requirements, comprising environmental resources. Wealthier communities will, therefore, choose to invest in reducing pollution and preventing it.

Kuznets theory on the relationship between poverty and the environment has a number of drawbacks. First, it could be argued that the environmental Kuznets' curve is spatially skewed because it ignores the export of emissions that frequently goes along with the movement of polluting sectors from more to less developed countries, a situation that is typical in an increasingly global economy (Hack & Alvarez, 2001). In other words, rising income may only transfer pollution around rather than necessarily reducing it. There are parallel interactions with many other types of natural resources, such as land and forests, where product demand in wealthy nations fuels environmental degradation in underdeveloped nations (Redclift & Sage, 1998). The disconnect between the production of natural resources in the developing world and the consumption of those resources by wealthier nations has been clearly demonstrated by ecological footprint studies.

Another potential cause for concern is that most research on how poverty and the environment interact has been done at the national level rather than the home level. Kuznets' explanation of a poverty-environment relationship has a number of flaws. First, it might be argued that the environmental Kuznets curve is spatially arbitrary since it ignores the transfer of emissions brought on by the relocation of polluting companies from industrialized to developing nations. This occurs frequently in a developing global economy (Hack & Alvarez, 2001). Furthermore, increasing wealth may shift pollution levels internationally rather than being a requirement for a reduction in pollution levels. Similar interactions take place when there is a greater demand for certain resources, such as land and forests, in industrialized countries, which causes environmental deterioration in emerging countries (Redclift & Sage, 1998). This disparity between the consumption of natural resources by wealthy nations and their production in underdeveloped regions of the world has been made clear by an ecological analysis.

Second, rather than being conducted at the family level, most research on how poverty and the environment interact are done at the national level. At the national level, efforts have been made to imply a connection between lead and various types of contamination. Since much analysis has been undertaken at the national level to demonstrate that there is an inverse link between household income and pollution, this topic is particularly significant to the poverty-environment debate, including the environmental Kuznets' curve.

Thirdly, it is challenging to oversimplify the linkages because the kinds of links that exist depend on the nature of the resources. According to popular wisdom, environmental deterioration brought on by poverty is a universal phenomenon that affects all resource categories. The sensitivity and robustness of ecosystems can vary. These characteristics may influence how resource-rich or resource-poor households interact with their surroundings. While the environmental Kuznets' tends to highlight changes like air pollution, for example, it tends to be mute on certain species of flora and fauna as well as other natural resources that inevitably decline as nations grow their economies and prosper.

Finally, the Kuznets' curve is unsuccessful in explaining the future behaviour of some poor households particularly in arid areas (Moseley 2001). For example, rural African households have been observed to be extremely reluctant in selling productive properties during a food emergency.

From the above explanation, poor and hungry households put little consideration to the future but instead focus on the present. However, it suggests that these individuals can make deliberate sacrifices currently, to create better chances of improved productivity in the future.

2.10.2 Political Ecology

This model was first proposed by Blaikie and Brookfield (1987) in their publication *Land Degradation and Society* and has since been elaborated by Blaikie (1988). It is used to denote what is referred to as 'the theoretical basis of an approach to land degradation (Black, 1990; Blaikie & Brookfield, 1987). Conventionally land degradation has been considered largely as an organisation matter, comprising 'natural' processes that may be enhanced due to population pressure, or poor managerial procedures.

Initial political ecology research examined the relationship between poverty and the environment under a Marxist framework of resource overuse and constraints for basic reproduction (Blaikie, 1989, Watts, 1987). It was hypothesized that households are forced to over-rely on their natural resource base as a result of rising costs and diminishing labour returns, which ultimately causes increased land degradation and poverty. This point of view has drawn criticism for excessively emphasizing how poverty affected environmental degradation (Gray & Moseley, 2005).

According to political ecologists, structural differences at both the local and global levels are the main driver of interactions between poverty and the environment, while poverty itself may contribute to some degree to environmental deterioration. Furthermore, political ecology has a tendency to focus on peasant farmers in rural areas even though the vast majority of those responsible for or affected by environmental changes are neither peasants nor rural. For instance, Hecht and Cockburn (1989) determined that capital intensive production practices were the primary cause of deforestation in the Brazilian Amazon. Urban populations are more vulnerable to environmental threats than rural dwellers, according to recent study in urban political ecology. This can be related to the toxic nature of urban environmental risks and urban populations' lowered capacity to adapt to these dangers (Pelling, 2003).

Political ecologists have been criticised for emphasizing structuralist explanations over local politics and concentrating primarily on the economic position of rural households while ignoring the local political framework (Moore 1993; Neuman 1992; Peet & Watts, 1996). Additionally, contemporary research is focused on many situations of political disputes over resources, including ethnicity (Carney & Watts 1990), gender, and cultural change (Gray, 2002; Moore 1996).

2.10.3 Political Economy

According to political economists, processes that concentrate power and money in a small number of people and places are what lead to poverty (Yaro & Hesselberg, 2010). Political economists concur on the idea that social interactions, political clout, private property rights, and economic forces are what essentially determine poverty. This definition of poverty implies that it is primarily a social phenomenon, followed by a material one (Amin, 1977; Frank, 1969;). According to the neo-Marxist dependency perspective, there are three levels at which wealth concentration processes take place. First, on a global scale, developed countries tend to dominate international trade at the expense of developing countries, exploiting them and making them poorer in the process. They take use of procedures like unfair control over various resources and unequal exchange to their advantage, and they profit from investments by sending earnings back to their home nations.

Second, the political class and influential individuals within countries tend to exploit the poor and vulnerable through changes in urban and rural terms of trade policies in addition to investment in urban industries. Third, the local elite and owners of land in rural areas tend to consolidate their wealth and power. This creates a situation whereby the local wealthy individuals exhaust resources from rural areas in collaboration with the urban rich. The dual effect of reduced costs of agricultural products in addition to increased prices of agricultural inputs results in rural poverty while concentrating wealth on influential individuals. Moreover, wealthy individuals tend to buy large tracts of land or common property, thereby employing the original inhabitants of the land as labourers with reduced wages. This makes them fall deeper into poverty and isolation (Hesselberg, 1985).

External factors are arguably the most vital elements because they affect production cycles which, in turn, may affect environmental deterioration (Eckholm, 1977). Other factors like wrongful use of technology and unfair prices of farm produce also contribute to environmental degradation in these areas. Governments in the Third World are forced to concentrate on the production of goods for export to the global market while pushing for multinational organisations to invest in their countries. This encompasses the adoption of inappropriate technologies that are often not well suited for tropical environments. These unsuitable technologies tend to increase environmental degradation. Conversely, the disproportionate demands of the developing nations for natural resources have resulted in the dilapidation of the environment.

The political economists' model was found to have mainly neglected the impact of environmental influences due to an overemphasis on political-economic links (Bryant, 1992). Many political ecology models of human-environment relationships, according to Batterbury et al. (1997), either voluntarily accept environmental change as a given occurrence or completely ignore the biological and physical biophysical aspects of environmental change. In fact, political economists don't offer enough theoretical frameworks or approaches for understanding specific undercurrents and processes of physical and biological alterations that could occur at various spatial scales.

2.10.4 The Classical View

This model was postulated by physical ecologists utilising neo-Malthusian methodical frameworks (Yaro & Hesselberg, 2010). Natural phenomena such as drought, excessive rainfall, high temperature and soil mechanisms are regarded as operating concurrently with anthropological problems that are the result of population growth and poor management of land resources (Kangwar, 1982). They argue that proper land management is pertinent for the existence of human beings. People are perceived as critical players in the continuous links between poverty and environmental dilapidation. It is presumed that economically, poor households are obligated to miss out on long-standing investments in the natural ecosystems because of their preference for momentary gains. Indeed, the classical model argues that the increasing population pressure on natural resources is the key factor that causes poverty and environmental decay (Brown, 1989; Eckholm, 1976; Erlich, 1990; Hofstad, 1997).

2.10.5 The Investment Poverty Model

This model was postulated by Reardon and Vosti in 1995 and is based on four variables including the asset constituents of poverty, segments of the environs, family behavioural patterns, and influencing factors. The primary hypothesis states that the assets a household has in its possession can determine its behaviour, which eventually affects its surroundings and assets. Pertinent factors are impacting both the connections between the various types of poverty and behavioural patterns and the links between household behaviour and the utilisation of natural resources.

Penttinen (2008) observed that rural households owned various assets including natural resources (water, land and biodiversity), human resources (education, health, nutritional status, skills and population numbers); and on and off farm physical resources (livestock, farmland, buildings and equipment and financial resources (access to capital and credit facilities). Assets are cannot be viewed as an end in themselves; because they are utilised to facilitate the creation of income opportunities for the households (Carney, 1998). The extent to which the household can use these assets to generate income then determines the magnitude of their poverty. The categorisation of the assets is therefore not a direct indicator of household poverty. When markets operate optimally, then assets are effortlessly traded for each another or changed into money, a disintegration of these assets according to varying categories then becomes unnecessary. However, when the functionality of the assets is restricted, a situation that manifests in most developing nations, especially in rural locations, an asset categorization as a measurement of poverty becomes essential (Carter & Barret, 2006).

The inadequacies of markets especially in developing nations make it difficult for households to benefit from their assets by converting them to money or other types of wealth, including converting household labour into cash. It is, therefore, possible for households to experience asset-specific poverty, which can affect the households' livelihoods and possible opportunities for accessing credit facilities and making sound investment decisions. For example, in households that experience shortages of land, which is important collateral for accessing credit, then the household's adeptness to make investment decisions that are determined by the access to loans is limited (Jansen et al., 2006).

Nkonya et al. (2004) argue that as a result of investment poverty, households are unable to make

sound conservation investment decisions which hinder them from making conservation investments that are pertinent to improving their agricultural practices or the prevention of the encroachment of delicate environment for use as pastures. The decline of such investments will affect the quantity or quality of the household's resources. Although the degradation of the environment in the developing world is not only attributed to poverty (Reardon & Vosti, 1995), damages to the environment that are linked to poverty could be averted if households especially in rural locations were able to stay above the investment poverty line which will empower them to undertake vital conservation investments rather than the consumption of the surplus income. The investment poverty conception is inevitably linked to environmental consequences, the result of which it has been referred to as conservation investment poverty (Scherr, 2000). The investment poverty model was of great importance to this study because of its emphasis on explaining the role played by assets in income creation for rural households, thus influencing their production and investment decisions

2.11 A Critique of the Literature Research Gaps

Studies on poverty in developing nations, Kenya included have been largely characterised by the World Bank's consumption and income data which are collected from household budget surveys (World Bank, 2018; World Bank, 2020). Most income reporting in developing nations is, however, inaccurate because respondents are reluctant to disclose their actual income. Additionally, poverty estimates that are based on income are prone to seasonal fluctuations and the expenses included in poverty lines do not take into account production costs, and as a result, do not contain aspects that are crucial to rural production systems (Brockington, 2019). Although consumption expenditure is more homogeneous and represents the long-term economic situation than the income data approach, it is also susceptible to issues comparable to those found when evaluating income statistics (Shaukat & Javed, 2020). This study utilized the asset-based poverty index postulated by Reardon and Vosti (1995) to determine the poverty incidence in Nyando and Muhoroni Sub Counties.

Asset ownership is a crucial determinant of a household's short and long-term economic prospects; because it improves access to finance, fortifies resilience to shocks, and identifies those who are structurally positioned to benefit from emerging economic possibilities. Since asset wealth grows

over time, it provides a dynamic picture of poverty and vulnerability and allows for the distinction between transient poverty and deeply ingrained, long-lasting structural poverty (Carter & Barrett 2006). Asset poverty is therefore a forward-looking indicator that can reveal levels and trends of economic inequality that are hidden by other indicators (Carter & Barrett, 2006). At the very least, it serves as a helpful supplement to established poverty indicators (Kuypers & Marx 2019).

Poverty in rural regions has been conventionally looked at from the viewpoint which suggests, the poor make use of inappropriate and environmentally degrading land use practices (Guedes, 2010, Reardon & Vosti, 1995). According to Guedes (2010), a vast majority of available literature on the link between the environment and poverty is focused on explaining how people (and as a result of household behaviour) impact the environment and modify the landscape the data on these linkages is however more often scanty.

Granting rural households' access to land and enhancing their capacity to manage it wisely is crucial for reducing poverty and ensuring sustainable livelihoods (Zhou et al., 2019). If land is not exploited effectively, rural households cannot find steady employment and long-term sources of support. Indeed, studies have been carried out in China to establish the link between rural land consolidation and the alleviation of multidimensional poverty (Xiu et al., 2021). Additionally, studies have been carried out in China to analyse the spatial and temporal land use change patterns with the aim of providing data to support poverty alleviation programs (Yong et al., 2018). In Africa, Apata et al. (2021) sought to establish the heterogeneity of agricultural land use systems and Poverty in Nigeria while in Kenya, Wasonga (2009) sought to determine the linkages between land use land degradation and poverty alleviation in rangelands. Miheretu and Yimer (2018) sought to establish the demographic socioeconomic, biophysical and institutional factors that affect farmer adoption of land management practices given the prevalence of soil erosion and land degradation in the highlands of Northern Ethiopia. Again, land management, in this case, was linked to land degradation and a host of other factors. Dougill et al. (2018) examined the implication of policy and institutions in the uptake of conservation agriculture in Malawi. Several studies have also been carried out in Nyando and Muhoroni sub-Counties to explain the dynamics of poverty within the region. These include the linkages between poverty, property rights and irrigation management (Swallow et al., 2002). Jensen (2009) studied the relationship between water, livelihoods and poverty in Nyando sub-County. Despite this, there is little empirical

evidence of the linkages between household poverty, land use practices, land management and agricultural production in Nyando and Muhoroni sub-Counties an area to which this study sought to contribute literature to.

In recent times, social networks have been an area of interest across social science disciplines. For instance, economists have reviewed the implications of social networks on elements like labour market functions, agricultural technology adoption, diffusion of microfinance and academic accomplishments (Armengol & Jackson, 2007, Banerjee et al., 2012, Lin, 2010;). Non the less, few studies have focussed their attention on the importance social networks on household poverty (Baird & Gray, 2014; Schwarze & Zeller; 2005; Smith et al., 2001). The primary focus of existing research is either on the exchange of material goods between communities and engagement in community groups (Johny et al., 2014). This study sought to contribute to the literature on the linkages between social networks and household poverty using cross-sectional data from Muhoroni and Nyando sub-counties in western Kenya

2.12 Conceptual Framework

Figure 2.1 presents the conceptual framework which is modified from the poverty investment model. It depicts the relationship between Household poverty (independent variable) and four dependent variables including land use practices, land, management practices, memberships to social networks and agricultural production. Household poverty manifests in the form of access to assets, (natural, and human, on farm physical resources and off farm physical resources). The household apportions its assets for different undertakings and investments either in agricultural practices (including improved land use practices and soil conservation measures) or non-agricultural practices and these have either constructive or undesirable outcomes on the farms and external influences such as non-farm agricultural engagements or non-farm incomes. The consequences of the different land use practices, in turn, affect the household's poverty levels.

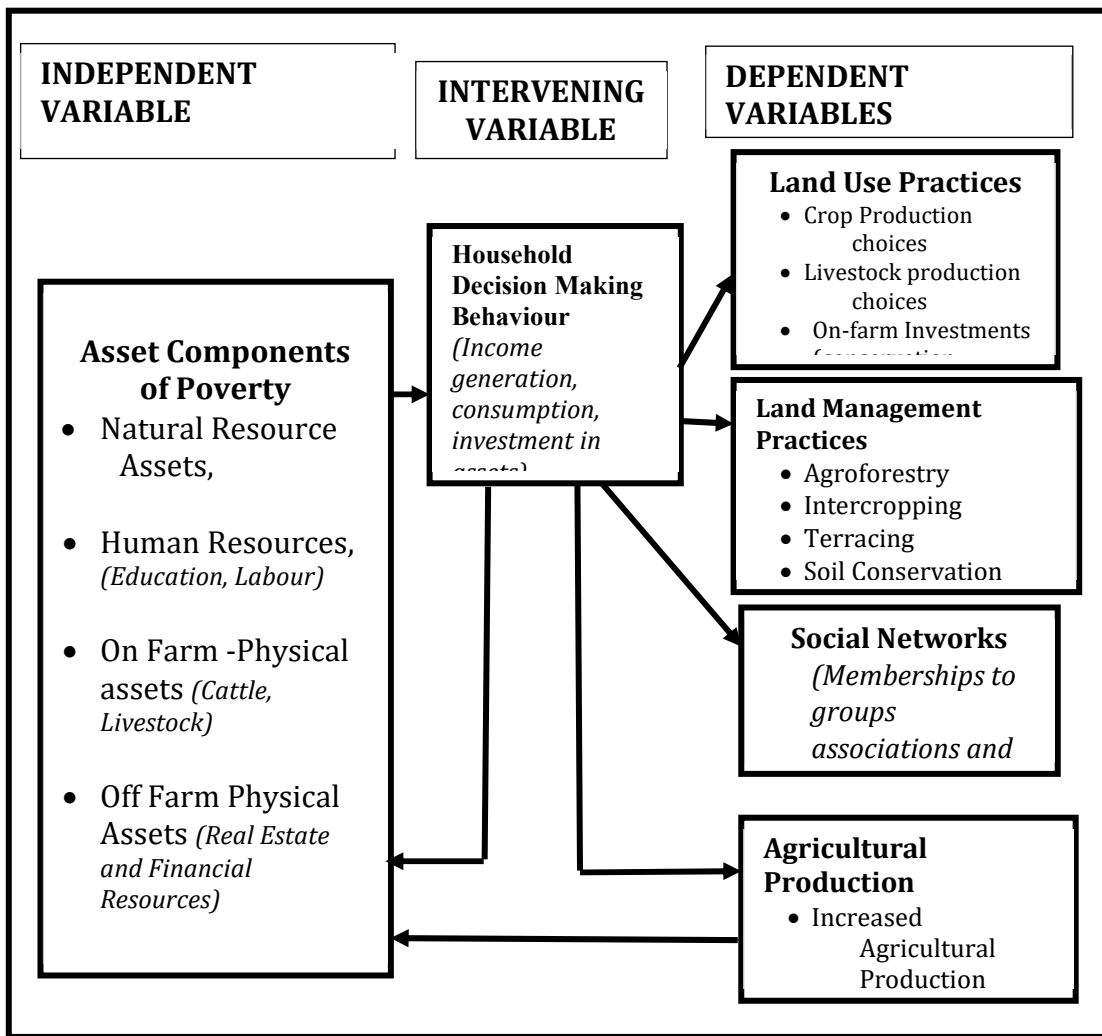


Figure 2.1: Conceptual Framework

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter provides information on the physical and socioeconomic characteristics of Muhoroni and Nyando Sub Counties. In particular, physiographic conditions such as geology, soils, relief and the agro-ecological conditions prevalent in the sub Counties are discussed. The physiographic and socioeconomic conditions are important because the sampling procedures that were used in this study were based on the population densities and agro-ecological conditions that are prevalent in the sub Counties. In addition to the study area, the chapter also discusses the methodological procedures that are employed in this study including the sample size, sampling procedures, research design, sources of data, methods and instruments of data collection, analysis and presentation.

3.2 Study Area

This study focused on Muhoroni and Nyando sub Counties, two of the seven sub Counties in Kisumu County. They both border the Lower Nyakach and Miwani sub-Counties, respectively. There are 47 counties in Kenya, which include Kisumu County. It is located between the latitudes 0° 20' South and 0° 50' South and the longitudes 33° 20' E and 35° 20' E. Kisumu County is surrounded by Homa Bay County in the south, Nandi County in the north-northeast, Kericho County in the east, Vihiga County in the north-northwest, and Siaya County in the west. With an additional 567 square kilometres of water, Kisumu County has a total land area of 2009.5 square kilometres. The two sub-counties were chosen for this study based on their agroecological zones and population densities, respectively. The administrative boundaries of Kisumu County are shown in Table 3.1.

