ASSESSMENT OF HOUSEHOLD LAND SIZE AND USE FOR SUSTAINABLE FOOD AND LIVELIHOOD SECURITY IN THE MAIZE-TEA-DAIRY MIXED FARMING SYSTEM: A CASE STUDY OF BOGECHE SUB LOCATION IN KISII COUNTY

BY

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DECLARATION

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ABSTRACT

This study investigates the impact of household land size and use on food and livelihood security in Bogeche sub location, Kisii County. The specific objectives of the study were as follows: to identify the current household land size and use, examine inter-generational transmission of land rights, analyze the factors influencing the size and use of household land, and propose appropriate policy interventions on land holding size and use that can ensure sustainable food and livelihood security for rural households in the mixed farming system of Kisii County. Data was collected using a structured questionnaire, which was administered to a sample of 137 household heads in the study area. Interviews and observation techniques were also used to enable triangulation of data and provide more information. Descriptive statistics provided statistical summaries while Pearson's test was used to establish the relationship between agricultural land use and household food security. This study found out that cash crop production had a strong positive coefficient (0.650) that was significant with household food security status at p value of 0.000. Food crop production had a low but positive coefficient (0.302), whereas napier grass had a strong positive coefficient (0.570). Settlements had a moderate negative coefficient (-0.433) that was significant at 5% with household food security status. The socio-economic characteristics that had a significant influence on agricultural land use and household food security include the level of education of household head, farm size, and household income. To improve efficiency and productivity of the agricultural land, this study proposes a minimum land size of 1 acre. It also recommends clustered settlement pattern to address the challenge of land subdivision. Other recommendations include establishment of value addition factories to process agricultural produce and provision of market for the farm products among others.

DEDICATION

This thesis is lovingly dedicated to:

My Parents, Mr and Mrs Ogutu

For their labors of love and selfless devotion throughout the years, without which this study would not have been completed, and to whom I am eternally indebted.

My Siblings: Eva, Esther, Mary, Naomi, Hilda, Ruth, Vanessa, and the late, Derrick

Their inspiration and encouragement gave me the tenacity to complete this academic pursuit; I could not ask for a better family.

My love, John Makabe

In the vastness of the cosmos, immensity of time, and myriads of people, it is always my joy and delight to share space and magical moments with him.

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ABBREVIATIONS AND ACRONYMS

ASDS	Agricultural Sector Development Strategy
AU	African Union
CAADP	Comprehensive Africa Agriculture Development Programme
CBS	Central Bureau of Statistics
EMCA	Environmental Management and Coordination Act
FAD	Food Availability Decline
FAO	Food and Agricultural Organization
GIS	Geographical Information Systems
GDP	Gross Domestic Product
GOK	Government of Kenya
GPS	Global Positioning Systems
KNBS	Kenya National Bureau of Statistics
LLO	International Labor Organization
MDG	Millennium Development Goals
NFNSP	National Food Security and Nutrition Policy
NGO	Non-Governmental Organization
NLC	National Land Commission
PPA	Physical Planning Act
SAPs	Structural Adjustment Programmes
SDG	Sustainable Development Goals
SPSS	Statistical Package for Social Scientists
SRA	Strategy for Revitalizing Agriculture
SSA	Sub-Saharan Africa
STISA	Science, Technology and Innovation Strategy of Africa
UN	United Nations
WFS	World Food Summit
WHO	World Health Organization

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1. INTRODUCTION

1.1 Background to the Study

Food security is a prevalent predicament that has dominated international deliberations for many decades (FAO, 2010). Most international leaders know well that the crisis not only disrupts international peace but also impairs socio and economic progress (Shaw, 2007). Notably, over 800 million inhabitants around the globe are undernourished. Of these, 98% (780 million) are from growing nations (FAO, 2015). Latest reports reveal that approximately 900 million have insufficient food (FAO, 2013). Moreover, over 2 billion people suffer from undernourishment, 25% of which might be young ones aged 5 and beneath (Kumba & Francis, 2015). Therefore, food insecurity remains a critical worldwide problem.