Table 3.1

Kisumu County Administrative Boundaries

Sub County	Area(km ²)	No. of Sub counties	No. of Locations	No. of Sub-Locations
Seme	128.8	2	4	12
Kisumu East	430.2	2	16	43
Kisumu west	358.7	2	8	37
Nyando	248.2	1	6	17
Muhoroni	336.4	2	9	34
Nyakach	357.2	2	14	28
Kisumu Central	32.7	1	6	25
Total	1892.2	30	63	196

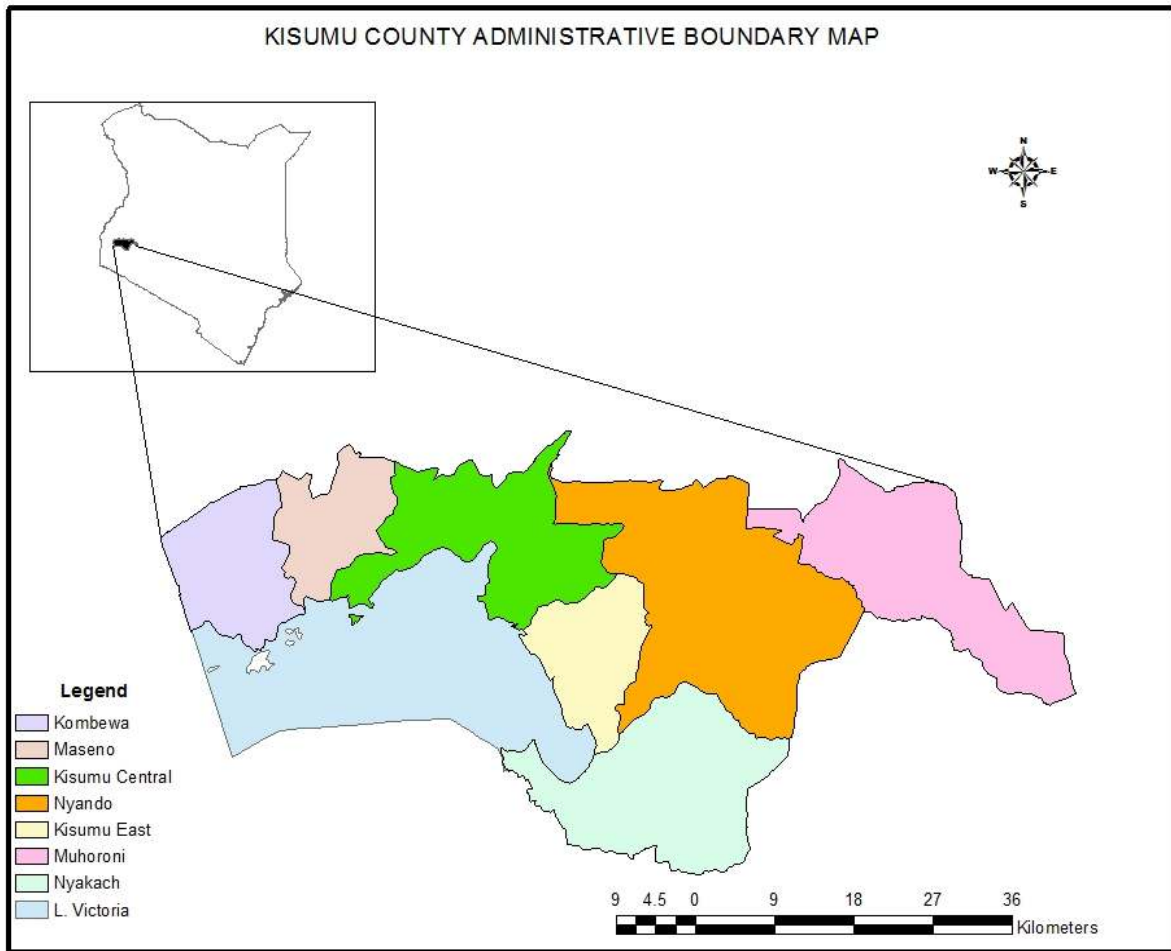


Figure 3.1: Kisumu County Administrative Boundaries

3.2.1 Geology and Soils

The Muhoroni and Nyando sub-counties lie in the eastern section of the large lowlands adjacent to the Nyanza Gulf, much of it in the Kano Plains. Kisumu County can be divided into three main topographical land formations namely, the Nandi Hills, the Nyabondo Plateau and the Kano Plains, which are sandwiched between the two hills (RoK, 2002). According to (RoK, 2013), Kisumu County is dominated by the Nyanza Rift Valley with two escarpments which have their origin in the Tinderet Volcanic Massif astride the rift Valley in the East and represents the northern part of the escarpments to the Kisian/Nyahera escarpment. In the South, the southern escarpment stretches from Koru/Fort Ternnan area to include the Nyabondo escarpment of South Nyakach Location. The slopes of the Nyando escarpment are characterised by colluvial/alluvial soils eroded from the escarpments while the Koru/Fort Ternnan and Awasi Plateau are occupied by volcanic cones (Oluoko – Odingo (2006). The Kano Plains are predominantly comprised of black cotton clay soils which are moderately fertile with poor drainage. The rest of the district has sandy clay loam soils derived from igneous rocks Jaetzold (1982).

3.2.2 Relief, Climate and Drainage

Kisumu County is comprised of three topographical land formations, namely: the lowland area covered by the Kano Plains, the Nyabondo Plateau, and part of the Nyanza Rift Valley' and the hilly parts rising to the foothills of the Tinderet Volcano and trending westwards as the Nyando/Nandi escarpment (Oluoko, 2006). The Nyabondo Plateau in the region has an altitude of 1800 meters above sea level, whereas the Kano coast is at 1100 meters.

From March to May, it has two-way rain, followed by short showers from September to November. Temperatures range from 20 degrees to 35 degrees Celsius, with an average rainfall of 600 to 1616 millimetres. The Sondu-Miriu and Nyando Rivers are the two main rivers in Kisumu County. The largest rainfall in Lake Victoria is located on the Kano Plains, where the Nyando River originates in the Nandi Hills. As it reaches the lake, it is a key contributor to the ongoing floods in its banks, which have a terrible impact on the local population and resources. Despite being small, the Awach River floods another river that has similar consequences as Nyando. The Sondu Miriu Hydro Power Station, in Nyakach, receives its water from the Sondu River.

The average yearly rainfall in Kisumu County ranges from 800 to 1200 mm (Mungai et al., 2002). Floods during the rainy season and severe water shortages during the dry season are common in the Kano plains. Although the rain is not evenly dispersed, it is bimodal. Rain-fed agriculture cannot be sustained year-round. Due of this barrier to agricultural development, the area now imports a significant amount of food. High temperatures in the area, coupled with little rainfall, have a severe impact on agricultural output. While the average annual temperature is between 120 and 160 C, the range of the average annual temperature was between 270 and 310 C. Kisumu County's rainfall totals are displayed in Figure 3.3.

3.2.3 Soils and Vegetation

Koguta, the only gazetted forest in the area, is only 3.2 km² in size. Southwest along Lake Victoria, there is a short beach (11 km) with a number of beaches and fishing opportunities. Particularly in Muhoroni and in other sections of Kisumu County, the soil and climate of the area are suited for the growth of sugarcane, while rice can grow well in the wetlands along the Awach and Nyando rivers. Cotton can be produced successfully on the Kano Plain thanks to its dark cotton soil (Jaetzold, 2009). The Nandi Hills and Nyabondo Plateau's high elevation makes it a good location for the production of milk and coffee. Flooding is a frequent occurrence in the Kisumu region (Kano Plains), and as a result, the lower Nyakach and Miwani valleys have experienced significant erosion, which has given rise to sizable mines like Katuk Ondejo in Lower Nyakach. The region's hills are mostly deserted, and deforestation is widespread. There are frequent large landslides in the Kisumu area. According to Walsh et al. (2004), 61% of the soil experiences moderate to severe erosion (40–70 tons of soil loss per hectare per year), whereas the remaining 39% gathers soil (38–61 tons of soil accumulated per hectare per year). Although the northern regions are degrading, low-lying areas are suffering the most from severe flooding and mudslides. 8.8 tons per hectare per year is the predicted net erosion rate for each basin (RoK, 2002). The distribution of rainfall in the Kisumu region is depicted in Figure 3.2.

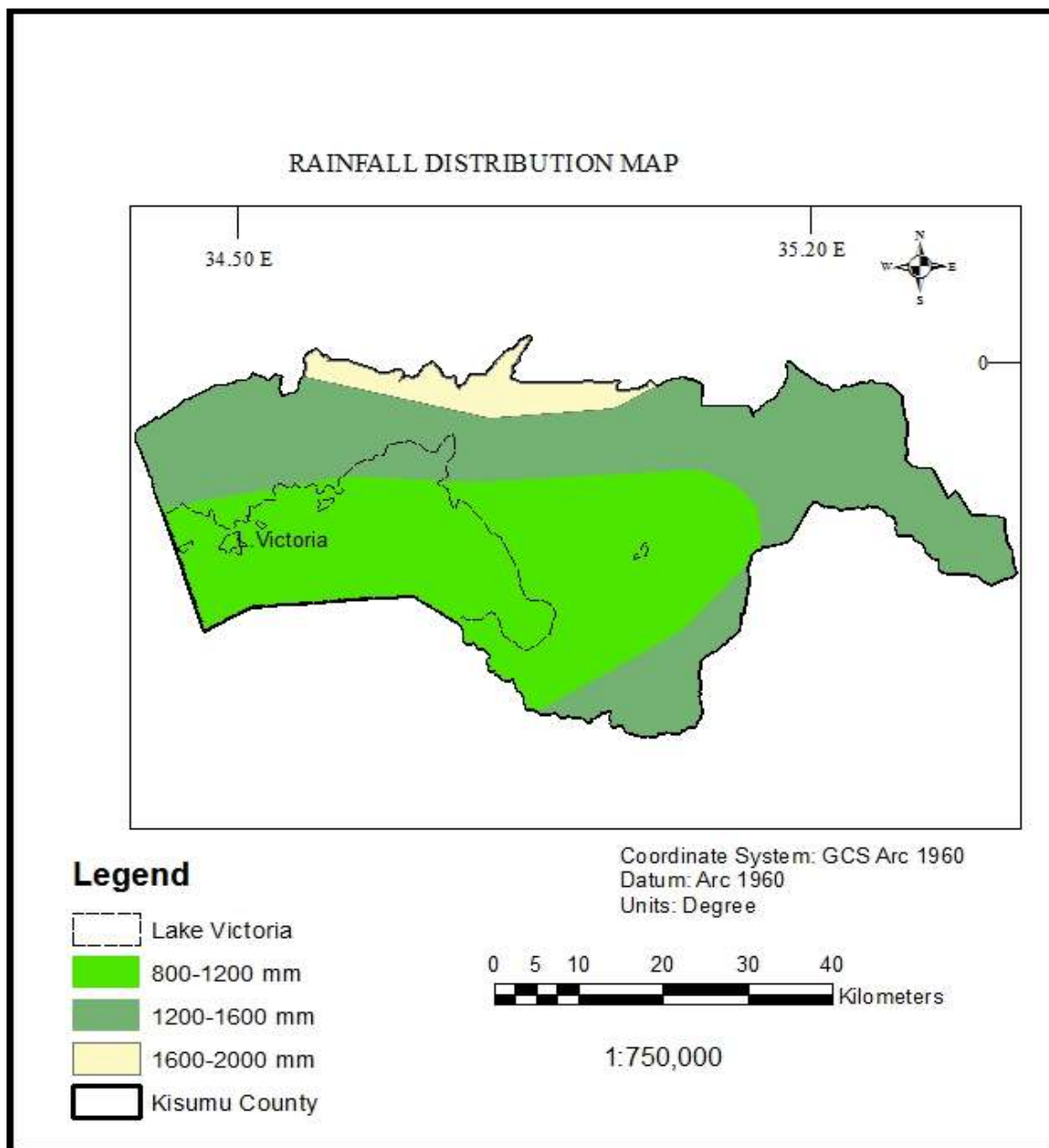


Figure 3.2 Rainfall Distribution Patterns in Kisumu County

3.1.2 Kisumu County Agro-ecological Zones

The agro ecological zones of Kisumu County range from the lower Midland cotton zone to the upper midland coffee zone (LM2-3 to UM3). The area covered by LM2 is also known as the marginal sugarcane zone is a sugarcane growing area mainly within Muhoroni sub County where cropping yields are average on good soils but poor for the most part. Water stress occurs especially after the second rains which are not very reliable (450—600 mm). Therefore, there is only a little storable surplus for the real dry season with its peak being in January.

According to Jaetzold and Schmidt (2009), the agro-ecological zones of Kisumu County make up approximately 75 per cent of land which is unsuitable for economically successful small-scale farming. Extremely heavy soils combined with a warm climate, relatively low annual rainfall and repeated flooding make farming a heavy burden. Especially in the areas around the LM 1-3 and LM 3-4 agro-ecological zones where Nyando Sub County is situated. Part of Muhoroni sub county falls under the marginal coffee zone (UM3) characterized by two growing periods and the annual average rainfall is about 1 000-1 600 mm, with 700 mm expected during the first rainy season and about 500 mm during the second. Because of its altitude ranging from 1 500-1 600 m, the annual mean temperature in the Marginal Coffee Zone is about 20° to 21° C, slightly lower than in the other zones of the district suitable for vegetables, sunflower and finger millet among certain crops (Jaetzold & Schmidt, 1982). Figure 3.3 shows the different agro-ecological zones found in Kisumu County

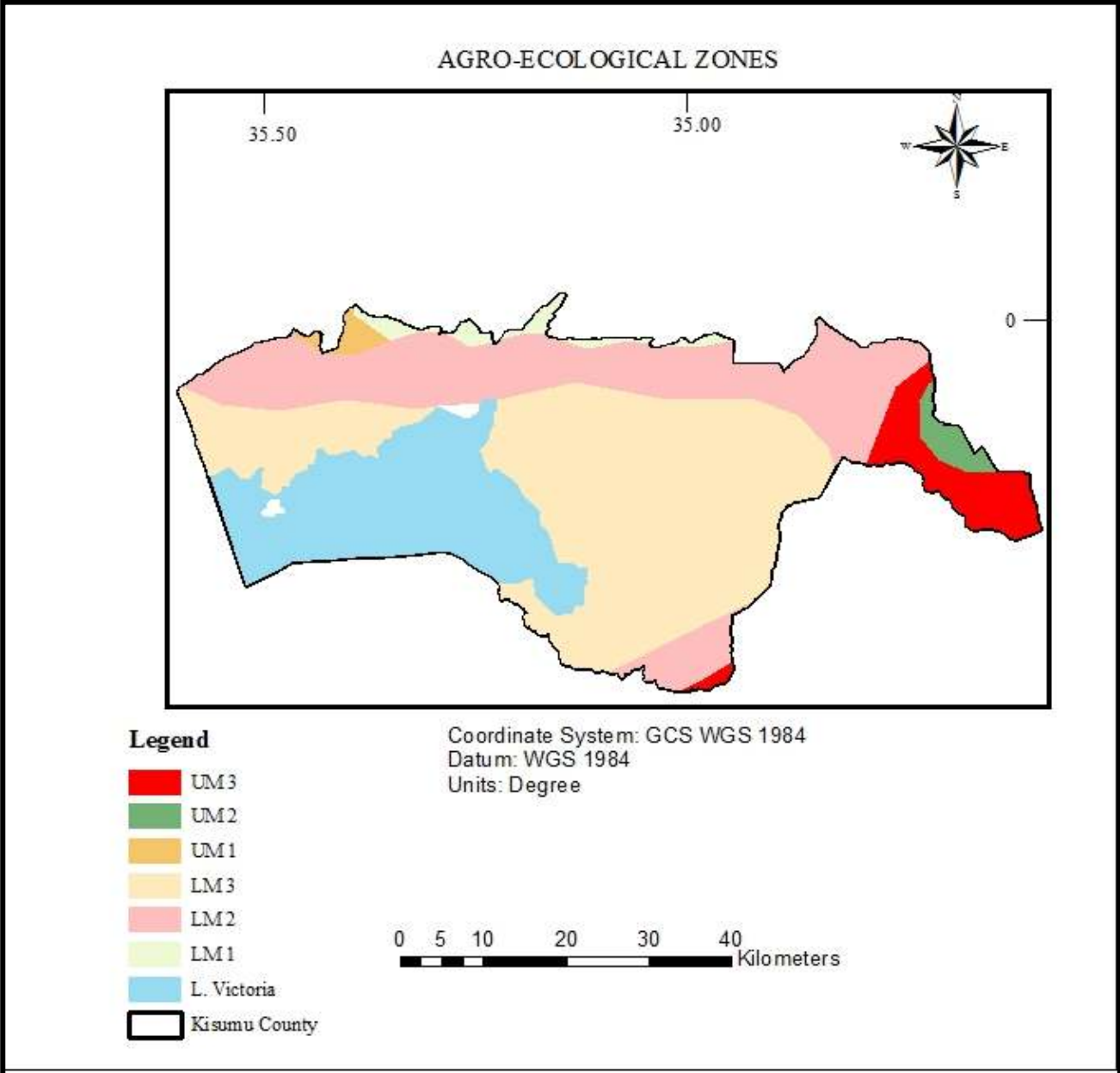


Figure 3.3: Kisumu County Agro ecological Zones

3.1.3 Population Distribution and Density

The population of Kisumu County according to the 2019 Copulation and Housing Census was estimated at 1,155,574 people with 560,942 men and 594,609 women. The population is a major factor influencing climate, topography, soil structure, and infrastructure and land ownership in the region. The population density of the County was 554 people per square kilometre. Population density ranged from 234 in Muhoroni Sub County to 4737 people per square kilometre in Kisumu Central sub County (KNBS, 2019). Table 3.2 shows the population densities within Kisumu County.

Table 3.2

Population Densities within Kisumu County

Sub County	Area	Population	Density (Km ²)
Kisumu East	142	220,997	1,560
Kisumu West	209	172,821	827
Kisumu Central	37	174,145	4737
Seme	268	121,667	454
Nyando	446	161,508	362
Muhoroni	658	154,116	234
Nyakach	327	150,320	460
Total	2,085	1,155,574	554

3.2 Research Methodology

This section discusses the methodology employed in the study and is divided into three subsections. The first subsection describes the study design; the second shows the main sources of data used for the analysis. The second subsection also highlights the main reasons for using both quantitative and qualitative research methods and explains the sampling design in each case. The third subsection describes the procedure and methods used for the analysis of quantitative and qualitative data.

3.2.1 Research Design

The research design serves as the intricate plan that directs a research endeavour towards its intended goal, or the underlying framework within which the research is executed (Saunders et al., 2009). It encompasses the layout for gathering data, performing measurements, and conducting analysis. The research utilized a cross-sectional descriptive research design, aiming to offer a precise snapshot or representation of the variables' characteristics. Both qualitative and quantitative research strategies were used.

Quantitative research is rational and systematic, focusing on the causal associations in the hypothesis, which determine research resolutions to accept or reject this hypothesis. The measurement method emphasizes statistical measures of validity, methodology, and measurement data to determine relationships between data groups (Eldabi et al., 2002). The measurement approach involves thinking about the nature of social science and provides a brief overview of the concepts of comprehensive decision-making. Lalwani and Gardner (2004) argue that quality research emphasizes assumptions about social status, especially human exploits and behaviour. Graziano and Raulin (2000) describe qualitative data-collecting procedures as having fewer constraints during research planning, which is less formal and fluid than the quantitative method. Graziano and Raulin (2000) include open-ended discussions, checklists of current and non-existent, field guides, in-depth discussions, text study and secondary analysis as data collection methods.

The study focused on the households as a unit of analysis in Kisumu County; this is because in most rural parts of the developing countries, Muhoroni and Nyando sub-counties included, it is the common unit of production. To endure what can often be difficult circumstances, rural agrarian households have been known to employ livelihood strategies, which can be defined as “the capabilities, assets (including both material and social resources) and activities required for a means of living” (Carney, 1998).

3.2.2 Conceptualization of Data

In this study, both primary and secondary data were sourced. Primary data were obtained from the field using questionnaires and interviews, and general observations. In each case, both quantifiable and non-quantifiable data were collected.

Four broad categories of primary data described below were sought from the households in Muhoroni and Nyando sub-counties. First, the study sought to access data on the different indicators that would elucidate the level or extent of poverty in the district. This included the households' socioeconomic characteristics including assets ownership. Second, the study sourced data on households' land tenure and control. Also included in this category was data on the households' decision-making behaviour. Thirdly, it was important to access data on the land use practices that are undertaken by the household units, including critical investments in land management practices like soil conservation and whether the households had access to markets for their farm produce as well as credit facilities to enable them to boost agricultural production.

The qualitative data that was used to supplement primary data, in this study was obtained through Focus Group Discussions to get different views from the community leaders, and policymakers. Knodel (1997) defines focus group discussion as a technique of assembling a small group of individuals from the population to be studied to generate a discussion on preselected topics specified by the researcher. The issues of discussion focused on land use patterns and land management practices, information participation in social networks, gender roles in decision making and land management practices; outcomes and perceptions of poverty and agricultural productivity trends. The selection process was done with the help of community mobilizers who were familiar with the discussants.

In addition to FGDs, key informant interviews (KIIs) were conducted with government officials such as the sub-County agricultural officers, religious leaders and community leaders. These are people who know what is going on in a given environment such as a society. The aim of key informant interviews is to gather data from a vast range of individuals with immediate knowledge regarding the community such as community leaders. These individuals have vast knowledge and understanding which will give insight into the nature of their problems and probable solutions to them.

Apart from the above primary data, secondary data was obtained by reviewing several documents with a view of gathering information on poverty trends, land use patterns and population characteristics. These documents consisted of relevant books from various sources, including university libraries, the Ministry of Agriculture library, the government printer, and county offices

among others. These have been used to provide data on the study area, agro-ecological conditions, and other details of assistance to this study. Other additional sources of secondary data included topographical maps and aerial photographs which were used to provide information on the study area, agro-ecological and geological conditions.

3.2.2 Sampling Population, Procedures and Sample Size

Researchers are frequently plagued by a myriad of challenges before carrying out statistical analysis, including making decisions on the sampling frame, sample size and sampling techniques (Oluoko, 1996). Sampling is an important part of all the research. Especially in the social sciences research need sampling techniques to study social phenomena.

Because it is impossible to study the whole population due to various facts like time limitation, high cost, population size so forth. There are different types of sampling methods available for the data collection. The choice of the survey methods may vary spatially, temporally as well as with individual decisions made by a researcher concerning the characteristics of the sampling population (Obara, 1983; Shah et al., 1980). Several considerations were made before deciding on the most appropriate sampling approach to be used. There are seven sub-counties in Kisumu County, namely, Kisumu East, Kisumu West, Kisumu Central, Nyando, Nyakach and Muhoroni divisions.

To find an appropriate and sufficient number of samples to be used during the quantitative analysis, 1.5 per cent of the total population was taken as the initial sample size, resulting in 250 questionnaires to be filled during the study. This sample size was deemed sufficient because, depending on the analytic method, a sample size between 30 and 100 may be sufficient to infer normality when other statistical requirements are present (Clark et al., 1986).

Table 3.3:

Sample Distribution in the Locations of Muhoroni and Nyando Sub Counties

Sub county	Sub locations		Household Numbers (2009- Census)	Sample	
	Location			Households	Per cent
Nyando	Kochogo	South	3850	60	24.0
		Kachogo			
	East Kano	Katolo	2960	45	18.0
	Wawidhi	Ayweyo	3270	45	18.0
Total			10,080	150	
Muhoroni	God Nyithindo	Tonde	2980	44	17.6
	Tamu	Lower Tamu	2315	38	15.2
	Muhoroni	Owaga	1425	18	7.2
Total			6720	250	100.0

Due to diversity of attributes considered important to this study, the Muhoroni and Nyando sub-Counties were the chosen. These sub-counties are first situated in distinct agro-ecological zones. The Lower Midland Cotton Zone, often known as LM3, which includes Nyando sub-County, is known for having intermediate rainfall. Second, Muhoroni sub County is distinguished by large-scale sugarcane farms, whereas Nyando sub County primarily consists of small-scale farms (Jaetzold & Schmidt, 2009). The Muhoroni sub County, on the other hand, is situated in the LM2, or the marginal sugarcane zone, which is characterized by a long to medium cropping season followed by a short to medium cropping season.

3.2.2. Sampling Techniques

Simple random sampling was used to select the locations for study after stratification according to agro-ecological zones, while the sub-locations were randomly chosen. Systematic random sampling was used to pick representative households for the study. The household heads were mainly targeted for this study. This is because the lists of land ownership were not reliable due to deaths or land changing hands. The technique is used as follows; it is conducted by sampling every k^{th} item in a population after the first item is selected at random from the first k items. Based on the technique, the researcher started at the centre of each location and followed in three different

transects following existing roads. Due to the close spatial proximity of households in Nyando sub County, every 5th household was selected, while in Muhoroni sub County where the households were scattered, every 10th household was selected for the interview.

Few cases of absentee and hostile respondents were encountered. However, where such situations such as hostility occurred, explanations were offered by the researcher as to the objectives of the research. In the absence of the head of the household at the time of the interview, a repeat visit was made especially on the weekends as it was expected that they would be at home during this period. If on return the researcher failed to get the respondent, then the next household was selected. Although the study had proposed to use a list of households from the district land offices, such a list was found to be inappropriate, this was mainly because most of the land had changed hands through sale of sub division.

In addition to the systematic random sample, purposive sampling was used in the study in the selection of the key informants who included; the Muhoroni and Nyando sub County Agricultural Extension Officers, the sub County Agricultural Officer and Farmers' Extension Leaders and Non-governmental organizations. Focus (target) groups were identified using the purposive sampling method with which informal interviews were done. Amongst the focus groups, some of the chosen demographic include women, village elders and common interest groups.

3.2.3 Data Collection Procedures

One of the most widely used methods for gathering primary data in research is the questionnaire. Questionnaires are printed sets of questions that respondents must respond to, either during in-person interviews or on their own, as a tried-and-true, well-organized, logically presented, and systematic technique of gathering data (mostly in the tradition of the quantitative method) (Payne & Payne, 2005).

Through the distribution of questionnaires (Appendix 1) to the agricultural households, the primary data for this study were collected. Although the interviews were performed in "Dholuo," the questionnaire was written in English, including the English translation of the Dholuo responses. This was done to make sure that the questions and responses were uniform and understandable.

To help the researcher conduct the survey, three research assistants who were fluent in the local language, Dholuo, were hired and trained. In order to improve the questionnaire and make the necessary adjustments, a pilot survey of 5% of the total respondents was carried out in a section of Nyando Sub County that was not the research area.

In each instance, the head of the home was interviewed the eldest son or adult in the family was interviewed in cases where the household head was absent. The goal was to guarantee accurate and trustworthy information. Similar to how semi-structured questionnaire interviews used during primary data collection were complemented and supplemented by focus group discussions (FGDs) for women's groups and village elders. This was so that the data acquired, particularly when contradictory responses were given, could be explained.

In addition to the data techniques mentioned, observation was also used to gather first-hand data. This approach offers trustworthy qualitative data that matches the information gathered from conversations and interviews. A thorough research of the land use activities, settlement patterns, household assets, and other household characteristics was also conducted using the observation method. The results from various methods of data collection were augmented with photographs. Secondary data for this study was gathered from a variety of sources, including documents and District Development Plans from the Kenya National Bureau of Statistics, policy documents from several publications, and assessments of pertinent government records.

3.2.4 Reliability and Validity of the instruments

Validity and reliability of the questionnaire were tested. According to related literature, there are differences between the definitions of validity and reliability because reliability tests typically show whether the results can be repeated in other contexts while validity examinations look at the instrument's precision and whether it is actually measuring what it is intended to measure. A validity test shows the extent to which an instrument accurately captures the study's notion (Buttle, 1995). Owino (2013) claims that the validity of research determines whether it accurately measures the thing it was intended to assess and how factual the study findings are. In order to establish the validity of the research instrument, the questionnaires underwent a pretesting phase in which supervisors reviewed the questions and provided feedback. Ambiguous questions were rectified and any inappropriate ones were eliminated. The revised questionnaire was subsequently

incorporated into the study. The researcher employed a variety of data sources, including focus group discussions and questionnaires, to enhance the credibility of the data. Moreover, careful attention was paid to align the research questions with the stated objectives.

A reliability test was conducted on the data to be used in this investigation. Yilmaz et al. (2015) came to the conclusion that an instrument's reliability could be inferred from its Cronbach's alpha, which was greater than or similar to 0.7. The Cronbach's alpha test was performed on the 66 items in the questionnaire that was utilized for this study and the resulting data that was gathered from the 250 respondents. The household poverty and land use questionnaire used in this study was fairly accurate, according to a reliability statistic of = 0.972. The reliability of this questionnaire was evaluated by comparison with other research as a measure of criterion-related validity or instrumental validity. Sultan and Wong (2010) deemed a tool with an alpha (α) = 0.8462 to be reliable (Appendix I).

3.2.5 Data Analysis and Hypothesis Testing

Data analysis is the process of organising and arranging data to provide systematic knowledge about a certain topic. Several statistical methods have been applied in this section to aid in the analysis and interpretation of data. Different geographical issues have been resolved using a variety of statistical methods and instruments (Werner et al., 1993). The primary concerns in this study were household poverty, land use, and land management.

Numerous authors of statistical literature have emphasized the importance of statistical approaches in the collection, analysis, and presentation of data. Although not a means in and of itself, these statistical methods have been helpful in obtaining reliable data for studies. The type of data gathered and the hypotheses to be evaluated typically dictate which data collecting and processing techniques are used (Oluoko, 1996).

After data collection, the data was organized and analysed to provide answers to the study's research questions. The surveys were evaluated for clarity, completeness, and consistency in the following manner. These questionnaire responses are then coded before entering the data. The statistical data were analysed using the SPSS program (Statistical Package for Social Sciences). Cross-tabulations and frequencies are examples of descriptive statistics that summarize numerical

data so that it may be described and patterns can be identified. The relationships between dependent factors like poverty and independent variables like agricultural productivity and land usage were also identified and quantified using inferential statistics.

In this study, an effort was made to choose the methods that best highlight the data that had been gathered. Different types of analytical tools were needed at different stages of analysis to explore household poverty's effects on land usage, land management, social networks, and agricultural production. These strategies are detailed in the paragraphs that follow.

3.2.6 Asset poverty Index

This study used an asset-based index approach to examine the prevalence of poverty in the sub-Counties of Nyando and Muhoroni. This is different from earlier studies on this topic, which took a money-metric approach. A variety of aggregation methods can be used to create an asset index. Studies that employ an equal-weighting methodology exist (Montgomery et al., 2000). An asset index proposed by Chaturvedi and Greeley (2007) was employed in this study as an indicator of poverty. An asset-based study, in accordance with Moser (1998), can highlight the dynamics of poverty by recognizing the capacity of the underprivileged to make use of their resources in order to lessen their vulnerability. Different coping mechanisms can be used by households with various types or quantities of assets when they experience shocks.

Second, there are many debatable ways to implement the asset-based approach. For instance, an asset index with distinct weights for each asset endowment was created by Moser and Felton (2007). They integrated the three components of prices, unit values, and principal components analysis to create their asset index. They determined the weights of each asset segment by categorizing each component of the asset into various groups. Their asset index was therefore produced using value judgment. Conversely, Chaturvedi and Greeley pointed out that using weights had both benefits and drawbacks. As Moser and Felton show, using weights—which are determined through challenging procedures—may produce results that are statistically more significant. Such a value judgment, however, might spark a new debate about whether or not the

weights are appropriate in the real world. Chaturvedi and Greeley do not apply weights for any assets in their asset index because of this dubious viewpoint.

Characteristics that are categorically recognized as determinants of poverty are taken into consideration while creating the poverty index, which is based on prior research in the field. Given the constraints of the data, multiple variables that indicate various aspects of poverty are included. These elements fit into one of the categories of capital, including financial, social, physical, and human capital.

Any composite indicator that reflects an individual, or more frequently a household's, ownership (or lack thereof) of a variety of assets, with the latter term being used broadly, is referred to as an asset index. As a result, an asset index may be defined as any indicator A_i that is calculated as a function of a set of underlying variables. a_{ij} , where a_{ij} represents the possession of asset j by household i . $f(a_{i1}, \dots, a_{im}) = 1$ $A_i = f(a_{ij})$ (1). Thus, in abstract terms, an asset index is any indicator A_i computed as a function of a set of underlying variables a_{ij} , where a_{ij} denotes household i 's ownership of asset j .¹

$$A_i = f(a_{ij}) = f(a_{i1}, \dots, a_{im}) \quad (1)$$

Ownership of assets in the above categories was used as an indicator of household poverty. By assigning scores to the different assets that were owned by the households, a poverty index was calculated for each of the households. Table 3.4 provides a list of the indicators used in this study to measure poverty.

3.2.7 The Land Use Entropy Index

The diversity of land uses in a given area is referred to as the "land-use mix," one of the key indicators of the land-use development pattern. Land-use mix indices have been pertinent to urban planning and public policymaking (Jiao et al., 2021). To make transportation easier and reduce reliance on the usage of vehicles, the indices have been used to locate houses, places of employment, retail establishments, and public services near together. There has been a lot of research on the topic of employing land-use mix as a suitable practice and management approach for urban design philosophies, but little has been done to examine the data accuracy and validity of land-use mix indicators. Although academics have linked multiple land use indices (MLU) to the idea of a single land use, ongoing research has expanded our understanding to take into account

not only the amount and magnitude of land types but also their various attributes, spatial shape, and functional organization. Various methods of measurement based on various understandings are possible; namely:

1. The diversity index, Simpson diversity index, and entropy index are quantitative measures of land use that can be used to determine the MLU level.
2. The spatial structural component of land use, such as the pedestrian index and closeness, can be used to measure accessibility and the MLU level.
3. Measuring the functional relationship aspect of land use using the promiscuity and compatibility approaches.
4. The MLU indices can be derived using a comprehensive measurement system built from the quantitative scale, spatial structure, and functional relationship of land use. This measurement is based on the comprehensive dimension.

Academics have recently started to pay more attention to the MLU phenomena in rural areas. Some researchers have looked into how rural settlement land has changed its use and become more useful from the perspective of land multifunctionality (Gu et al., 2019).

The diversity of the land use mix is measured using the land use entropy. The following notion of "Entropy" was developed in part by Frank & Pivo (1994). They contend that entropy might be used to comprehend the proportions and balance of different land uses. The calculation of land use entropy is given in Eqn (1).

$$Entropy = - \frac{1}{\ln(k)} \sum_{j=1}^k P_j \ln(P_j)$$

P_j is the percentage of developed land in the j th use type in the census tract or zone, where j is the number of unique land use types. The overall amount of land is taken into account in the entropy equation, and this equation is further strengthened by using only the percentage of developed land to accurately reflect different types of built-up regions. Land use entropy values range from 0 to 1. Zones with a value close to 1 have almost equal distributions of land uses across all categories, whereas zones with a value closer to 0 have a smaller mix of land uses across all categories. (Table 3.5).

3.2.9 Composite Index of Adoption of Land Management Practices

In this study, the families in the sub Counties of Nyando and Muhoroni land management practices were examined using the composite index of adoption postulated by Barungi and Maonga (2011). Yila and Thapa (2008) contend that although the composite index of adoption does show the variety of technologies accepted, it does not adequately reflect the level of use. The creation of policies for the successful implementation of land management programs is made easier by the computation of this index, which aids in understanding the variation in technology adoption and its reasons. The composite index of adoption (CIA) was calculated in this manner.:

$$CIA = \frac{IA_1 + IA_2 + \dots + IA_{100}}{N}$$

Where;

IA_i represents the Index of Adoption of Land management practices for the i^{th} household

T_i signifies the total number of land management practices adopted by the i^{th} household

N is the sample size (Table 3.5).

3.2.10 Social Network Index

Social capital, in the form of community organizations, can serve the purposes of knowledge sharing, limiting opportunistic behaviour, and enhance group decision-making. The effectiveness of social capital in performing these functions depends on a number of factors that reflect its composition, operations, and organizational structure. A variety of cutting-edge techniques have been employed to quantify social capital, and as Woolcock and Narayan (2000) point out, it is probably impossible—and perhaps even undesirable—to develop a single "right" estimate for a number of variables. This is due to a number of factors, including the inclusion of many levels and multi-dimensional analytic units in the definitions of social capital that are the most comprehensive. Grootaet et al. (2004) offered a framework for evaluating social capital to rekindle conversation and agreement in theoretical and empirical issues using a variety of empirical methodologies.

In their list of six social capital components, Grootaet et al. (2004) included networks and groups, trust and solidarity, teamwork and cooperation, information and communication, social inclusion

and integration, political participation, and empowerment. Density of membership model—utilized in this study—was based on calculation how many people participated in various associations and organizations. The membership variable had a value of 1 if household heads were members of organizations, 0 otherwise. According to Szreter and Woolcock (2004), relationships between individuals with the same social identity are more likely to be associated with wellbeing, whereas relationships between individuals who are situated at different levels of the social scale are more frequently associated with reciprocal respect but less frequently with wellbeing.

3.2.11 Agricultural Productivity Model

A number of researchers have provided their own definitions of agricultural production based on their own disciplines and worldviews. It has been interpreted differently by numerous academics, including agronomists, economists, and geographers (Dharmasiri, 2009). Overall agriculture productivity refers to as "output per unit of input" or "output per unit of land area" in the fields of agricultural geography and economics. From this viewpoint, Dewett and Singh (1966) described agricultural productivity as the varying relationship between agricultural outputs and one of the essential inputs while maintaining other elements constant. It is a measure of how efficiently inputs are used in production when all other factors remain constant. Agricultural productivity refers to the income from an arable land unit or cultivable land unit in this context.

The agricultural productivity model proposed by Fowowe (2020) was updated in this study, and agricultural productivity is now estimated as follows:

$$AGRIC = \alpha_1 C + \alpha_2 A + \alpha_3 FI + \dots \varepsilon_1$$

Where;

$\alpha_1 C$ represents variables relating to the economic value of crop outputs

$\alpha_2 A$ represents variables relating to the economic value of animal products

$\alpha_3 FI$ represents variables relating to the economic value of farm inputs capturing household head characteristics

AI 5 variables capturing agricultural inputs

3.2.12 Spearman's Rank Correlation

The statistical test known as Spearman's rank correlation coefficient, or (Spearman's rho), determines the strength and direction of the link between two ranked data variables

(Chinyamunzore, 2019). When nominal, ordinal, or interval/ratio data do not meet the requirements for a parametric test, it is employed to analyse the data (Weiers, 2011). The sample population's regular distribution is not taken into account by the nonparametric Spearman's rho correlation test. Therefore, it is less restrictive (Weiers, 2011). The original, untransformed data were utilized to generate Spearman's correlation coefficients. The formula for calculating Spearman's rho is

$$\rho = 1 - \frac{6 \sum_{i=1}^n d_i^2}{n(n_2-1)}$$

Where ρ = Spearman' rho,

n = sample's pairs of observations,

d = each pair's difference in ranks.

The Spearman's Rank Correlation was used in this study to determine the relationship between household poverty and land use, land management, memberships in social networks and agricultural production.

3.2.13 Cross-Tabulation

The association between at least two variables can be summed up in a cross-tabulation. This table demonstrates the degree of relationship between the factors or with a trial of centrality (Ary et al., 1985). One method of examining the relationship or relationship between at least two variables is to carry out a cross-tabulation examination. This method uncovers the contrasts between the factors as far as absolute numbers or frequencies and rates, introducing such information in table structure for simple investigation. These frequencies and rates are important in deciphering and dissecting the presence of affiliations and connections between factors. Cross tabulation examination, also known as the contingency table investigation is regularly used to analyse downright (nominal data) information. A cross-tabulation table that has two or more dimensions records the incidence of respondents that exhibit particular qualities portrayed in the table. Additionally, cross-tabulation provides a wealth of data about the connection between the factors. In this study, the cross-tabulation analysis was utilised to analyse household poverty by sub-County and gender. It was additionally used to look at family land management practices by sub-County and part and to compare household membership to social networks by sub-County.

3.2.14 Contingency Coefficient (C)

The Contingency coefficient, C, is utilised when the factors to be related are categorised (Borg & Gall, 1991). The analyses of the rates and frequencies contained in the cross-tabulation tables permit a researcher to illustrate the significance behind the critical relationship that has been found (Kempner, 1994). The Contingency coefficient is comparable to the chi-square measurement and gives the least demanding technique for deciding the factual importance of C (Borg & Gall, 1991). The Contingency coefficient produces correlations that are comparable to the Pearson product-moment relationship. Generally, C is supposed to be utilized where data categorical (in classes) or while changing over the scores to classifications presents information in a more coherent or justifiable structure (Borg & Gall, 1991). The Contingency coefficient was utilized in this study to establish the relations between Gender and land management in Nyando and Muhoroni sub-Counties.