In Sub-Saharan Africa (SSA), the food inadequacy scenario is critical. Approximately 220 million (23% of the whole population in SSA) fail to satisfy their every day nutritional requirements (FAO, 2015). This shortage results from many factors, key amongst them being the rapid population increase as well as subdivision of agricultural land. In line with Kumba and Francis (2015), the population rise is estimated at a rate of 2.5% every year until 2025, pushing the total number up to 1.2 billion people by then. The rapid increase has led to extended overexploitation and stress on agricultural land. It is noteworthy that the per capita access to land is about 0.12 hectares (Jayne et al., 2010), which means that certainly, land has been strained and subdivided excessively into uneconomic units that have little capacity to support farming.

Kenya is one the nations in sub-Saharan Africa that is food insecure. In 1961, it enjoyed stability and sufficient produce for its populace. Actually, when assessed against the WHO's standards and requirements, it produced a surplus of 10 percent at that time (Dietz, 2014). However, the production rate reduced progressively such that by the turn of the 20th century, Kenya's produce was able to feed only sixty eight percentage of its populace (Kumba & Francis, 2015). Decades later, particularly in 2005, 47.2% of the general population in rural and agriculturally rich areas could not meet the required 2250 Kilocalories daily energy intake per person (Kumba & Francis, 2015). Latest reports reveal that food inadequacy in Kenya is predicted at 25% of the entire population, amounting to 10 million (NFNSP, 2011).

Kisii County in Kenya is noticeably highly food deficient. Specifically, about 60 percent of the populace cannot meet the basic every day energy requirement of 2250 Kilocalories per grownup (Kisii County, 2013). One of the primary factors imposing the deficiency is uneconomic subdivision of farm land (Kisii County, 2013). Notably, the average farm holdings within the county measure a size of 0.5 hectares for families of roughly 5 persons, bringing the per capita unit to about 0.1ha (Kisii County, 2013). It is in the context and dynamics discussed above that this study is anchored. Primarily, this study sought to deal with the predicament of food scarcity in Kisii County, particularly Bogeche area. The principal objective is to uncover the effect of

land holdings size and use on and livelihood as well as food security of the agriculturally-dependent rural families and recommend suitable remedies that can inform policy makers.

1.2 Statement of the Research Problem

Despite the rigorous international and countrywide endeavors to fight food inadequacy, undernourishment continues to be rampant internationally and mainly in Kenya. As mentioned earlier, over 25 percent of the country's populace is food insecure. Of these undernourished Kenyans, nearly 1.5 million require emergency help to meet their food needs yearly (FEWS-internet, 2015). One of the principal factors causing food and livelihood insecurity, as stated in diverse literature, is subdivision of farms into uneconomic units.

Subdivision of agricultural land is not really a brand new phenomenon. It has been a first-rate problem in many countries dating back even to as far as the 17th century (Tan, 2005). However, its effects on agricultural productiveness have been felt more critically of late (Tan et al., 2008; Thapa, 2007). Even though land subdivision has been stated broadly as a major impediment to agricultural development, only limited empirical research has been conducted to decide the correlation among farm size and access to food. A majority of the studies have targeted the impact of variables like growth rate and density of a people, climate, and soil fertility, whilst setting very little emphasis on family farm size and use.

The few research work that has been carried out to assess the implication of farm size and use on agricultural productivity has drawn contradictory findings. A few researchers assert that small holdings encourage inefficiencies in production through diminishing the agricultural land and hindering mechanization (Demetriou, Stillwell, & See, 2013). In spite of these apparently logical arguments in opposition to subdivision of farms, others have drawn conclusions that promote the phenomenon. For instance, Berry and Cline (1979) argue that subdivision encourages agricultural intensification and allows farmers to produce more yields from a small piece of land.

Van Dijk (2003) and Bentley (1987) provide a more balanced view, particularly pointing out that land subdivision has strengths and limitations with consequent favorable and detrimental outcomes for distinct contexts. Accordingly, Demetriou and Stillwell (2013) recommend that these consequences ought to be evaluated one by one for each community or setting by means of considering the local circumstances in relation to economic, social, and environmental aspects before pertinent policy decisions are determined and embarked on.