Table 3.4

Indicators of Poverty and the Construction of a Poverty Index

Poverty Indicator	Categories	Weights /Scores
Human Capital		
Household labour	Availability of hired labour	2
	Non Availability of hired labour	0
Education level of household head	Number of Years spent in Education	Number of years spent 0
	None	
Physical Capital	On and Off Farm Physical Assets	
Type of Walls	Earth wall	0
	Brick wall	2
Flooring materials	Earth Floor	0
	Cement Floor	2
	Tiled Floor	3
Source of Energy	Firewood with open fire	0
	firewood with modified saving	1 4
	Gas cooker	2
	Charcoal	3
	Kerosene	
Toilet	No toilet	0
	Pit Latrine	1
	Flush Toilet	2
Water source	Piped	3
	Well	2
	Surface	1
	Other	0

Livestock	Cattle	2
	Goats	2
	Sheep	2
	others	2
Capital assets	Non-mechanized farm	1
	equipment	2
	Tractors and Farm Machinery	2
	Real Estate	2
	Financial Capital (Access to Credit)	
Natural Capital	Ownership of Land	2
	Non Ownership of land	0

Table 3.5

Land Use and Land Management Classification and Analysis Matrix

Land Types	Reference	Weights/Scores
Land Use Classification and Analysis		
Food Crops	Land used for planting food crops like maize and sorghum	Presence of specific food crops -1 Absence of specific food crops - 0
Horticultural Crops	Land used for growing horticultural crops like tomatoes, capsicum, onions etc	Presence of specific horticultural crops - 1 Absence of specific horticultural crops - 0
Fruits	Land used to grow fruits like mangoes and passion fruits	Presence of specific fruits - 1 Absence of specific fruits - 0
Cash Crops	Land used for growing rice and or sugarcane	Presence of specific cash crops -1 Absence of specific cash crops - 0
Non- food crops	Land used to grow non-food	Presence of specific food crops -1

	crops e.g., cotton	Absence of specific food crops - 0
Livestock	Land used for breeding cattle, goats sheep, chickens, pigs and other livestock	Presence of specific non-food crops -1 Absence of specific non-food crops - 0
Rented Out	Land that is leased out to other farmers for to earn household head extra income	Available land for lease -1 Absence of land for lease - 0
Business Premises	Land that is set aside for non-farm income like business premises, and residential areas to be leased out	Land for non-farm income -1 No land for non-farm income - 0
Land Management Indicators		
Soil Conservation measures	Household Practices SC Measures Cattle manure Crop residue Chemical Fertilizer	Yes = 1 No = 0
Land Management Practices	Household Practices specific land management techniques eg Agroforestry, Trenches, Water Ways Sisal Fences, Building Gabions Intercropping, Crop Rotation	Yes = 1 No = 0
Social Networks Classification Indicators		
Memberships to Social Networks	Household head is a member of an association or organisation e.g. Producers Organizations, Agricultural Cooperatives,	Yes = 1 No = 0

	Savings and Credit Organizations, Community Welfare Organizations, Rotating Savings and Credit Associations (ROSCAs) and Women Groups	
Agricultural Productivity Indicators		
Agricultural Productivity	This was a computed using a combination of the economic value of Crop production variables, Animal production Variables and Farm Inputs such as labour, fertilisers and farm equipment	Price of various products in Kenya Shillings (Kshs)

Table 3.6
Data Analysis Matrix

Objective	Key Variables	Data Analysis
1. To assess the effects of household poverty on land use in Muhoroni and Nyando sub-counties	Poverty – Human Capital Physical Capital Natural Capital Social Capital Financial Capital Land Use – Food Crops Horticultural Crops Sugarcane Non- Food Crops Leased Out Business Premises	Spearman’s Rank Correlation (ρ)

<p>2. To Determine the relationship between Household poverty and land management in Muhoroni and Nyando sub counties</p> <p>(Determine whether gender is a determinant in Land Management Muhoroni and Nyando sub counties)</p>	<p>Land Management Practices</p> <ol style="list-style-type: none"> 1. Tree Planting/Agroforestry 2. Trenches 3. Gabions 4. Water ways 5. Inter-cropping 6. Crop rotation 	<p>Spearman's Rank</p> <p>Correlation</p> <p>(ρ)</p> <p>Coefficient of Contingency</p> <p>C</p>
<p>3. To determine the relationship between membership to social networks and rural poverty in Muhoroni and Nyando sub counties</p>	<p>Social networks – Membership to</p> <ol style="list-style-type: none"> 1. Producers Organisation 2. Agricultural Cooperatives 3. Savings and credit organisations 4. Rotating Savings and Credit Organisations 5. Women's Groups 6. Community Welfare organisations 	<p>Spearman's Rank</p> <p>Correlation</p> <p>(ρ)</p>
<p>3 To Examine the Linkages between household poverty and agricultural production in Muhoroni and Nyando sub Counties</p>	<p>Agricultural Production - Economic Value of</p> <ol style="list-style-type: none"> 1. Crop Products 2. Livestock Products 3. Agricultural inputs 	<p>Spearman's Rank</p> <p>Correlation</p> <p>(ρ)</p>

3.2.15 Hypothesis Testing

The following null hypotheses were tested for their validity

- i. There is no significant relationship between household poverty and land use in Muhoroni and Nyando Sub-counties
- ii. There is no significant relationship between household poverty and land management in Muhoroni and Nyando Sub-counties
- iii. There is no significant relationship between membership to social networks and household poverty Muhoroni and Nyando Sub-counties
- iv. There is no significant link between household poverty and agricultural production levels in Muhoroni and Nyando Sub-counties

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Introduction

The findings from the respondent interviews, focus groups and key informant interviews, as well as an analysis of the available data, are presented in this chapter. Indeed, the chapter aimed to achieve the study's objectives, namely: to determine the relationship between household poverty and land use, evaluate the relationship between household poverty and land management, including links between gender and land management, investigate the relationship between the level of household poverty and membership in social networks, and determine the effects of household poverty on agricultural production in Muhoroni and Nyando sub Counties.

4.2 Socioeconomic Characteristics of Household Heads in Muhoroni and Nyando Sub Counties

The socioeconomic and demographic composition of a household is important; it influences the standard of living for its occupants. In fact, identifying the features of the various income or consumption groups in a nation is the first stage in creating a poverty profile. This makes it possible to comprehend the characteristics of the impoverished and how they differ from others who are not poor. In Muhoroni and Nyando sub-Counties, the socioeconomic and demographic features of rural families were examined to evaluate their role in the households' poverty status.

4.2.1 Distribution of Household Heads by Gender and Age

It is widely acknowledged that the age and gender of a household head impacts rural poverty to a large extent. This is because current concepts of poverty have overemphasized the access to or ownership of assets that can be utilised to generate income by which poor households can get out of poverty (Moser, 1998). An analysis of the sample household heads interviewed in both Muhoroni and Nyando sub-counties indicated that, 176 were male and 74 were female; representing 70.4 per cent and 29.6 per cent of the population, respectively. The disparity in the gender of the household heads in Muhoroni and Nyando is mainly attributed to the fact

that a good number of the female heads were widows. Figure 4.1 shows the distribution of the household heads by gender. Granted that the customary means to household headship for women tends to be widowhood, and widows constitute a higher per centage of the population at advanced ages, the greater share of female-headed households among households with older household heads, was expected.

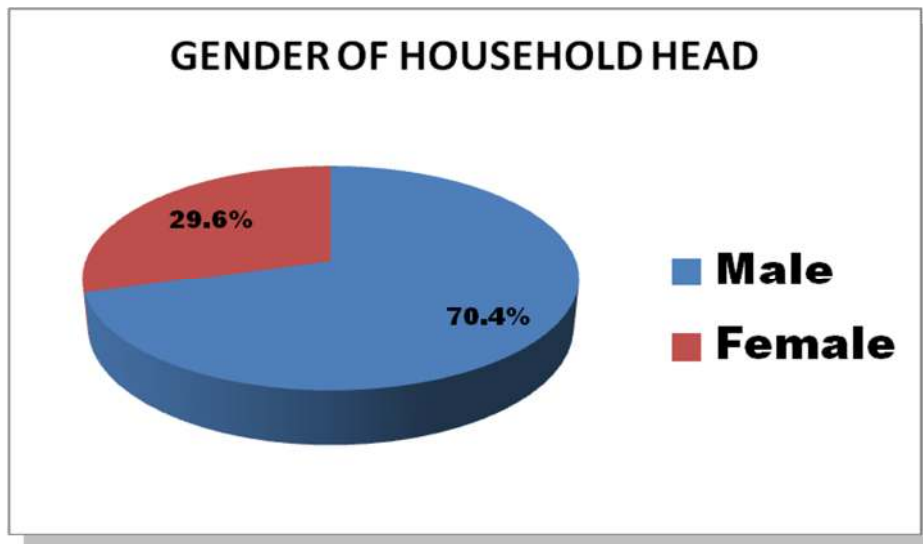


Figure 4.1: Gender of the Household Heads

Studies have indicated that poverty rates are likely to be higher in female-headed households in both urban and rural areas (Javed & Asif, 2011; World Bank, 2006).

Age is an important factor in terms of its influence on perceptions, attitudes and practices on issues related to modern agricultural practices. Researchers have argued that levels of poverty within households are likely to increase with the age of the household head (Njuguna, 2011). This is because they are no longer in their productive years and their children and dependents are mostly out of the home. Results from this study indicate that the sampled household heads were aged between 24 years and 94 years, with a mean age of 50 years and a modal age of 45 years (Table 4.1).

Table 4.1

Age of Household Head

Age of Household Head	Frequency	Per cent
24 – 30	9	3.6
31 – 40	59	23.6
41 – 50	67	26.8
51 – 60	60	24.0
61 – 70	37	14.8
71 and above	18	7.2
Total	250	100.0

Studies carried out by FAO in several rural sites in Africa show that the aged in rural regions strain the scarce household resources and community services. The aged population in rural regions are often plagued by deteriorating health conditions after living difficult lives constituting hard physical labour. They are prone to high levels of stress and uncertainty about their future.

4.2.2 The Educational Background of the Household Heads

According to the World Bank (2001), education is pertinent to human development since it empowers people, improves their wellbeing and enables them to actively participate in nation-building. It empowers them by inculcating the know-how and abilities necessary for improving their income earning capabilities and quality of life. On its own, education may not guarantee successful farming, but it enhances the households' ability to adopt and comprehend the consequences of technological innovations and new farm practices (Juma, 2002; Metalign, 2005). Superior educational achievement may indicate an increased number of employment opportunities and in particular in the rural context, increased awareness of the full potential of new agricultural technologies and associated agricultural practices (Kibuchi, 2000).

Of the sample respondents interviewed in Nyando and Muhoroni sub Counties; 14 per cent of the household heads indicated that they had not received any form of education at all while 46 per cent had either lower or upper primary school education. This leaves at least 22 per cent of the total sampled population with minimal education achievement. The results also indicate that the male-headed households had received more education compared to the female educated households. Table 4.2 shows the distribution of the household heads' level of education.

Table 4.2

Education Level of the Household Head

Education level	Frequency	Per cent
None	35	14.0
Lower Primary	21	8.4
Upper Primary	95	38.0
Secondary School	74	29.6
Post-Secondary Education	25	10.0
Total	250	100.0

The results above compare favourably with those of the Kenya Integrated Household Budget Survey (KIHBS, 2018), which puts the total sum of Kenyan household heads with no formal education at 14.4 per cent. The report further shows that, at least 51 per cent of the household heads have at least a primary education. Comparatively, results in this study indicate that 46.4 per cent of the household heads had achieved at least some primary education.

Studies have shown that poverty levels were considerably elevated amongst people with lower levels of education (KIHBS, 2018). Indeed, the link between education and poverty seems strong since most of the measures of poverty indicate that the lesser the level of education accomplished, the more probable the adults were to be poor and undergo severe levels of poverty (Statistics-South Africa, 2014). It is shown in this study that, approximately 31 per cent of the female household heads had not received any form of education at all compared to 6.8 per cent of the male household heads (Table 4.2).

Table 4.3

Education levels of Household Heads by Gender

Level of Education	Gender of Household head	
	Male (%)	Female (%)
None	6.8	31
Lower Primary	6.8	12.2
Upper Primary	36.9	40.5
Secondary School	36.4	13.5
Post-Secondary Education	13.1	2.7
Total	100	100

Statistics have shown that poverty rates in Kenya were greatest among households headed by persons with no formal education and significantly low in households whose heads had attained tertiary education or higher (KIHBS, 2018; KNBS, 2009). Moreover, although household heads with no formal education constituted 14.4 per cent of the population, they formed the second largest portion of 28.2 per cent to overall poverty. Poor households whose heads had no formal education also experienced comparatively worse levels of poverty. This study determined that 31 per cent of female household heads in Muhoroni and Nyando sub-counties had no formal education at all, which is markedly higher than the national average of 14.4 per cent. This suggests that the female-headed households are likely to experience deeper poverty than their male counterparts (Table 4.3).

4.2.3 Household Monthly Income

The household monthly income is defined as the finances that go to the household every month from various sources. Income embodies a very significant area of concern when distinguishing the poor. It encompasses all modes of income stemming from financial investment, employment, household industries, agricultural goods, property rent and pension (KIHBS, 2018). The level of income is significant not only for the households but its allocation among household members and various segments in the society. Income may not be easy to define

because it comprises numerous components of which cannot all be considered in monetary terms. For instance, farm households may use most of their produce for subsistence (Choudhry et al., 2009). Additionally, people tend to make inaccurate statements about their income level, which is commonly understated. This study endeavoured in part to rectify these anomalies by gathering information on the various economic activities, of the household heads.

Studies have indicated that agriculture is the mainstay of the economies of many African nations (Nambiro, 2007). In Kenya, it remains the major occupation and the main livelihood stream for most people (KIHBS, 2018). Indeed, 83.6 per cent of the respondents in Muhoroni and Nyando Sub-counties indicated that their major source of livelihood was the agricultural sector. Business or the non-farm sector accounted for 9.2 per cent of the respondents. Those employed in the informal sector or '*jua kali*' or cottage industry accounted for 1.6 of the sample of the two sub Counties. Only a paltry 4.4 per cent of the population were professionals or employed in technical institutions and factories. This can be ascribed to the low education levels that characterise the two sub Counties.

It is also observed that 70.8 per cent of the respondents interviewed indicated that they did not have any alternative sources of income other than the ones that they had stated (Table 4.4).

Table 4.4

The Main Economic Activity for household heads

Main economic Activity	Per cent
Business; Self-employed in the Non-agricultural sector	9.2
Employed in the Informal sector	1.6
Agriculture	83.6
Fishing and Related Business	1.2
Professional/ Technical	4.4
Total	100

The total annual income referred to the finances that accrued to the household in a year from various sources including food crops, cash crops, dairy products, employment, rents and other investments including remittances from relatives. In classifying the income levels of the households of Muhoroni and Nyando sub-Counties according to the aggregate received from various sources, this study categorised respondents who had a monthly income less than Kshs 3000 as having very low income; those who earned between Kshs 3001 and 6000 low incomes; Kshs 6001 – 12000 moderate income earners; Kshs 12001 – 15000 high incomes, and Kshs 15000 and above very high income (Table 4.5)

Table 4. 5

Monthly Income (Kshs) of Respondents by Sub County

Monthly Income Kshs.	Sub County		Total (%)
	Nyando (%)	Muhoroni (%)	
No Income Acknowledged	18 (12)	7 (7)	25 (10)
Very Low Income	59 (39.3)	3 (3)	62 (24.8)
Low Income	44 (29.4)	57 (57)	101 (40.4)
Moderate Income	10 (6.7)	20 (20)	30 (12)
Moderately High Income	8 (5.3)	4 (4)	12 (4.8)
High Income	2 (1.3)	4 (4)	6 (2.4)
Very High Income	9 (6)	5 (5)	14 (5.6)
Total (N)	150	100	250

According to the research findings, 10 per cent of the respondents declined to acknowledge their sources of income. While a paltry 5.6 per cent of the respondents earned considerably very high incomes. None of the household heads reported receiving money from external sources including remittances from children. The main sources income mentioned salaries from government employment (teachers, technicians). Another important source of income reported by the respondents included income from small scale businesses. Based on the distribution, it is clearly observed that a high proportion of households in Muhoroni and Nyando sub-Counties are within the low income earning category (Table 4.6)

Table 4.6: Type of Economic Activity of Head of Household

Nature of Economic Activity	Frequency	Per cent
Self Employed	161	64.4
Permanent Employee	20	8.0
Temporary Employee	47	18.8
Not Involved in Any Economic Activity	22	8.8
Total	250	100.0

4.2.4 Household ownership of Assets in Muhoroni and Nyando sub Counties

A household's assets comprise its material goods such as its animals, land, cultivated areas, people, agricultural equipment, buildings, and appliances, as well as its financial assets, make up its assets. These values are important since they represent the household's wealth portfolio and so provide information about its financial situation. Eighty-four percent (84%) of the sampled respondents said they had inherited their land, with 14 percent saying they had bought the homestead they were currently living on. The growing problem of land fragmentation, (in which individual pieces of land are getting smaller as they are divided up among family members), is highlighted by the trend of land inheritance. Another crucial measure of agricultural output is land fragmentation (Table 4.7).

This problem of land fragmentation, especially in high-potential agricultural areas contributes significantly to challenges to ensuring food security in Kenya. This is largely because it has, led to economically unviable farm holdings (RoK, 2016). Productivity levels of the primary crops and livestock products have either remained stable or have decreased in recent time, according to the Kenya Vision 2030 (RoK, 2008).

Table 4.7

Mode of Property Acquisition

Mode of Property Acquisition	Frequency	Per cent
Inherited Land	212	84.8
Bought	35	14.0
Gift from the State	3	1.2
Total	250	100.0

While agrarian associated activities still comprise the largest share of total income among rural households in Muhoroni and Nyando sub Counties, a number of studies show the increasing significance of non-farm activities in developing and least developed countries (Carletto et al., 2007). The ownership of non-agricultural property is a significant factor in poverty alleviation because it represents a source of alternative income that can be used to complement the earnings from agriculture which is an important way breaking the cycle of poverty in most parts of rural Africa (Winters et al, 2007). From the findings (Fig. 4.2), it may be noted that most of the sampled households would struggle to get access to supplementary non-agricultural income. This contributes to increased poverty for such. Indeed, of the sample respondents in Muhoroni and Nyando sub Counties, 91 per cent did not own assets that could be used to generate income outside the agricultural sector. A small number of respondents (9 per cent) owned non-agricultural based properties and such located in towns outside their area of residence (Figure 4.2).

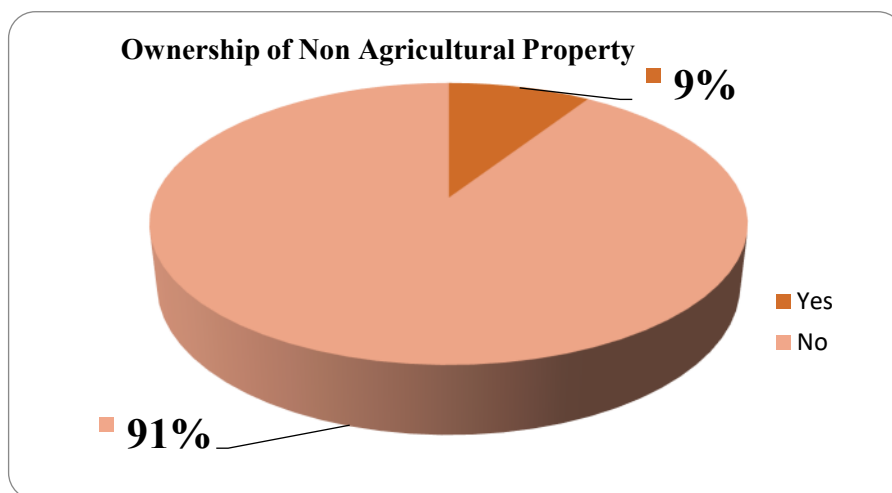


Figure 4.2: Ownership of Non Agricultural Property

The impact of non-farm related incomes on the livelihoods of rural communities has been acknowledged by several authors (Islam, 1997; Reardon et al., 2001)) who have stated that the influence of non-farm revenue sources on rural households has grown markedly in the last twenty years. Indeed, different case studies illustrate that the proportion of non-farm income to the overall household income varies between 30 per cent and 40 per cent (Reardon, 1997). These details are shown in Table 4.8.

Table 4.8

Type of Non- Agricultural Property owned by the Households

Type of Property	Frequency	Per cent
Non- agricultural Land Use	3	1.2
Houses to let	15	6.0
Commercial property	5	2.0
No Other forms of Property	227	90.8
Total	250	100.0

4.3 The Incidence of Household Poverty in Muhoroni and Nyando sub-counties

A report by the Kenya National Bureau of Statistical (KNBS) and the Kenya National Bureau of Statistics, puts the incidence of poverty and rural poverty in Kenya at 36 per cent and 40 per cent, respectively (Integrated Household Kenya, 2018). Findings from this study showed that out of the 250 respondents that were sampled and analysed, 160 or 64 per cent were considered poor while 90 of the respondents (36 per cent) were considered as living above the poverty line. This suggests that the incidence of rural poverty in Muhoroni and Nyando sub-counties is much higher when equated to the national average.

The high incidences of poverty experienced in Muhoroni and Nyando sub-Counties can be attributed to the over-reliance on agriculture as a means of subsistence. In Muhoroni sub County, for instance, the situation is compounded by the falling revenues from sugarcane production in Kenya, which is partly due to decreasing productivity in the farms (Kenya Sugar Board, 2008). The national average sugarcane yield is approximately 65 tonnes per hectare. This figure is much lower than the average anticipated yields of 100 tonnes per hectare which are required to achieve the highest level of profitability in sugarcane farming (Kenya Sugar Board, 2008). Additionally, farmers in Kenya whose livelihoods depend on sugarcane suffer from declining income. The declining livelihoods are exacerbated by the long duration (18 to 24 months) that the sugarcane plants take to reach maturity (Kenya Sugar Research Foundation, 2006). During the focus group discussions, respondents stated that bad seed cane variety is one of the factors that led to a decline in sugarcane production.

In Nyando sub County on the other hand, households are largely subsistent farmers (Raburu, 2012). And like in many areas in Kenya, Nyando sub County is characterised by declining land sizes, in addition to experiencing persistent floods which have ravaged most parts of the sub County, causing great losses to the economy in terms of lives and property (Raburu, 2012). Figure 4.3 illustrates the level of household poverty in the two sub Counties.

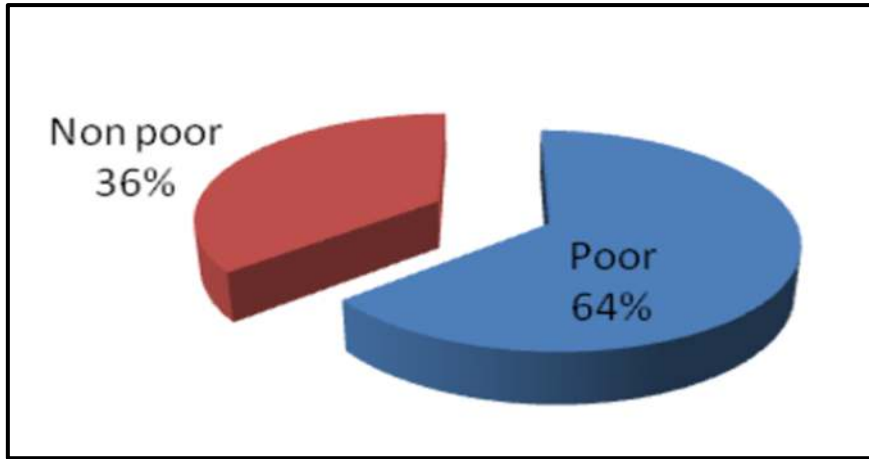


Figure 4.3: Incidence of Household Poverty Muhoroni and Nyando Sub Counties

4.3.1 Household Poverty by Sub County

Results from the study also indicate that the per centage of poor households was higher in Nyando sub County (85 per cent) compared to Muhoroni sub County where 32 per cent of the households were considered poor. These differences may be attributed to the fact that although sugarcane farming is prevalent in Muhoroni sub County, households received income from other crops such as maize, sorghum and cattle rearing besides other business related activities in Muhoroni town

Subsistence-oriented farming explains the higher incidence of poverty in Nyando sub County. However, other factors include poor agricultural and land use technologies, erratic and unreliable rainfall. As noted by focus group discussants higher poverty levels in Nyando sub-County are caused by frequent floods, mismanagement of rural based agricultural industries such as sugarcane, rice, cotton and fish industries and shrinking land sizes, Table 4.9 shows the household poverty levels by sub County.

Table 4.9

Household poverty by Sub County

Household Poverty	Division		Total
	Nyando (%)	Muhoroni (%)	
Poor	128 (85)	32 (32)	160
Non Poor	22 (15)	68 (68)	90
Total	150	100	250

These results corroborate findings of the Kenya Integrated Household Budget Survey report by the Kenya National Bureau of Statistics (2018). This report puts the population living below the poverty lines in Nyando Sub County (Kochogo – 82.5 per cent; Wawidhi 83.2 per cent and East Kano 80 per cent). In addition, the report puts the population living in the study locations of Muhoroni sub County (God Nyithindo 37 per cent; Tamu 25 per cent and Muhoroni 34 per cent).

4.3.2 Household Poverty by Gender

The percentage of female-headed households has significantly increased, according to Liu et al., (2017). In Muhoroni and Nyando sub Counties, the predominance of female-headed households was primarily ascribed to widowhood. According to this study's findings, households with female heads are often poorer. Additionally, just 20% of the sample's female-headed households were not considered to be poor, with the poor making up the other 80%. In contrast, only 57% of male-headed households were deemed to be poor. The gender disaggregated household poverty rates in Muhoroni and Nyando sub-Counties are displayed in Table 4.10.

Table 4.10

Household Poverty by Gender of Household Head

Household poverty	Gender of Household Head		Total
	Male (%)	Female (%)	
Poor	101(57)	59 (80)	160
Non poor	75 (43)	15 (20)	90
Total	176 (100)	74 (100)	250

The findings of this study are in tandem with studies by Buvinic and Gupta (1997), who found that female-headed households were more typical of the poor. Rogan (2016) observed that although overall poverty levels have decreased, there were still gender differences in financial poverty in post-apartheid South Africa. Likewise, female-headed households perform noticeably worse than male-headed households (Alkire et al., 2012). Research by Rogan's (2016) also found that male-headed households were expected to earn more than female-headed households. On the other hand, a study conducted in Nigeria by Oginni, et al. (2013) found out that female-headed households were 39% poorer than those headed by men.

4.4 The effects of household poverty on land use

The first objective of this study was to determine the relationship between household poverty and land use in Muhoroni and Nyando sub Counties. Specifically, the study sought to characterize land use practices and the processes used to make decisions about land use and management. The study also examined the connections between the current land use patterns and household poverty. Land use practices are as complex as the numerous environmental systems. Temporal and spatial factors, in addition to a large number of interactions and processes involved across different jurisdictions, contribute to the complexity of these practices. For the long-term growth of rural communities, a deeper understanding of these interdependent linkages is critical.

Traditional theories of land use have stressed the interaction between a community's cultural background, physical capabilities, and needs, on the one hand, and the natural features of the land, on the other (Nagamani & Ramachandran, 2003). Additionally, the input, activities, and

arrangements people make on particular land types define land use (FAO, 2000). According to this conceptualization, land use includes human activities such as the use of land for residential areas, industrial neighborhoods, and agricultural fields. In the ensuing decades, land-use patterns will significantly contribute to the change in the ecosystem (Baulies & Szejwach, 1997).

4.4.1 Land Tenure Dynamics in Muhoroni and Nyando Sub Counties

Land is considered to be one of the most valuable assets for among rural households in SSA (IFAD, 2012). Thus, susceptibility to hunger and poverty is markedly reduced markedly when households have secure access to land. The findings on land ownership and size in the sub-Counties of Muhoroni and Nyando are reported and discussed in this section.

Several statutory property rights apply to land in the sub Counties of Muhoroni and Nyando. There are many recognized types of private land tenure. Large-scale agriculture, non-agriculture, and four different types of individual tenancy on trust land (freehold land in adjudication regions, freehold land in settlement schemes, non-agriculture land, and group ranches) are the three types of individual tenancy on the former colonial property (Kungu & Namirembe, 2012).

Each of the 250 study participants owned the land on which they resided, with 85.2% of respondents indicating that they acquired their land through inheritance, according to the data. The study also established that land ownership was not a major determinant of how the property was used in Muhoroni and Nyando sub Counties. In a similar vein, Quan (1997) suggests that sub-Saharan Africa's distribution of land is still largely equitable, and land is still held under traditional tenure systems where occupation and utilisation rights that are stable, inheritable, and beneficial to people and households. Only 14% of respondents to the poll claimed to have purchased the land on which they resided.

The prevalence of land inheritance in Muhoroni and Nyando sub-Counties, has however, continued to exacerbate land fragmentation. The connection between the size of the land and household poverty has been acknowledged, particularly in Sub-Saharan Africa (Metalign, 2005). According to Jayne et al., (2009), farms with less than 0.5 hectares of land per person

are associated with significantly lower levels of household income in rural areas that are predominately agrarian.

The findings of this study also echo those of studies conducted in Western Kenya which stated that, land sizes have decreased as a result of fragmentation and redistribution (Odenya et al., 2008; Wawire et al., 2002). Indeed, this study's findings demonstrate the prevalence of small farm holdings Muhoroni and Nyando sub Counties, with 51.2% of the households surveyed owning less than 3 acres of land. Smaller farms were particularly prevalent in Nyando sub County. In contrast, the average land per household in Muhoroni sub County was 4.4 acres. This has encouraged commercial sugarcane farming which requires large tracts of land.

Contributing to the discussion on the relations between land size and poverty Gebreselassie (2006), suggests that even with technological advancements, extremely small farms cannot be made profitable enough to end widespread rural poverty even through extension services that primarily focus on the diffusion of technology. Instead, as landholdings get smaller, so do per capita food production and farm income. As a result, farmers in this category practically never have money to invest in or purchase inputs. The average land sizes in Muhoroni and Nyando Sub Counties are shown in Tables 4.11 and 4.12.

Maize and sorghum were the two main food crops grown in the Counties. 95.6 % of the households in the study grew maize, making it the most common crop. In addition, sorghum and rice, which were grown on farms by 52% and 42% of households, respectively, came in second and third. Plants for the horticulture industry were grown in 22% of households. 9.2% of households, predominantly in the Nyando sub County, engaged in rice farming, but only 0.4% of households grew non-food crops. With only 4.8% of respondents renting out their properties, very few households operated numerous businesses on their farms (land).

Only 1.2% of homes have a company of some type operating on their property. The diverse land use patterns in Muhoroni and Nyando sub-Counties are shown in Table 4.11.

Table 4.11

Average Land Size in Muhoroni and Nyando Sub Counties

Land Size in Acres	Frequency	Per cent	Cumulative Per cent
Less than One Acre	7	2.8	2.8
1 - 2 Acres	55	22.0	24.8
2.1 - 3 Acres	66	26.4	51.2
3.1 - 4 Acres	36	14.4	65.6
4.1 - 5 Acres	15	6.0	71.6
Over Five Acres	71	28.4	100.0
Total	250	100.0	

This study determined that 51.2 per cent of those surveyed owned less than three acres of land. In comparison to Muhoroni sub County, which had 40% of households with land less than 3 acres, the figure for Nyando sub County was 58 per cent of households with land less than 3 acres.

Table 4.12

Land Size by Sub Counties

Size of Land (acres)	Division		
	Nyando	Muhoroni	Total
Less than an acre	5	2	7
1 - 2 Acres	48	7	55
2.1 - 3 Acres	35	31	66
3.1 - 4 Acres	24	12	36
4.1 - 5 Acres	10	5	15
More than 5 Acres	28	43	71
Total	150	100	250

4.4.2 Land Use Patterns in Muhoroni and Nyando Sub-Counties of Kisumu County

Muhoroni and Nyando sub Counties have a variety of land use types. The various patterns are influenced by lithology, geology, geography, the availability of moisture, and most significantly, human activity (Van Der Kwast, 2002). The Nyando basin has a variety of land uses. The primary land use is agriculture.

Maize and sorghum were the main food crops in the Muhoroni and Nyando sub Counties. 95.6 % of the families in the study grew maize, making it the most common crop. In addition, sorghum and rice, which were grown on farms by 52% and 42% of households, respectively, came in second and third. Plants for the horticulture industry were grown in 22% of households. 9.2% of households, predominantly in the Nyando sub County, engaged in rice farming, but only 0.4% of households grew non-food crops. With only 4.8% of respondents renting out their properties, very few households operated numerous businesses on their farms (land). Only 1.2% of homes have a company of some type operating on their property. Table 4.13 shows diverse land use patterns in Muhoroni and Nyando sub-Counties.

Table 4 .13

Different Land Use Practices in Muhoroni and Nyando Sub Counties

Land Use	Respondents (%)	Mean Acres	
		Nyando	Muhoroni
Maize	95.6	1.0465	1.0830
Sorghum	52.0	0.7417	0.3335
Horticultural Crops	22.2	0.650	0.1985
Fruits	0.4	0.0067	0.0000
Rice	9.1	0.0000	0.0075
Sugarcane	42	0.2450	3.3785
Non- food crops	0.4	0.1233	0.0000
Livestock	32.8	0.6980	0.0575
Rented Out	4.8	0.0700	0.1150
Business Premises	1.2	0.0117	0.0000

Findings in this study show that vast majority (98%) of the households were engaged in crop farming. The most common livestock in Muhoroni and Nyando sub-Counties were: cattle, sheep, and goats. Comparatively speaking, families in Muhoroni sub County had fewer animals than those in Nyando sub County. Several households with an average size of 1.2 and 1.7 acres have kept their land fallow in Muhoroni and Nyando sub Counties, respectively. Advanced age and a lack of farm labour and inputs are some of the explanations for this phenomenon. In some instances, some of the lands had already been subdivided or sold.

In Muhoroni and Nyando sub-Counties, agriculture provides employment for 60% of the population and generates more than 52% of household income, making it without a doubt the most significant source of revenue. While rice, sugarcane, cotton, and coffee continue to be the principal income crops, subsistence crops including maize, cassava, sorghum, and sweet potatoes still account for the majority of cropping operations. Rice and sugarcane growing are both done on a local and large scale, but sugarcane production predominates in Muhoroni sub County. The majority of the rice farmed in Nyando sub-county is irrigated. The National Irrigation Board and Muhoroni Sugar Mills are two of the main industries that support these agricultural activities (NIB).

Despite having livestock, households in the two sub-Counties reported that 89% did not make a living off livestock and chicken products such as milk, meat, skin, eggs, or pigs. Figure 4.3 shows the land use types forms in Muhoroni and Nyando sub Counties.

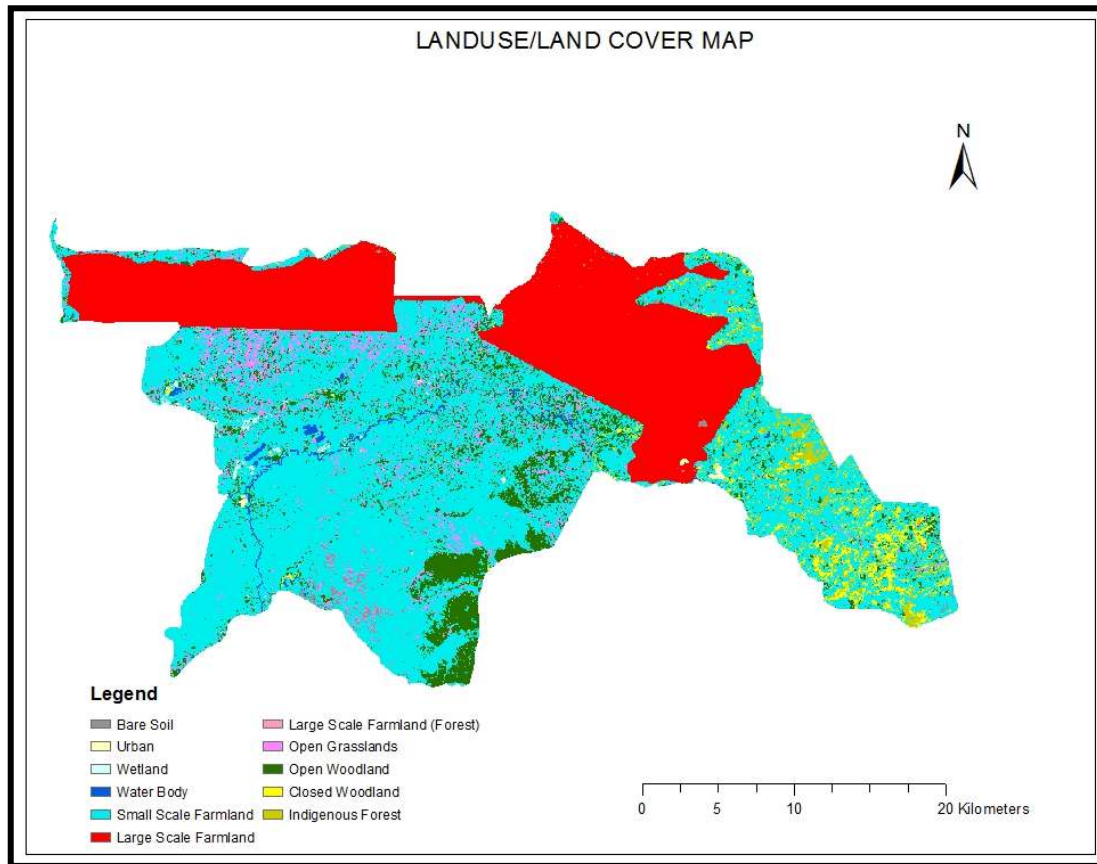


Figure 4.3 Land Use Map of Muhoroni and Nyando sub Counties

4.4.3 Household Poverty and Land Use in Muhoroni and Nyando sub-counties

In order to determine the relationship between household poverty and land use, the Spearman rank correlation was used to test the following hypotheses:

***H₀** There is no significant relationship between household poverty and land use in Nyando and Muhoroni sub counties.*

***H₁** There is a significant relationship between household poverty and land use in Nyando and Muhoroni sub counties*

The results of the correlation are indicated in Table 4.14.

Table 4.14

Correlations between Household Poverty and Land use in Kisumu County

			Household Poverty	Land Use
Spearman's rho	Household Poverty	Correlation Coefficient	1.000	.269**
		Sig. (2-tailed)	.	.000
		N	250	250
Spearman's rho	Land Use	Correlation Coefficient	.269**	1.000
		Sig. (2-tailed)	.000	.
		N	250	250

** . Correlation is significant at the 0.01 level (2-tailed).

Results in Table 4.14 indicate that there was a statistically significant but weak positive correlation between land use and household poverty ($\rho = 0.269$, $p \{0.000\} < 0.01$), leading to the rejection of the null hypothesis. Thus, an increase or a decrease in land use intensity would lead to an increase or a decrease in household poverty in the study area. These results imply that the intensity and variety of land use in the sub Counties of Nyando and Muhoroni are likely to influence the degrees of poverty at the household level in the study sub-Counties.

Results from this study put the incidence of poverty in Nyando and Muhoroni at 64 per cent. Moreover, the study also determined that the poverty levels in Nyando sub county where the land use was mainly characterised by subsistence farming was considerably higher (85%) when compared to Muhoroni sub County where sugarcane farming was prevalent. The study also established that 95.6 per cent of the respondents practicing maize farming on their land in both sub counties. Coombes et al. (2011) argued that poverty traps and subsistence farming are two important factors influencing land use. They stated that in some cases, low-income households are forced to grow just yearly crops for survival. There were little indications of land use diversification among the households, with just 1.2% of them engaging in any kind of commercial activity on their farms and a pitiful 0.4% growing crops other than those used for food.

Similarly, findings by Kelly et al. (2003), indicated that subsistence farming, low crop yields, and low household incomes were key characteristics in sections of Nyanza province, provide evidence in support of the study's findings. In addition, a study conducted in the Amazon revealed that most households needed to earn a minimum amount of money to invest in more successful land use strategies (Caviglia-Harris & Sills 2005; Guedes et al., 2016). Furthermore, almost two-thirds of the world's poor and food insecure populations lived in households that often relied on subsistence agriculture in rural parts of developing countries, according to research by Gautam and Andersen (2016) in Nepal. Despite the different inherent dangers, subsistence farmers face several structural, cyclical, and institutional pressures and stresses that frequently put them in danger of going below subsistence levels.

The findings from this study show that land-use practices in the Muhoroni and Nyando sub Counties are linked to household poverty. The nature of these practices may certainly promote land degradation and the destruction of soil and vegetation cover, thereby activating erosive processes. According to the focus group discussants, the productivity of the land had been decreasing with time due to over cultivation, dated agronomic techniques and inadequate income that could be used to purchase farm inputs such as fertilizers.

4.5 Linking household poverty and land management in Muhoroni and Nyando sub Counties

The second objective of this study was to determine the relationship between household poverty and land management in Muhoroni and Nyando sub Counties. Land in rural areas has been the major focus for many governments and non-governmental institutions (RoK. 2016; Spichiger et al., 2013). This is because rural areas especially in developing regions such as SSA are characterized by poor populations

In order to increase the land's productive capacity, land management practices such as controlled grazing, agricultural water management, soil and water conservation measures, and forestry and agroforestry techniques are recommended (FAO, 2009). Thus, managing land resources requires land users to maximize the economic and social advantages of the land while preserving its natural functions.

Land management practices can be viewed from the perspectives of the economy, society, institutions, politics, and the environment. In order to combat land degradation, use of locally appropriate, globally applicable, economically viable, and environmentally sound solutions at the local, regional, national, and international levels are recommended (FAO, 2009). The intricate process of managing property involves more than just the will or actions of the people who use the land. Its challenges and successes extend beyond a household's sphere of activity to include participants in the external environment (Hurni & Yilkal, 2007). In order to maintain production, lower risk, protect the potential of natural resources, stop soil and water degradation, be economically viable, and be socially acceptable, it combines technologies, policies, and activities that are aimed at integrating socio-economic principles with environmental concern (Regassa, 2002).

Most of the revenue earned by households in developing nations comes from resources found on the land (Nkonya 2008). The management of land-based resources, such as cropland, grazing land, forests, and wetlands, not only affects the welfare of the households but also has reverberations that affect the flow of environmental services, such as prevention of erosion and runoff, removal of pollutants, and many other uses that are flexible and adaptable to different circumstances.

It is in view of these, data regarding the relations between gender and the adoption of land management practices in Muhoroni and Nyando sub Counties was also sought.

4.5.1 Household Decision Making on Land Management in Muhoroni and Nyando sub Counties

This study sought to determine household decision making behaviour on land management practices in Nyando and Muhoroni sub Counties. Results show that male headed households made the majority of the important decisions regarding the use and management of land resources, with a share of 54.8% compared to 27.6 per cent of those made by female-headed households. The results of this survey also suggest that the majority of other decisions, including those related to the selection of crops to be planted, the selling of agricultural products, and the sale of land, were made jointly by, respectively, 41.6%, 51.2%, and 52.4% of the households. According to information gathered from focus groups discussions involvement by women in decision-making on land and land-related issues is limited, hence

they (women) have little or no influence on land management strategies such as the practice of agroforestry. On the other hand, evidence shows that men and women participated equally on decisions on which crops to produce, how much to save for household consumption, and how much to sell. Data on decision-making behaviour as it relates to land management are shown in Table 4.15.