Additionally, a majority of empirical research on the issue stop their analysis at the implication of family land size and use on agricultural productivity without drawing a straight link between those variables and livelihood or food sustainability. In most of the literature, the idea has been that expanding farm sizes and putting more land under farming will in the long run enhance the

families' access to food and livelihood. However, the dynamics at play in securing livelihoods and food are complicated such that a rise in agricultural productivity does not necessarily translate to more food and secure livelihoods. Consequently, this research piece sought to fill the gap by presenting a unique angle that goes past the static interaction of land use and its measurements versus agricultural productiveness. Particularly, it attempts a more dynamic approach by investigating not only how the two variables affect agricultural produce but also whether they actually impact food and livelihood access given that more produce does not always mean livelihood or food security because of the complexity of forces at play. It also aimed to generate area-particular findings that consider the immediate economic, social, cultural, political, and environmental dynamics as suggested in the discourse above. Thus far, no research endeavor of this nature has been conducted in Bogeche locality, Kisii County.

1.3 Justification of the Study

Land is one of the most essential physical capitals employed in agricultural production (UNDP, 2002). Therefore, restrained rights to access it could create food and livelihood deficiency. In Kenya, land within the rural rainy and fertile environs is scarce and accessing sustainable off-farm livelihoods is an uphill task. The scarcity of agricultural land makes the issue of land use policy a critical one. Family unit's food security is anchored on the idea that a populace will meet most of its food demands both via individual/own production or shopping for it from the marketplace (FAO, 2009). For majority of the rural populace, own harvests also called subsistence farming is the principal source of income as well as food (Francis & Kumba, 2015). Therefore, land size is a key determinant of how adequately a rural household is fed.

By examining how the variables (land size and use) impact access to food and income of families, this research targets to generate empirical findings that can be used to formulate a functional land use policy not only for Bogeche area and Kisii County but also anywhere else with a similar farming system and prevailing conditions.

1.4 Significance of the Study

Agriculture is a key economic sector that serves as the main source of livelihood to over 80% of Kenya's rural population (FAO, 2009). Besides, the field contributes approximately 45% of local and national revenue collections as well as 75% of raw industrial materials (FAO, 2009). Appreciably, over eighty percent of agricultural produce in Kenya is acquired from crop and animal farming at the rural family unit stage (Agustina, 2008). Accordingly, by focusing on households, this work will benefit not just majority of the rural population but also the whole country and the overall economy.

1.5 Objectives of the Study

The broad objective of this study is to assess the impact of land size and use on food and livelihood security in Kisii County. To achieve the goal, this research was guided by four

particular objectives as follows:

- To identify the current household land size and use and determine how they influence household food and livelihood security in the study area
- To examine inter-generational transmission of land rights and how it affects household food and livelihood security
- To analyze the factors influencing the size and use of household land and their impact on the food and livelihood security of the rural population
- To determine and propose appropriate policy interventions on land holding size and use that can ensure sustainable food and livelihood security for rural households in the mixed farming system of Kisii County