Table 4.15

Key Decision Maker Regarding Utilization and Management of Land

Decision Maker	Frequency	Per cent
Male Head	138	55.2
Female Head	69	27.6
Wife	8	3.2
Both	35	14.0
Total	250	100.0

Similarly, studies in developing countries suggest that men control household decision-making when it comes to managing household productive resources, placing women in secondary roles (Hyder et al., 2005; Langat, 2016). By examining the domestic decision-making process and women's access to useful household resources, Kazi (1997) explored women's autonomy in rural Punjab, Pakistan. Women's influence over economic decisions has been found to be quite minimal. Most women only took part in choices involving the purchasing of food. They are consulted on all other choices, whether they are domestic or economic, but they do not play a significant role. The study found a significant and favourable correlation between mobility and decision-making power.

There are variances everywhere in the world, according to a World Bank study on regional patterns of gender discrepancies in basic rights, access to resources, and control over those resources. The report also demonstrates that women in poor nations rarely have the same rights as males. Additionally, laws, customs, and cultural practices all reflect gender disparity in how women and men are treated in terms of rights and benefits. Marriage, inheritance,

property ownership and management, as well as activities and decision-making in the home and society, all exhibit these disparities (World Bank, 2001).

4.5.2 Land Management Practices in Muhoroni and Nyando sub Counties

The respondent households were asked to state which methods they employed on their farms to manage soil fertility. 48 per cent of the households across Muhoroni and Nyando sub-counties did take any measures to improve soil fertility on their farms. When compared, households in Muhoroni sub County had a higher tendency to practice soil conservation measures (73 percent) than those in Nyando sub County (11 percent).

Table 4.16

Soil Conservation Practices by Sub County

Fertility Measures	Per cent	
	Nyando	Muhoroni
Cattle manure	19.3	17.0
Crop residue	3.3	6.0
Chemical Fertilizer	4.0	66.0
None	73.3	11.0
Total	100	100

Of the respondents who used some method to improve fertility of their soil, 19.6 per cent used them for all crops, 30.8 per cent for cash crops and 49.6 per cent for subsistence crops. The remaining 50.4 per cent did not invest in the use fertilizers for their farms. The study also sought further information on the frequency and regularity of fertilizer application on the farms. In response to this, 150 households across the two sub-counties indicated that they did not use fertilizers on their farms at all. This accounted for 60 per cent of the households.

In addition to the soil fertility measures, information was sought on the land management practices that were practiced by the household heads. 24.8 per cent of the sampled respondents indicated that they employed land management practices on their farms. The other 75.2 per cent of the respondents did not adopt any form of practice on their farms. Table 4.17 below shows the different land management practices that were used by the households in Muhoroni

and Nyando sub Counties.

Table 4.17

Land Management Practices in Muhoroni and Nyando sub Counties

Land Management	Frequency	Per cent	Cumulative Per cent
Tree Planting	3	1.2	1.2
Trenches	14	5.6	6.8
Napier grass strips	6	2.4	8.0
Water Ways	14	5.6	13.6
Building Gabions	3	1.2	22.0
Intercropping	6	2.4	24.4
Crop Rotation	1	.4	24.8
Not Applicable	188	75.2	100.0
Total	250	100.0	

Focus group participants who provided feedback blamed the small size of the farms, insufficient extension services, and household poverty for the failure to successfully apply land management measures. According to the respondents, small-scale and subsistence farmers were less likely to use extension services, which meant they were not kept up to date on the most effective methods of land management. One of the main issues raised in the debates was the fact that wealthy large-scale farmers were more likely to use the extension services than small-scale farmers, resulting in solutions that only benefited a select group of farmers in the sub Counties. Similar research by ICRAF (2007) in Ethiopia and Uganda found that large-scale farmers were likewise the focus of extension and consulting services. The absence of demonstration farms, according to ICRAF (2007), made it challenging for the subsistence farmers to fully participate and adapt to the new farming techniques. As a result, the majority of farmers do not engage in any land management activities, giving the subsistence farmers no opportunity to increase their understanding of effective management techniques (Gunya, 2009).

4.5.3 Linkages between household poverty and land management in Muhoroni and Nyando Sub Counties

In order to determine the relationship between household poverty and land management in Nyando and Muhoroni sub Counties, the Spearman rank correlation analysis was used to test the following hypothesis

H₀ There is no significant relationship between household poverty and land management in Nyando and Muhoroni sub counties.

H₁ There is a significant relationship between household poverty and land management in Nyando and Muhoroni sub counties (Table 4.18).

Table 4.18

The Correlation between Household Poverty and Land Management

			Household Poverty	Land Management
Spearman's rho	Household Poverty	Correlation Coefficient	1.000	.397**
		Sig. (2-tailed)	.	.000
		N	250	250
	Land Management	Correlation Coefficient	.397**	1.000
		Sig. (2-tailed)	.000	.
		N	250	250

***. Correlation is significant at the 0.01 level (2-tailed).*

These results indicate that there was a statistically significant and moderate positive correlation between land management and household poverty ($\rho = 0.397, p \{0.000\} < 0.01$). Thus, an increase or decrease in household adoption of land management practices would lead to an increase or a decrease in household poverty in the study area. The results suggest that households that adopt more land management practices in Nyando and Muhoroni sub Counties are less likely to be poor when compared to households with limited or no land management practices. The findings also imply that implementing land management strategies is probably going to boost household income.

The results of this study indicate that, in Muhoroni and Nyando sub-counties, various land management methods are relevant to improving household livelihoods. First, through sustainable soil conservation techniques and agronomic land management methods, successful land management practices offer households creative options to prevent land degradation. Second, by using effective planning and land management techniques, households are able to resolve conflicts that may result from varying land uses. This promotes a variety of positive outcomes, including agricultural production, soil health, and non-farm activities, all of which are essential for the development of rural livelihoods. The declining land areas in Muhoroni and Nyando sub Counties as a result of land fragmentation make this particularly true. Farmers with modest land holdings were less likely to follow some farm management strategies, according to Subedi (2009) study conducted in Bhutan. According to Matsa and Matsa (2010), land management techniques, comprising both individual decisions made by farm households and collective decisions made by groups of farmers and communities, have an impact on agricultural production and land conditions.

Finally, by facilitating access to the fundamental resources and infrastructure needed for the development of livelihoods, particularly in rural regions, the implementation or adoption of good land management methods can help break the downward cycle of poverty. The results of this study support Guya's (2009) hypothesis that poor households cannot adopt better land practices due to poverty and a lack of financial resources. Such better techniques demand financial investment to buy the appropriate agricultural equipment and additional funds to enrol in the requisite training to acquire the expertise needed in field management. Furthermore, a study conducted in Ethiopia by Kifle (2016) found a substantial difference in household income between people who adopted and didn't adopt land management strategies. He noticed that households that had embraced land management strategies had a higher likelihood of improving their quality of life than households that had not. This was attributed to households using land management techniques.

4.5.4 Relations between Gender and Land Management in Muhoroni and Nyando sub Counties

The study also sought to determine the significance of the relationship between gender and land management practices in Muhoroni and Nyando sub Counties. A cross-tabulation analysis was done using the SPSS and the results are shown in Table 4.19.

Table 4. 19

Household Land Management Practices by Gender of Household Head

Land Management Practices	Gender of Household Head		Total
	Male	Female	
Tree Planting	2	1	3
Trenches	12	2	14
Water Ways	9	5	14
Sisal Fences	16	5	21
Building Gabions	2	1	3
Intercropping	3	3	6
Crop Rotation	1	0	1
Not Applicable	131	57	188
Total	176	74	250

Information in Table 4.19 shows very low adoption levels of the different land management practices especially within the female-headed households. A contingency coefficient C was done to determine the significance of the relationship between the gender of the household head and the use of land management practices in Muhoroni and Nyando sub Counties. The result $C = 0.165$ indicates a non-significant relationship between the two variables. The findings suggest that gender was not a determinant of the adoption of land management practices.

Table 4.20

Coefficient of Contingency C on the Relationship between Gender and Land Management

	Value	Approx. Sig.
Contingency Coefficient	.165	.541
N of Valid Cases	250	

The non-significant relationship between the two variables may be an indicator that there are other far reaching issues affecting the adoption of land management practices such as the high incidences of poverty and lack of extension services. Results of this study indicate that in 55.2 per cent of the households, in Muhoroni and Nyando Sub Counties, the key decision making on land management was done by the male household heads. Only 14 per cent of the households stated that land management decisions were done jointly. the dynamics of household decision making on the utilization of resources and the management of land.

In agriculture and development, where women and men have different access to agricultural opportunities, the notion of gender has been taken into consideration. Over time, civilizations, societies, and classes have different ideas about what traits are often associated with men and women. It is difficult to change male-female relationships at the farm level since gender inequities are embedded in homes (Omwoha, 2007). Gender disparities in land management have been highlighted by Duncan and Brants (2005). There is no such issue, according to some studies, and as a result of migration, education, and economic transformation in rural communities, women's access to land is improving.

Similarly, a report by IFAD (1998) on women's access to land in Ghana identified women in enhancing land rights. According to the report, although women supply 80 per cent of labour for farm activities, they have limited control of resources such as land. Decision making is usually left to the male heads. Focus group discussants in Muhoroni and Nyando sub Counties stated that women have no major problem managing land especially in the absence of their spouses as long as proof of ownership existed and that the land was not communal; in which case decisions on land management would then be made by male members of the extended family. Results in this study show that 79 per cent of households in Muhoroni and Nyando

sub Counties had land sizes less than three acres. Results from this study also suggested that in 52 per cent of the households, women made decisions on what crops to plant while 46 per cent of the made decisions on the sale of farm produce respectively.

4.6 Membership to social networks and household poverty in Muhoroni and Nyando sub counties

The third objective of this study was to determine the relationship between social network membership and household poverty in Muhoroni and Nyando sub counties. One of the biggest shifts in poverty interventions has been a resurgence of interest in social networks as a relevant factor in rural economic development (Mitchell et al., 2004). The justification for this claim is that those entrepreneurial behaviours, like other socioeconomic phenomena, have a strong social context (Granovetter, 2005; Johannisson et al., 2002; Putnam, 1995; Temple & Johnson, 1998).

Rural economies are primarily dependent on rain-fed agriculture in emerging nations and are beset by inequality, instability, and poverty. These nations' rural areas are plagued by a wide range of issues, including dispersed landholdings, seasonal weather patterns, inadequate infrastructure, credit shortages, and segmented labour markets. As a result, they find it difficult to rely on a single source of income throughout the year (Reardon et al., 1992). Rural households tend to diversify their income sources by engaging in a range of revenue-generating activities to enhance their incomes and so avoid poverty (Ellis, 1998). One element that can aid in income diversification is the social networks of households. A family's social network can help with the acquisition of concepts, know-how, services, and expertise, which might affect their choice to start a new project or support an ongoing one (Maertens & Barrett, 2012).

Therefore, this study investigated the social network dynamics and household memberships to these networks in the sub Counties of Muhoroni and Nyando. According to this study, social networks play a significant role in enhancing household heads' awareness of and practice concerning proper land use and land management activities, which in turn aids in lowering poverty in the sub-Counties.

4.6.1 Extent of Household Involvement with Social Networks in Muhoroni and Nyando Sub Counties

The findings from this study reveal that membership to social networks varied significantly across Muhoroni and Nyando sub Counties. In Nyando sub County, 66 per cent (99 household heads) of the 150 respondents were found to be members of at least one or more associations, while in Muhoroni sub County, 55 per cent (55 respondents) were found to be members of at least one or more associations. Table 4.21 presents descriptive statistics on the number of associations to which households belonged.

Table 4.21

Membership to Social Networks by Sub County.

Membership to Social Networks	Sub County		Total
	Nyando	Muhoroni	
Yes	99 (66%)	55 (55%)	154
No	51 (34%)	45 (45%)	96
Total	150	100	250

However, examined further with a gender lens, it is evident that the differences are not major. Of the sampled respondents, 60 per cent of the male household heads confirmed that they belonged to an association or organisation; in comparison to 64 per cent of the women, in Muhoroni and Nyando sub Counties respectively (Table 4.22). Further interrogation of the data revealed that when compared to male-dominated associations and organisations, groups and organisations that were patronised by women tended to be more aligned with household socioeconomic requirements. The associations men belong to tended to place a strong emphasis on handling professional or business-related problems as well as social crises like sickness and bereavement.

Table 4.22

Membership to Social Networks by Gender of Household Head

Membership to Social Networks	Gender of household head		Total
	Male (%)	Female (%)	
Yes	106 (60.2)	48 (64.8)	154
No	70 (39.8)	26 (35.2)	96
Total	176 (100)	74 (100)	250

Additionally, data was sought to establish the nature of social networks that the household heads belonged to. The categories of social networks that featured prominently in Muhoroni and Nyando sub Counties included; producer and agricultural associations, self-help groups, savings and credit groups, religious groups, and women groups. There were marked differences between the two sub-counties when it comes to association membership social networks. According to the findings, 38 per cent of those surveyed in Muhoroni sub County were members of producers' organizations, compared to 5.5 per cent in Nyando sub County. Agricultural cooperatives were the most frequent in Muhoroni sub County, with 19% of the respondents being associated with at least one, compared to 2% in Nyando sub County. The data also shows that while Community Welfare Organizations (CWOs) were common in Nyando sub County (27%) while they were non-existent in Muhoroni sub County. Conversely, Rotating Savings and Credit Associations (ROSCAs) and women's organisations, which were more common in Nyando sub County were absent in Muhoroni sub County (Table 4.23).

This occurrence can be attributed to Nyando sub County's comparatively higher levels of poverty, a factor that we considered to have contributed to the emergence of many non-governmental organizations and associations. For Muhoroni sub County, sugarcane farming is predominant; and this could be associated with the prevalence of producer organizations and agricultural cooperatives.

Table 4.23

Membership to the Various Social Networks in by Sub County

Organisation or Association	Sub counties	
	Nyando (%)	Muhoroni (%)
Producers Organisation	5.3	38
Agricultural Cooperative	2	19
Savings and Credit Organisation	8.7	11
Community Welfare Organisation	27	0
Rotating Savings and Credit Associations (ROSCAs)	15	0
Women Groups	15.3	5

4.6.2 Reasons for belonging to Social Networks

Individuals patronize social networks for varying reasons and motives. Nonetheless, the basic premise is that the social associations and networks formed by these interactions provide tangible benefits to the participants and result in a higher degree of well-being, either directly or indirectly. This study sought to determine the reasons or motivations for respondents joining social networks. These reasons are shown in tables 4.24, 4.25 and 4.26 below. Generally, family welfare was given as a reason by most respondents for joining associations.

Table 4.24

Reasons for Belonging to Women Groups

Reasons for belonging to Women Groups	Sub County		Total
	Nyando	Muhoroni	
To Improve Agricultural Production	1	1	2
For Business	5	1	6
Individual Well-being and home improvement	63	2	65
Education	8	0	8
Not members	73	96	169
Total	150	100	250

The findings from this study suggest that 4.8 female household heads who were associated with women groups and rotating savings and credit associations (ROSCAs) respectively, reported having joined these groups to meet their own needs as well as that of their households. Respondents in Muhoroni sub County joined social networks mainly to improve agricultural production. Only two respondents cited land management as the reason leading them to join social networks.

Table 4.25

Reasons for Belonging to a Producers Organisation

Reasons for Belonging to Producers Organisation	Sub County		Total
	Nyando	Muhoroni	
To Improve Agricultural Production	0	27	27
For Marketing of Produce	2	1	3
For Business	2	0	2
Community Welfare	1	3	4
Land management	1	2	3
Both Agricultural Production and Land Management	0	2	2
Both Agricultural Production and Marketing	0	2	2
Not Members	144	63	207
Total	150	100	250

All of the sample respondents who participated in community welfare organisations were from Nyando sub County. They noted that they were part of community welfare organizations primarily for their welfare as well as for home improvement. The 8.8 per cent of the respondents who were members of rotating savings and credit organizations gave similar reasons. The findings of this study indicate that not more than 1 per cent of respondents interviewed indicated that they were part of social networks to get capital to inject in or start business ventures or to expand their sources of income. This suggests that these organisations were pertinent to the satisfaction of the immediate needs of the households. Not much of the earnings from these organisations were reinvested in farming, a sector which the vast majority of the households in Muhoroni and Nyando sub-counties rely on for a living (Table 4.26)

Table 4.26

Reasons for Belonging to Community Welfare Organisations

Reasons for Belonging to Community Welfare Organizations	Sub County		Total
	Nyando	Muhoroni	
To Improve Agricultural Production	1	0	1
For Business	4	0	4
Community Welfare	12	0	12
Individual Wellbeing and home improvement	12	0	12
Education	12	0	12
Not Applicable	109	100	209
Total	150	100	250

4.6.3 Social Networks and Household Poverty in Muhoroni and Nyando sub Counties

Social capital has been measured at personal and household levels using a variety of techniques (single measures or indices). According to many different types of social capital analysis studies (Hassan & Birungi, 2011; Narayan & Pritchett; 1999; Tenzin et al., 2013), signs of trust and norms (Haddad & Maluccio, 2003), and manifestations of group activity, there must be a connection to local organizations and networks (Grootaert et al., 2002).

In this study, social networks were conceived as a representation of the number of associations or organizations that the household head supported. Individual respondents (household heads) were questioned about whether they belonged to any organizations, associations, or groups, and this information was used to create the social network variable (agricultural associations or cooperatives, rotating savings and credit associations, women or religious groups). Regardless of the number of group memberships, a household is considered to have social capital if the responder was connected to a specific group or association. As a result, the variable was given the value 1 if people were members of social networks while it was given the value 0 if they weren't. The Spearman's Rank Correlation (ρ) was utilised to test the following hypothesis:

H₀ *There is no significant relationship between household poverty and memberships to social networks.'*

H₁ *There is a significant relationship between household poverty and memberships to social networks.'*

Table 4.27:

The Correlation between Poverty and Memberships to Social Networks

		Household Poverty	Membership in Social Networks
Spearman's rho	Household Poverty	1.000	.233**
	Correlation Coefficient	.	.000
	Sig. (2-tailed)	250	250
	Membership in Social Networks	.233**	1.000
	Correlation Coefficient	.000	.
	Sig. (2-tailed)	250	250
		N	N
		250	250

***. Correlation is significant at the 0.01 level (2-tailed).*

The findings indicate that there was a statistically significant but weak positive correlation between membership in social networks and house poverty ($\rho = 0.233, p \{0.000\} < 0.01$). Thus, an increase or a decrease in membership in social networks would lead to an increase or a decrease in household poverty in the study area. The results suggest that households in Nyando and Muhoroni that are affiliated with an organisation or an association are less likely to be poor. This is because such affiliations enhance a household's access to other components of agricultural production, including appropriate technology and information on improved land use and land management processes that can be beneficial in Muhoroni and Nyando sub-Counties.

Similar findings were made by Nasution et al. (2015) in their research in Indonesia, which demonstrated that social activity involvement increased household spending and decreased poverty. Exclusion from social networks and institutions has been mentioned as one of poverty's defining characteristics in a number of research conducted in developing nations.

Through the sharing of risks, these studies help us better grasp the important role social networks play in raising the socioeconomic level of households.

The poverty rate in Muhoroni and Nyando sub-Counties was 64 percent despite the fact that 61.6% of households there claimed to belong to different communities, organizations, and associations. This suggests a number of things, including the fact that the vast majority of the members of these social organizations are not employed for agricultural investment, which is the primary source of income for the majority of households. Despite 15% of households in Muhoroni and Nyando sub-counties belonging to Rotating Savings and Credit Societies (ROSCAs), just 4% of these households reported borrowing money from these businesses, according to the data. The money was only used for business by 2.4% of household heads.



Plate 4.4: Members of a women's group in a formal meeting at the market.

Members of social networks may use their status to apply for credit from banks and other microfinance organizations. Then, among other investments in the agricultural industry, the loan facilities can be utilized to buy fertilizer and farm machinery. Additionally, social media

platforms may be useful for members to access important data from extension programs and other groups and organizations. Participants in focus groups in Nyando and Muhoroni sub counties reported that knowledge of effective farming techniques was easily available or accessible. They also didn't know that these social media platforms could be utilized to acquire credit, which they recognized as a problem. Additionally, they claimed that most households lacked the necessary knowledge of the precise procedures required to get credit.

Results emerging from this study corroborate those by Besley et al. (1993), investigated the economic efficiency and function of several ROSCA types. Through these small, largely indigenous savings and credit societies, they were able to prove that social associations were exploited as an alternative form of collateral. They draw attention to the growing understanding of the role that social capital plays in shaping the wellbeing of people, families, and nations. Additionally, in a study of 750 Tanzanian homes, Narayan and Pritchett (1999) examined the scope, features, and intensities of associational contact. determined that the high levels of social capital in the villages contributed significantly to household welfare.