1.6 Basic Research Assumptions

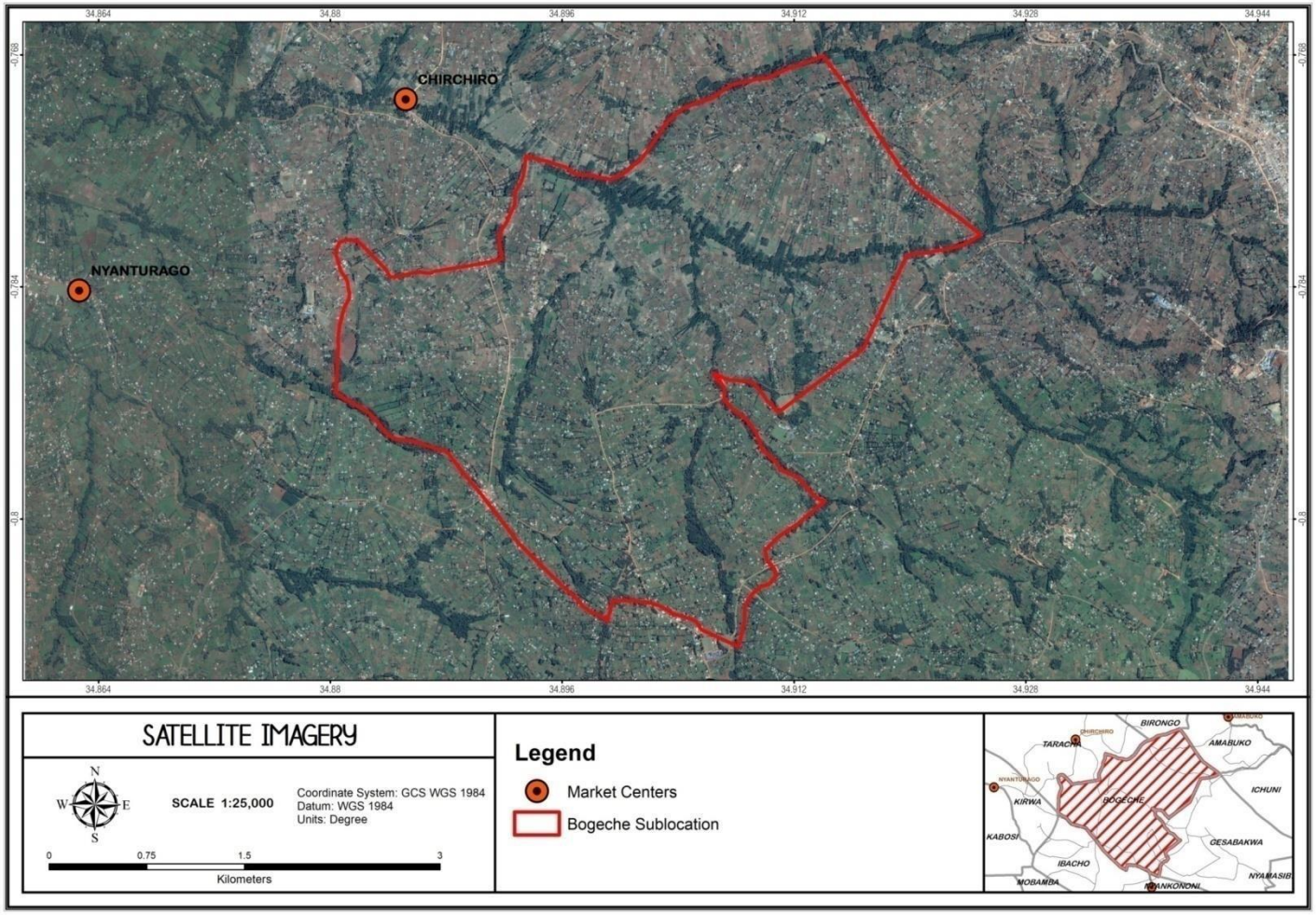
The overall assumption adopted in this study is that the issue of food scarcity can be controlled and remedied through establishment and execution of apt land use policies. Specific assumptions include:

- Certain sizes of land and how they are used lead to food and livelihood deficiency
- Without putting particular controls on the division and use of land the predicament will worsen

1.7 Geographical Scope of the Study

Theoretically, this research covers all of the regions in Kisii County wherein the mixed maize-tea-dairy farming approach is being practiced. However, due to financial and time constraints, a representative unit, namely, Bogeche sub location was decided on using the sampling design explained in the methodology section. Bogeche covers an area of approximately 11km2. The locality is predominantly rural as demonstrated in the satellite image below (Map 1.7). An in depth look at area is given in the fourth chapter.

Map 1.7: Satellite Imagery of the Study Area



Source: Author, 2018

1.8 Definition of Key Operational Terms

A *household* is a fundamental unit of evaluation that includes someone or institution of people that live together, and/ or proportion monetary activities vital for their living and survival, and/or collectively cultivate a common place or piece of land, and/or are answerable to the same head (FAO, 1997).

Food security is the state the state of having dependable and sustainable capability of accessing food so as to live healthy (Ellis, 2000).

A *livelihood* encompasses having a right to use assets, namely, natural, economic, physical, human, and social capital, to influence how much gain in the form of a livelihood is obtained by an individual or family (Ellis, 2000).

A *livelihood* is *sustainable* when it has ability to address and recover from strain and shocks and hold or enhance its competencies at present without undermining the natural resource supply needed for future survival (DFID, 2000).