4.7 Household poverty and agricultural production in Muhoroni and Nyando sub Counties

This study's fourth objective was to establish the relationship between household poverty and agricultural production in Muhoroni and Nyando sub Counties. Discussions of factors considered to be significant in deciding agricultural productivity abound in Kenya and other developing-country literature. These comprise scientific factors such as research and extension, market access, input use, and changes in technology and education. Climate, farm production policies, land ownership trends, insufficient beneficiary participation in making decisions, instability, and the policy and legal environment are additional factors. A number of development initiatives in Kenya have attempted to mitigate the constraints related to these factors by initiating services that avail information on farm inputs, education, infrastructure, credit facilities and marketing networks. It is assumed that removing these constraints would result in increased farm productivity and incomes (Nyangito, 2003).

The relationship between poverty and agricultural productivity has been researched by scholars in detail since the 1950s. Undeniably, studies have illustrated the potency of this

relationship more clearly (Kuiyah et al., 2006; Thirtle et al., 2003). Similarly, other studies conducted in sub Saharan Africa constantly suggest that agricultural production advances have elevated rural earnings by directly multiplying farmers' incomes, and, most importantly to poorer households, by growing employment prospects and revenue. (Kuiyah et al., 2006). Most of these studies have however been plagued by a lack of empirical data.

While the general expansion of the agricultural sector is pertinent to both economic growth and the reduction of poverty, the task for developing countries is the recognition of particular farming and rural development requirements and prospects so as to direct interventions for intensification suitably. This process needs adequate knowledge of the resources available to rural households in addition to the factors influencing the decision by households to allocate resources. This study therefore, endeavoured to gain insights and contribute to knowledge on the linkages between household poverty and agricultural production in Muhoroni and Nyando sub Counties.

4.7.1 Determinants of Agricultural Productivity in Muhoroni and Nyando sub Counties

4.7.2 Household Farm Equipment and Farm Labour in Muhoroni and Nyando Sub-counties

There is generally a low level of agricultural mechanization in Kenya despite the availability of several line institutions such as Kenya Agriculture and Livestock Research Organisation (KALRO) and other Agricultural mechanization stations as well as rural technology development stations (Agricultural and Rural Development Unit, 2009). Whereas agricultural mechanization has been happening in the country, it is skewed towards crop and most productive regions of the country. Even, in the most productive regions of the country, disparity exists with commercial crops (e.g. mainly sugarcane) having leaped forward in mechanization.

Findings from this study showed that most of the households in Muhoroni and Nyando sub Counties relied heavily on the non-mechanized equipment to prepare their land. Although almost all the sampled households in Nyando sub county relied heavily on non – mechanized

equipment; at least 25 per cent of the households in Muhoroni sub County used Mechanized equipment and another 73 per cent stated that they used both mechanized and non-mechanized equipment. This implies that households weighed the conditions under which mechanization became profitable and the implications for other farming decisions regarding land, labour and input use. The results from Muhoroni and Nyando sub Counties also suggest that the nature of the farming equipment used was rudimentary and likely to affect the agricultural production levels. Table 4.28 shows the nature of the equipment used in both Muhoroni and Nyando sub Counties.

Table 4.28

Nature of Agricultural equipment used in Nyando and Muhoroni sub Counties

Nature of Equipment used	Sub County		Total
	Nyando	Muhoroni	
Mechanized	2	2	4
Non Mechanized	146	25	171
Both	0	73	73
None	2	0	2
Total	N=150	N=100	N= 250

4.7.3 Types of Farm Equipment

This study sought to examine the various types of farming equipment that the households in both Muhoroni and Nyando had access to. Information shows that 64 per cent of the sampled households relied heavily on animal traction or oxen to prepare their land. Further, 72 per cent of the households in Muhoroni depended on both animal traction and motorized traction to prepare their land. A study by Maina (2004) associated a variety of factors with the merits of using animal traction. As opposed to manual labour, using animal traction first improves the timeliness of farm operations and expands the area that may be cultivated. Second, the animal traction package offers the potential for cash generating through hiring and transportation away from the farm. Thirdly, by better preparing the seedbed and ploughing deeper, the use of animal traction may increase yields. Last but not least, the utilization of animal traction has

the potential to result in labour savings for agricultural operations. The different equipment types used by households in the two sub Counties are listed in Table 4.29.

Table 4.29

Types of Agricultural equipment used by Households in Muhoroni and Nyando sub Counties

Types of Agricultural equipment used	Sub County		Total
	Nyando	Muhoroni	
Animal Traction	144	17	161
Motorized Traction	0	1	1
Sprayer	0	1	1
Tractor	1	1	2
Manual Digging	3	8	11
Both Animal Traction and Motorized Traction	0	72	72
No Equipment	2	0	2
Total	N=150	N=100	N=250

4.7.4 Use of Farm Labour

Over half of the sampled households in both sub Counties stated that they utilised hired farm labour to work on their land (Table 4.30). It is observed that approximately 57 per cent of the households in Muhoroni sub County used hired labour compared to Nyando sub County's 49 per cent. Most of the hired labour worked as casuals (part time workers); 63 per cent of households in Muhoroni compared to Nyando sub County's 58 per cent. Studies have shown the importance of farm labour in agricultural productivity (Ebkom, 1998; Muraya, 2017). Further, a study in the Kenya highlands by Ebkom (1998) established that there was an increase in crop productivity with an increase in farm labour. So, what is the finding in this study about use of hired labour on: a) reduction of poverty – focus of your study, and b) increase in agriculture productivity.

Table 4.30

Households using Hired farm labour by Sub County

Households using hired labour	Sub County		Total
	Nyando	Muhoroni	
Yes	74	57	131
No	76	43	119
Total – N	150	100	250

Most of the hired labour in Muhoroni and Nyando sub-Counties was used for land preparation, with a small per centage engaged in weeding mainly in Nyando sub County. Table 4.31 shows the tasks for which hired labour was used

Table 4.31

Type of work done by Part time labourers by Sub County

Specify the type of work	Sub County		Total
	Nyando	Muhoroni	
Land preparation	46	57	103
Clearing	5	0	5
Harvesting	3	4	7
Land Preparation and Herdsman	1	2	3
Weeding	32	0	32
Did not use Hired Labour	63	37	100
Total	150	100	250

The farm workers were mainly paid in cash depending on the task at hand. Table 4.32 shows the types of wages paid to hired labour (part time) farm workers.

Table 4.32

Type of Wage Paid to Farm Workers by sub County

Type of Wage Paid to	Sub County		
	Nyando	Muhoroni	Total
Labourers			
Cash	50	62	140
Crop Sharing	32	1	5
Both	5	0	5
Did not hire labour	63	37	100
Total	150	100	250

Results indicate that less than 50 per cent of households in Nyando sub County used hired labour on their farms. In some instances, a form of crop sharing was used as payment for work done when households did not have access to cash. This suggests that more than half of the households in Nyando sub County could afford to use hired labour on their farms. On the other hand, 62 per cent of the households in Muhoroni sub County had access to hired farm labour.

4.7.5 Access to Farm Credit

Findings from this study showed that less than 10 per cent of the sampled households in Muhoroni and Nyando had access to formal credit. Those who managed to access it mostly sourced credit from cooperative organizations and rotating saving and credit associations (ROSCAs). These findings suggest that most of the households were poor and lacked steady or alternative sources of income. This, therefore, limited their options for accessing credit facilities thereby limiting investments in farm production.

Access to credit has been invoked as pertinent to poverty alleviation especially in rural areas of Africa. According to Jeiyol et al. (2003), agricultural credit is pertinent to efficient and farming activities, particularly in developing countries. They argue that credit is one of the critical elements required for agricultural production, and can be used to acquire farm inputs such as hired labour and farm equipment (Odoh et al., 2009). Additionally, studies in rural areas of Nigeria have shown that access to credit is recognized as pertinent to the adoption of

farm technologies and the resultant increase in farm income (Akpan et al., 2013; Lawal et al., 2009). Table 4.33 shows the households' access to credit and the sources from which they accessed the credit.

Table 4.33

Organization from which Credit is sourced by Sub County

Organization where Credit is Sourced	Sub County		Total
	Nyando	Muhoroni	
Bank	2	0	2
Cooperative Association	3	9	12
ROSCA	4	0	4
No Access to forma Credit	140	91	231
Total	150	100	250

This is particularly significant in Muhoroni and Nyando sub Counties because while the uptake of credit is low (less than 10 per cent), respondents who participated in focus group discussions stated that most of the credit acquired was used to meet immediate household needs and was not ploughed back into the farms to improve agricultural production.

4.7.2 Crops and Livestock Production in Muhoroni and Nyando Counties

According to the study's findings, majority of households in Muhoroni and Nyando sub Counties cultivate maize (95,6%) and sorghum (52%). Most of the times, especially for the most widely cultivated commodities, a very tiny percentage of the yield was sold. For instance, it was observed that only 7% of the commodities produced was sold. In a given year, almost 75% of all households sold less than 20% of the crops they had harvested. This might be explained in terms of the low levels of output resulting in , little excess commodities for sale after meeting their subsistence needs. Crop production figures in Muhoroni and Nyando sub Counties are displayed in Table 4.34.

Table 4.34

Crop Production Levels in Muhoroni and Nyando Sub Counties

Crop	% of Crop Growing Households	Median Kgs Harvested per Household	% of Harvest that is sold
Maize	95.6	300	7
Sorghum	52	250	12
Horticultural Crops	32	150	57
Rice	9.1	600	7
Fruits	0.4	150	60
Sugar Cane	42	10000	95

Additionally, the findings demonstrate that livestock and poultry are commonly raised in Muhoroni and Nyando sub counties, with over 32% of households earning some income from the sale of these animals annually. A total of 89% of families reported having livestock, with an average cost of Kshs 600 to Kshs 24,000 per animal. Surprisingly, the survey respondents' average annual income from cattle sales is Kshs 10,000. The fact that sales are so low in comparison to stock or animals, shows that most livestock is not sold or that most goods are consumed by households. With the exception of eggs, none of the homes reported selling any animal products, and 90% of the households reported making less than Kshs 4000 per year from these sales. The annual animal production statistics in Muhoroni and Nyando sub Counties are displayed in Table 4.35.

Table 4.35

Animal Production Levels in Muhoroni and Nyando Sub Counties

Livestock	% of Households who Sold one or more of the livestock	Average Amount Earned from Sales
Chicken	42	3800
Pigs	6	6000
Cattle	9	18,000
Goat/Sheep	11	8000

4.7.3 Agricultural Production Levels in Muhoroni and Nyando Sub Counties

Sub-Saharan Africa's agricultural productivity, in particular, has recently underperformed in comparison to developing nations (Hemming et al., 2018). Additionally, the majority of African nations' agricultural sectors continue to be dependent on farming practices in which smallholder farmers depend on family finances for investment (NEPAD, 2013). Although the output of the agricultural sector in Africa has increased and it is still the main engine of economic growth in many of the continent's countries, productivity is still poor when compared to other developing regions (Hemming et al., 2018).

In this study agricultural production was measured in terms of the economic value of the crop and livestock products that were produced by the households per annum. An agricultural production index was then developed whereby households who produced quantities of goods worth Kshs 1 – 40,000 per annum were classified as having very low agricultural production levels; those with between 40,001 – 60,000 low agricultural production; those with products worth Kshs 60,001 – 80,000 were considered as having moderate agricultural production levels while those who had products worth 80,001 – 100,000 were considered as having high agricultural production levels. Households whose crop and livestock product value was more than Kshs 100,000 were considered as having very high agricultural production levels. Table 4.36 shows agricultural production levels in Muhoroni and Nyando sub Counties.

Table 4.36

Agricultural Production Levels in Muhoroni and Nyando Sub Counties

Agricultural Production levels			Frequency	Per cent	Cumulative per cent
Very Low Agricultural Production			178	71.2	71.2
Low Agricultural Production			14	5.6	76.8
Moderate Agricultural Production			11	4.4	81.2
High Agricultural Production			6	2.4	83.6
Very High Agricultural Production			41	16.4	100.0
Total			250	100	

Results from this study thus indicate that 92 per cent of the households in Nyando sub County experienced very low agricultural production levels compared to Muhoroni sub County's 40 per cent. The results also indicate that 36 per cent of those considered to have very high levels of agricultural production were found to be in Muhoroni sub County, compared to Nyando sub County's 3.3 per cent. Table 4.37 shows Agricultural production levels by sub County. Results from this study therefore show that both Nyando and Muhoroni sub Counties experienced very low levels of Agricultural productivity. This can be explained by a variety of factors. First, only 4 per cent of the sampled households in Nyando sub County reported that they used chemical fertilizers on their farms compared to Muhoroni sub County's 66 per cent. According to the household heads, most of the fertilizers were applied on cash crops like sugar cane and rice. Cattle manure and crop residue were preferred for the other crops; and was utilised by only 22 per cent of the sample respondents. The low uptake of chemical fertilisers may be attributed to a number of factors; such as the low income levels of the respondents' *vis a vis* the rising costs of fertilizer.

Second, 90% of the sample households in Muhoroni and Nyando sub counties, lacked access to any kind of credit facilities. Lack of financing was highlighted by participants in the focus group discussion as a major barrier to buying essential farm supplies that could help them

enhance agricultural production. According to studies, the main reason why households avoid making expensive agricultural investments is that poor rural smallholders in Africa frequently face significant labour, land, and financial constraints that limit their capacity to make investments in land improvements (Zeller et al., 1997). If they have access to financing, poor farm households may be able to overcome these obstacles, but typically, this access is refused due to their lack of investment collateral. Their property is frequently the sole accessible asset for collateral, and this may not always be recognized as the basis for obtaining loans (ibid).

In Africa, impoverished farmers' access to finance for land improvements is constrained either by restrictions on the provision of rural credit for this purpose or because of the insecurity of their property rights, which disqualifies them from credit programs. Legal land titles play a key role in easing the financial constraints that limit the acquisition of inputs and, more generally, land improvements. However, many smallholders lack legally binding titles to their land (Feder 1995).

Table 4.37

Agricultural Production Levels by Sub County

Agricultural Production Levels	Sub County		Total
	Nyando (%)	Muhoroni (%)	
Very Low Agricultural Production	138 (92)	40 (40)	178
Low Agricultural Production	5 (3.3)	9 (9)	14
Moderate Agricultural Production	1 (0.6)	10 (10)	11
High Agricultural Production	1 (0.6)	5 (5)	6
Very High Agricultural Production	5 (3.3)	36 (36)	41
Total	150 (100)	100 (100)	250

The low agricultural production levels experienced in Nyando sub County can also be attributed to the uneconomical land subdivision which had resulted in low farm yields and income. The lack of or reduced household income has implications on the households' ability to invest in proper farm management practices. Although both crop and animal production were practised, the outputs were mainly used for subsistence as low yields were reported.

4.7.4 The relationship between household poverty and agricultural production in Muhoroni and Nyando sub Counties

In order to determine the relationship between household poverty and agricultural production. The Spearman's Rank Correlation (ρ) was utilised to test the following hypothesis

H₀ there is no significant relationship between household poverty and agricultural production in Nyando and Muhoroni sub Counties.

H₁ there is a significant relationship between household poverty and agricultural production in Nyando and Muhoroni sub Counties

Table 4.38

Correlation between Household Poverty and Agricultural Production

		Household Poverty	Agricultural Production
Spearman's rho	Household Poverty	Correlation Coefficient	1.000
		Sig. (2-tailed)	.364**
		N	.
			.000
Spearman's rho	Agricultural Production	Correlation Coefficient	.364**
		Sig. (2-tailed)	1.000
		N	.000
			.
		N	250
			250

***. Correlation is significant at the 0.01 level (2-tailed).*

The results in Table 4.38 indicate that there was a statistically significant and moderate positive correlation between agricultural production and house poverty ($\rho = 0.364$, $p \{0.000\} < 0.01$), leading to the rejection of the null hypothesis. This result is interpreted to suggest that an increase or a decrease in agricultural production would lead to an increase or a decrease in household poverty in the Nyando and Muhoroni sub Counties. With regard to the study areas, agricultural productivity levels experienced by are likely to determine their levels of poverty. Results from this study are similar to those done by Kiresur et al. (2010) in India who established that household poverty was significantly influenced by agricultural productivity at the micro-level. They noted that the low agricultural productivity of rural households was the root cause of poverty. Additionally, a study by Amoakwaa (2021) concluded that increasing agricultural productivity had enormous potential for the reduction

of poverty in Sub-Saharan Africa. Moreover, findings by Darko et al. (2018) in Malawi established that increased agricultural productivity had the anticipated welfare-improving impact.

CHAPTER FIVE

SUMMARY CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary of Key Findings

The goal of this study was to extensively evaluate the relationships between household poverty, land usage, land management, agricultural productivity, and the role of social networks in reducing poverty in the Western Kenyan sub Counties of Nyando and Muhoroni. In Muhoroni and Nyando sub-counties, the study specifically aimed to investigate the effects of household poverty on land use practices, evaluate the connections between household poverty and land management, look into the effects of social network membership on household poverty, and look into the relationships between household poverty and agricultural output.

The findings of this study show that 64 per cent of the households that were sampled in Muhoroni and Nyando sub Counties were considered poor. In addition, results show that there were more poor households in Nyando sub County (85 per cent) compared to Muhoroni sub County where 32 per cent of the households were considered poor. These differences may be attributed to more widespread farming of sugarcane as a cash crop in Muhoroni sub County.

The first objective of this study was to determine the relationship between household poverty and land use. The results also indicate a statistically significant but weak positive correlation between land use and house poverty ($\rho = 0.269, p \{0.000\} < 0.01$), suggesting that an increase or a decrease in land use diversity was likely to lead to an increase or a decrease in household poverty in the In Nyando and Muhoroni sub-Counties. Results also revealed that maize production makes up 95.6% of the sub Counties of Muhoroni and Nyando's total land use, highlighting the predominance of subsistence farming. There were few indications of land use diversification among the households. Only 0.4% of farmers grew non-food crops, and only 1.2% of farmers engaged in any kind of business activity.

The second objective of this study was to determine the relationship between household poverty and the adoption of land management practices. This study established a statistically significant and moderate positive correlation between land management and house poverty

($\rho = 0.397, p \{0.000\} < 0.01$); which suggests that, an increase or a decrease in the adoption of land management practices was likely to lead to an increase or a decrease in household poverty in the Nyando and Muhoroni sub Counties. Results from a cross-tabulation analysis done to determine the relationship between gender and land management revealed only a slight variation between the male-headed households and the female-headed households in terms of the application of various land management practices on their farms thereby suggesting that gender was not an important determinant of households' decisions to adopt particular land management practices.

The third objective of the study was to establish the relationship between memberships to social networks and household poverty. Results have shown that there was a statistically significant but weak positive correlation between membership in social networks and household poverty ($\rho = 0.233, p \{0.000\} < 0.01$). This indicated that an increase or a decrease in membership in social networks was likely to lead to an increase or a decrease in household poverty in Nyando and Muhoroni sub Counties. However, the study observed that although 64 per cent of the sampled households belonged to some social networks, most households in Muhoroni and Nyando did not use social networks to invest in land management practices or to improve their and use and land management practices.

The fourth objective sought to determine the relationship between household poverty and agricultural production in Nyando and Muhoroni sub counties. Results emerging from this study have shown that there was (or is it is) a statistically significant and moderate positive correlation between agricultural production and house poverty ($\rho = 0.364, p \{0.000\} < 0.01$). Thus, an increase or a decrease in agricultural production would lead to an increase or a decrease in household poverty in Nyando and Muhoroni sub Counties. Moreover, increases in agricultural productivity provide opportunities for the poor households in Muhoroni and Nyando sub Counties to increase their incomes and by extension reduce poverty levels. Whether these households can take advantage of these opportunities may depend on additional elements like their ability to effectively use social networks, access to credit and savings services, and farm inputs and equipment. Therefore, efforts to boost access to human, financial, physical, environmental, and social capital among the poor households are likely to have a significant impact on their ability to escape poverty.

Overall, this study contributes to knowledge on the linkages between poverty, land use land management and the role of social networks in poverty alleviation specifically in Nyando and Muhoroni sub Counties where empirical data on the said issues are lacking. First, most available measures of poverty have relied heavily on consumption data thereby excluding other items of expenditure that households invest in items such as animals, land, or acquisitions of farm inputs such as fertiliser, hybrid seeds or farm equipment are not usually incorporated into household expenditure accounts that are utilised to analyse poverty levels.

In terms of methodology this study has contributed to the understanding of household poverty by use of the asset-based theoretical framework in Nyando and Muhoroni sub-Counties. This approach considers the links between a household's assets (physical, natural, social and financial) and household decision-making behaviour and household poverty. The study concluded that to reduce poverty in these sub Counties, it was pertinent to examine the household assets to gain insights into the interplay between these assets and how they influence household livelihood strategies and poverty levels.

Second, despite the fact that the concepts of land use change and land cover have received extensive reviews, this study was able to examine the relationships between household land use and land management strategies in the sub Counties of Nyando and Muhoroni; as well as the effects of household decision-making behaviour on household poverty—information that is lacking in the study area.

Third, this study has also contributed valuable insights on the links between household poverty and memberships to social networks in Nyando and Muhoroni sub Counties. While social networks have been invoked as a strategy for poverty alleviation in rural areas, in several ways including the diffusion of information on appropriate technologies and improved farming methods and or land management practices, empirical data has largely remained scanty and scattered both in Kenya, and more. particularly in the two sub Counties where this study was carried out. The study has shown that social networks have not been well embraced to the extent to leverage poverty alleviation

While increased agricultural productivity is widely seen as a pathway out of rural poverty, the propositions are often beset by a lack of data, especially in Nyando and Muhoroni. This study endeavoured to link household poverty to agricultural production thereby contributing valuable insights on households' participation in agricultural and farming practices and how these have contributed to poverty alleviation

5.2 Conclusions

This study has shown that land use practices have had significant effects on household poverty in Muhoroni and Nyando sub-counties. Indeed 95.6 per cent of the land use was characterised by maize crop farming with most household's dependent on subsistence farming. This is coupled with ever decreasing land sizes.

The study has also established that the adoption of land management practices is a proxy measure of household poverty; this suggests that households in Nyando and Muhoroni that adopt a number of land management and soil conservation measures are likely to be less poor

This study has determined that social networks are a significant strategy for reducing poverty. This is particularly true in rural areas, such those in Muhoroni and Nyando sub Counties, where agricultural output is the primary driver of economic development. These networks may be helpful in assisting household members in gaining access to loans, knowledge, and even the necessary labour and equipment required to increase agricultural output. They are also efficiently able to engage in non-farm activities, which helps them diversify their sources of income and lessen their reliance on agriculture. The dynamics of groups and organizations make them helpful in a number of ways, giving rural inhabitants better access to savings in the neighbourhood and some protection from economic upheavals.

The study has shown that increased agricultural productivity is crucial to household poverty alleviation given that 91 per cent of the households in Nyando and Muhoroni sub Counties have agriculture as their source of livelihood and the land sizes in the study area are below 2 acres. Additionally, households need to have access to the techniques for increasing the economic productivity of their agricultural lands.

5.3 Recommendations

This section is devoted to making recommendations arising out of the conclusions listed above. They comprise both policy and academic, that is, areas for future research.

5.3.1 Policy Recommendations

- i. Land is an essential resource, especially for the rural poor. Policies that target effective land use practices should be formulated to aid and enable households in Nyando and Muhoroni sub Counties to improve their current land use practices and move away from subsistence agriculture which is prevalent in the two sub Counties.
- ii. There is a need to for the county government of Kisumu to keep households abreast with current and appropriate and sustainable land management practices. This will help improve soil fertility and productivity and mitigate land degradation
- iii. Social networks in Nyando and Muhoroni should be strengthened through the capacity building of the various groups and associations in the sub Counties. This can be achieved in various ways; but with a focus on capacity building of the members and their groups' associations in efficient and appropriate management of their financial resources including appropriate land use and land management practices which in turn can improve agricultural productivity and by extension alleviate poverty.
- iv. The adoption of appropriate agricultural technologies is a requirement for achieving increased agricultural production; which would in turn reduce poverty, and promote growth in other economic sectors. Household poverty is likely to decrease as innovative farming methods are embraced. To achieve this, the national and county governments should work together to develop technical agricultural policies that can encourage the adoption of technology by our farmers.

5.3.2 Areas for Further Research

While seeking answers to the research questions and associated hypotheses, the study unveiled other pertinent issues that need to be explored and elaborated

- i. One recommendation for future research is to carry out a comparative study in the future using different data analysis techniques, when more data are available, given that this study used assets to compute poverty in Western Kenya.
- ii. Studies should be carried out to map non-farm activities in the stud areas and determine their role in poverty alleviation
- iii. Studies should be carried out to look into the determinants of sustainable land management practices among households in Nyando and Muhoroni sub Counties.
- iv. Another avenue for further research is investigation of social networks and their relevance to agricultural production in the study areas or elsewhere in rural Kenya.

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**APPENDICES
APPENDIX I**

Questionnaire ID No. _____

**QUESTIONNAIRE TO ELICIT VIEWS ON THE EFFECTS OF HOUSEHOLD
POVERTY ON LAND USE AND LAND MANAGEMENT: A CASE STUDY OF
MUHORONI AND NYANDO SUB-COUNTIES- KISUMU COUNTY**

Name of Interviewer _____

Date of Interview _____

Division _____ Name of Village _____ Sub-Location _____

Location _____

Eligible Respondent – *Head of HH/or spouse*

I. Socio-Economic Characteristics

DEMOGRAPHIC CHARACTERISTICS OF HOUSEHOLD AND COMPOSITION

	Relation to head				Education levels						Marital status
1	Head	9	Grandchild	1	Std 1	9	For m1	1	College 3	1	Single
2	Spouse	10	Other relative	2	Std 2	10	For m2	1	Collect 4	2	Monogamous married
3	Own child	11	Unrelated	3	Std 3	11	For m3	1	Univ 1	3	Polygamous married
4	Step child	12	Brother/sister IL	4	Std 4	12	For m4	2	Univ 2	4	Divorced
5	Parent	13	Parent IL	5	Std 5	13	For m5	2	Univ.3	5	Widowed
6	Brother/sister	14	Worker	6	Std 6	14	For m6	2	Univ. 4	6	Separated

ID	Names of household members	Relationship to the household head:	Gender: 1.Male 2.Female	Age in years:	Marital Status	Number of Years in education:
1.						
2.						
3						
4						
5						
6						
7						
8						
9						
10						
11						

7	Nephew/niece	15	Other Specify	7	Std 7	15	Coll e 1	23	Univ. 5	7	Other
8	Son/daughter IL			8	Std 8	16	Coll e2	99	Don't know		
								98	None		
								0	Preschool		

1. Specify the number of people living permanently in the household and sharing the same food _____
2. What work do you mainly do for a living (occupation)? (Multiple responses allowed, If not sure write in full) _____
 - a. Business, self-employed (non-agriculture)
 - b. Employee in informal sector e.g. in market
 - c. Agriculture/Farming

- d. Fishing and related business
- e. Professional, technical.
- f. Others (specify) _____

3. Do you have any other sources of income? 1. Yes 2. No

4. If yes, specify the source _____

5. What is your spouse's occupation? (*For married respondents, multiple choices allowed*)

- a. Business, self employed (non-agriculture)
- b. Employee in informal sector e.g. in market
- c. Agriculture/subsistence
- d. Fishing and related business
- e. Professional, technical.

ID	<i>Main economic activity</i> <i>1. Self employed</i> <i>2. Permanent employee</i> <i>3. Temporary employee</i>	<i>If self employed, which sector</i> <i>1. Agriculture</i> <i>2. Business</i> <i>3. Hand craft</i> <i>4. Building</i> <i>5. other</i>	<i>If 2,3 or 4, use (monthly earnings)</i>	<i>Earnings per month:</i>	<i>If temporary activity which (use codes)</i>	<i>Estimate monthly earnings</i>
1.						
2.						
3						
4						
5						
6						
7						
8						
9						
10						
11						

f. Others (specify) _____

HOUSEHOLD MAIN ECONOMIC ACTIVITIES

	Activity Code						
1	Battery charging	8	Cobbler	15	Hotel	22	Video business
2	Bicycle repair	9	Farm hand	16	Local brewing	23	Weaving
3	Brick making	110	Electrician	17	Pit latrine digger	24	Groceries business
4	Carpentry	11	Fish trading	18	Rental of property	25	Traditional doctor
5	Casual worker	12	Hair dresser	19	Kiosk	26	Posho mill
6	Charcoal burning	13	Harrowing	20	Selling water	27	Sand harvesting
7	Clothes/hoes business	14	Herdsman	21	Selling snacks	28	Other specify

HOUSEHOLD PROPERTY AND OWNERSHIP

6. How many rooms does the house contain? _____

Tenure Status of main residence	If <u>OWNER</u> Nature of property acquisition	Quality Floor of House	Quality of wall of house	Quality of roof of house
1.Owner	1. Built on Inherited land	1. Earthen	1. Mud	1. Iron sheet
2.Tenant	2. Bought	2. Cement	2. wood	2. Tiled
3.Residence for free	3. Quality Bought with ongoing credit	3. Tiled	3. Stones	3. Thatch
4.Resident in compensation for services	4. Not Applicable	4. Other specify	4. Iron sheet	4. Other specify
	Other specify _____		5. Other specify	

7. How do you get water?

- a. Running water in the house
 - b. Running water outside the house
 - c. Roof Catchment
 - d. Collective water point
 - e. Water vendor
 - f. Well
 - g. River
 - h. Other specify _____
8. How do you light your house?
- a. Electricity b. generator c. Kerosene d. Firewood e. Solar f. LPG g. other
9. What do you use for cooking? 1. Firewood 2. Kerosene 3. Charcoa. 4. LPG. 5. Biomass 6. Other _____
10. Which kind of sanitary do you have?
- a. Private toilet b. latrines c. collective sanitary d. None e. Other _____
11. Do you have property to rent or for your economic activities other than the principle residence 1. Yes 2. No. (fill the table below)

Properties to rent					
Type	Property 1	Property 2	Property 3	Property 4	Property 5
1. Non-agricultural land use					
2. House					
3. Commercial property					
4. Other specify					
Mode of Acquisition					
1. Inheritance					
2. Purchase					
3. Attribution by community					
4. Other					

Property is 1. Rented 2. Vacant					
Amount of rent _____					
Place situated 1. Village 2. Other Village 3. Same Division 4. Other division 5. Town					

SOCIAL CAPITAL AND SOCIAL GENDER NETWORKS

12. Are you a member of any organization, group or association 1. Yes 2. No

If Yes, Fill the table below

Organization	Are you a member 1. Yes 2. No	For how Long?	Why are you a member? 1. Agricultural production 2. marketing 3. Business 4. Community Welfare 5. individual wellbeing/home improvement 6. To receive funds 7. Land management, improvement and access
Producers organization			
Agricultural cooperative			
Savings and credit coop.			
NGO			
Water Users			

13. Is your spouse a member of any organization group or association in the locality? 1.

Yes 2. No

If YES, in 12 fill the table below

Organization	Are you a member 1. Yes 2. No	For how Long?	Why are you a member? 1. Agricultural production 2. marketing 3. Business 4. Community Welfare 5. individual well being/home improvement 6. To receive funds 7. Land management, improvement and access
Producers' organization			
Agricultural cooperative			
Savings and credit coop.			
NGO			
Water Users			
Women Group			
ROSCAs			

LAND ASSETS LAND USE AND MANAGEMENT

14. Do you as an individual own any land? 1 Yes 2 No

15. If yes, how much do you own? (State size in acres . _____)

16. What is the type of land? 1. Normal rain fed agric. 2. Irrigated land 3. March land 4.

Other _____

17. How did you acquire the land? 1. Bought 2. Inherited 3. Gift 4. Other specify

18. Size and type of land holding

Type of Land	Land Holdings (acres)
Land Cultivated	
Land Leased out	
Land rented	

Land Fallow	
Total Land owned	

19. What type of land ownership is it? 1. With Title Deed 2. Without Title Deed

3. Other specify _____

20. Which activities are carried out on your land?

Land Use	Acres
Maize	
Sorghum	
Millet	
Horticultural crops	
Fruits	
Non- Food Crops	
Sugarcane	
Rice	
Livestock	
Rented Out	
Business Premises	
Other Specify	

21. Have you sold or given out land? 1. Yes 2. No

22. If YES what is the total area _____

23. Type of Land sold or given out 1. Normal rain fed agric. 2. Irrigated land 3. Marsh land 4. Other _____

24. Mode of transfer of the land: 1. Inheritance 2. Sale 3. Rental 4. Seizure by community 5. Other _____

25. Year of Cession _____

26. Price of Cession _____

27. To who did you concession to? 1. Child 2. Relative 3. Member of the community 4. Other person

28. What are the reasons for concession: 1. Settlement of children 2. Need 3. Old Age and Illness 4. Land degradation. 5. Other
29. If rental or share – cropping what's the payment? 1. Money 2. Products 3. Services 4. Other _____
30. Who is the key decision maker regarding utilization and management of land in this household?
1. Male head (*Options are intended to make gender differentiations*)
 2. Female head
 3. Wife
 4. Husband
 5. Both
 6. Other (specify) _____
31. Who makes decisions regarding what to plant?
1. Male head (*Options are intended to make gender differentiations*)
 2. Female head
 3. Wife
 4. Husband
 5. Both
 6. Other (specify) _____
32. Who makes decisions regarding sale of produce?
1. Male head (*Options are intended to make gender differentiations*)
 2. Female head
 3. Wife
 4. Husband
 5. Both
 6. Other (specify) _____
33. Who makes decisions regarding sale of land?
1. Male head (*Options are intended to make gender differentiations*)
 2. Female head
 3. Wife
 4. Husband
 5. Both

6. Other (specify) _____
34. In your opinion, what is the status of soils on your farm? 1. Very fertile 2. Fertile 3. Marginally fertile 4. Not fertile 5. Others specify why? _____
35. Has this always been the case? 1. Yes 2. No
36. Which of the following does your household use to manage the soils' fertility? (a) Cattle manure (b) Compost Manure (c) Crop residue (d) Mulching (e) Chemical fertilizer (f) None
37. On which crops are the above (a) – (e) applied? 1. All crops 2. Cash crops 3. Subsistence crops
38. How regularly are fertilizers applied to your plots? 1. Frequently – more than 8 times/year 2. Every time a new crop is planted 3. Seasonally 4. Once in a year. 5. Once every two years. 6. Infrequently 7. Not applied at all.
39. Are there any other soil conservation measures used by the household? 1. Yes 2. No
40. If Yes State which _____

Agricultural Production

41. Provide the following crop information

Crops	Area (ha)	Production (kgs) <i>Where Applicable</i>	Amount not sold	Amount Sold (kshs)
Maize				
Sorghum				
Millet				
Vegetables				
Sugarcane				
Rice				
Other (specify)				

42. Provide the following livestock information

Livestock	Type	Number
Cattle	Beef	
	Dairy	
Sheep		
Goats		
Poultry		
Pigs		
Other (specify)		

43. Do you sell livestock on your farm 1. Yes 2. No

44. If yes how much incomes do you earn from the sale of animals last year?

Livestock Sold	Income earned in the last year (Kshs)

45. Do you sell livestock products from your farm? 1. Yes 2. No

46. If yes, how much income do you earn from livestock products in a year?

Livestock Products	Income earned in the last year (Kshs)

LABOUR FORCE

47. Are you using any farm labour 1. Yes 2. No

48. If yes, do you hire full time workers? 1. Yes 2. No
49. If Yes, specify the type of wage 1. Cash 2. Crop sharing 3. Other

50. Specify the type of work 1. Land Preparation 2. Harvesting 3. Cleaning 4. Other _____
51. If cash payment specify 1. Daily 2. Weekly 3. Monthly 4. Based on work
52. What is the average cost paid to each worker Kshs. _____
53. Do you have part time employees 1. Yes 2. No.
54. If Yes Specify the type of Work 1. Land preparation 2. Cleaning 3. Harvesting 4. Other
55. Specify the type of wage 1. Cash 2. Crop Sharing 3. Other _____
56. If cash payment, specify 1. Daily 2. Weekly 3. Based on the task 4. Other _____

AGRICULTURAL EQUIPMENT

57. What kind of agricultural equipment do you use 1. Mechanized 2. Non-mechanized 3. Both
58. If yes which type of 1. Animal traction 2. Motorized traction 3. Sprayer 4. Micro irrigation equipment 5. Irrigation pump 6. Tractor 7. Other specify _____
59. How do you access the equipment 1. Individual purchase 2. Collective purchase 3. Rental 4. Borrowing 5. Services 6. Acquisition with a project 7. Other specify _____
60. Do you plan to acquire agricultural equipment 1. Yes 2. No
61. If yes, why 1. Availability of money 2. Land extension 3. Shortage of Labour 4. Update Equipment 5. Other specify _____
62. Have you parted with any equipment over the past 5 years 1. Yes 2. No
63. If yes why 1. To fund other activities 2. Need for money 3. Old age or illness 4. Other specify _____
64. Do you have a credit loan? 1. Yes 2. No

65. If Yes from which organization 1. Bank 2. Cooperative Association 3.
ROSCA 4> Friends and Rel.
5. Other Specify (multiple answers acceptable)
66. Is it easy for you to access formal credit 1. Yes 2. No.

APPENDIX II: FOCUS GROUP DISCUSSION SCHEDULE
RELATIONS BETWEEN HOUSEHOLD POVERTY, LAND USE, LAND
MANAGEMENT, SOCIAL NETWORKS AND AGRICULTURAL PRODUCTION IN
MUHORONI AND NYANDO SUB COUNTIES, KENYA

Focus Group Discussion (FGD) Guide

1. BRIEF ON THE RESEARCH

- Nature of the research
- Why the Research
- Choice of the area and group choice of method of data collection
- Conduct of FGD [The Need for and importance of full participation]

2. GROUP INTRODUCTION

- General group introductions including personal briefs
- Background Information on participants

3. MEMBERS PERCEPTION OF POVERTY

- Find out members' perception of poverty in their locations

4. LAND USE AND LAND MANAGENT PRACTICES

- Get information on the different land use and land management practices
- Household decision making behaviour
- Challenges faced by the community on issues of land use and the adoption of land management practices

5. AFFILITATION TO SOCIAL NETWORKS

- Establish the different types of social networks or organisations [type of support provided to members and participation of members].
- Find out reasons for joining the different social networks
- List of problems the associations face and suggest how they can be solved.
- Probe whether membership to the association has improved household livelihoods
- Determine the level of participation in social networks and whether they are involved in land use and land management practices.

6. AGRICULTURAL PRODUCTION

- Assess participants perception on agricultural production levels
- Determine the challenges they have and how they have handled them

APPENDIX III: LIST OF PUBLICATIONS

Juma, N. A., Wegulo, F.N., Otieno, J. (2017) The Role of Social Networks in Poverty Alleviation in Nyando District Kenya. *Scholars Journal of Humanities and Social Sciences* 5 (4A) 323-331

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The Role of Social Networks in Poverty Alleviation in Nyando District, Kenya

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Abstract: One of the most important paradigm shifts in poverty interventions has been a renewed interest in social networks as an important variable in sustainable rural economic development. There are very few studies that have focused on the role of social network or other forms of social capital on rural income diversification and rural poverty in rural areas of Kenya. The objective of this study was to establish role of social networks in poverty alleviation in Nyando District. A Cross-sectional research design involving use of both systematic random sampling and purposive sampling was adopted. Primary data was obtained using structured questionnaires to interview a minimum of 250 household heads from two divisions of Nyando district. The results indicated that 61.6% of the household heads belonged to social networks. In addition, the results indicate that membership to social networks varied markedly in Muhoroni and Nyando Divisions of Nyando District with, 55% and 66% respectively. Further, 43% of the respondents belonged to producer's organizations, 21% to agricultural cooperatives 9.8% savings and credit organizations 27% to community welfare organizations and 15% belonging to women groups and rotating saving and credit organizations respectively. Several reason were given by respondents for belonging to social networks including satisfaction of individual needs 4.8 % individual wellbeing 13.3 %. To improve agricultural production 10% and to receive funds. A Pearson product moment correlation (r) was employed to determine the significance of the relationship between membership to social networks and rural poverty in Nyando District. The results ($r = 0.241$) indicated a significant relationship between membership to social networks and rural poverty in Nyando District. The study concluded that though social networks may play an important role in poverty alleviation, vast majority of these social groups are not used for income generation or investment in the agricultural sector, which is the predominant source of livelihood for most households.

Keywords: Social Networks, Social Capital, Rural Poverty, Nyando, Muhoroni

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Linkages between Rural Poverty and Land Use in Nyando and Muhoroni Sub Counties Kenya

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Abstract strength of the linkages between rural poverty and land use. The results showed that the Maize was by far the most dominant crop grown by 95.6 percent of the households compared to other different land use practices. In addition, results also indicated a significant relationship between rural poverty and land use in the two sub counties. The study therefore concludes that policies that increase households awareness on efficient and practical land use patterns that will help them break the vicious cycle of poverty given their diminishing sizes of land.

Keywords: Rural Poverty, Land Use, land tenure, Nyando, Muhoroni

This study examined the relationship between rural poverty and land use among households in Nyando and Muhoroni Sub counties in Kenya. A Cross-sectional research design involving use of both systematic random sampling and purposive sampling was used in this study. Primary data was obtained using structured questionnaires to interview a minimum of 250 household heads from the two sub counties in Western Kenya. Data analysis involved the use of descriptive statistics. The Pearson product moment correlation (r) was used to determine the