A *farming system* is defined as a populace of individual farm structures which have similar natural resources, market strategies, household livelihoods and constraints, and for which similar development strategies and interventions would be suitable (Agustina, 2008).

A *mixed farming system* refers to a mixture of farm and domestic activities which are interdependent and interact to attain the desires of a household (Beets, 1988).

Land is basically any ground, soil, or earth considered as a unit of ownership or possession by individual family units and includes water, building and structures, as well as the space below and above the ground.

Land use is the patterns, spatial arrangements, and economic or social activities that humans undertake to utilize, change, or maintain land (FAO, 1997; UNEP, 1999).

Land tenure refers to an established system to determine who exercises the right to utilize land and the resources that accompany it (FAO, 1997).

Land subdivision entails the technique of dividing land into smaller pieces (Agustina, 2008).

1.9 Limitations of the Study

The primary obstacles encountered in this work are as follows:

- A preferred or common scale to quantify the yearly harvest was lacking since most farmers were only aware of local measurement units. To overcome it, probing techniques were applied to facilitate the conversion and wherein necessary, real measuring had to be performed.
- The information extracted depended largely on the farmer's ability to recall how much crop or livestock produce was obtained and consumed in previous harvest seasons since most households did not keep records. To cope with this problem, respondents were advised to consult other household members.
- Measuring the farm sizes turned to be operationally tough but was curbed through the usage of global Positioning system (GPS) tool with dimensions calculation capability.

1.10 Organization of the Study

This study is organized into six broad chapters, the first being the introduction. The second is devoted to the assessment of relevant theoretical and empirical literature. The third offers the strategies, techniques and overall methodology followed in the study. The fourth dwells on reviewing the historical backdrop to the study location. The fifth provides the results of analysis the research findings. At last, the sixth gives the summary, key aspects of the study's contribution, and areas that need future research.

2. LITERATURE REVIEW

2.0 Overview of the Literature Review Section

This segment offers a critical assessment of relevant literature concerning the subject of examination as informed by the study's broad and specific goals. The discussion lays foundation for collecting and evaluating data.

2.1 Understanding the Concept of Food Security

Through the years, food security as a concept has been discussed using various approaches. According to Pinstrup- Andersen (2009), there are numerous definitions of the concept. The famous definition states that "it exists when all people, at all times, have bodily, social and financial ability to secure a variety of nutritious foods sufficient to meet their energy needs" (FAO, 1996). Conceptually, food security has 4 dimensions that are derivable from the definition, particularly, food access, availability, stability, and utilization (Pinstrup-Andersen, 2009). Availability captures the quantity, range, and quality of food obtainable by humans. The signs of food availability encompass adequacy of dietary electricity and protein acquired from the available food (Pinstrup- Andersen, 2009). Food stability captures peoples' exposure to risk of food insecurity due to incidences of shocks such as domestic food price volatility, fluctuations in domestic food supplies, political instability, and peoples' loss of income (Pinstrup-Andersen, 2009). The food utilization dimension focuses on peoples' ability to utilize food as indicated by stunted growth, under-weight, anemia and vitamin A deficiency among children under five, and prevalence of iodine deficiency and anemia among pregnant women (Pinstrup- Andersen, 2009). Thus, food insecurity will exist to a small or large extent depending on the extent to which one or more of the four dimensions of food security is/are violated. More practically, food insecurity exists when people's calorie intake is below the minimum dietary energy requirement and will manifest itself as hunger or undernourishment (Pinstrup- Andersen, 2009).

A noteworthy measurement of food security is vulnerability. Vulnerability to food insecurity refers to the full range of factors that place people at risk of becoming food-insecure. The degree of vulnerability of individuals, households or groups of people is determined by their exposure to the risk factors and their ability to cope with or withstand stressful situations. FAO defines vulnerability as the presence of factors that place people at risk of becoming food insecure or malnourished including those factors that affect their ability to cope (FAO, 2009). In other words, vulnerability to food insecurity relates to situations where there is a risk that future food intake will be inadequate. Notably, just like there are no unique indicators to measure the three food security dimensions (availability, access and utilization), vulnerability does not have exact indicators for measurement (Pinstrup-Andersen, 2009). The vulnerability, which is a risk, hence a probability, may be measured, but only in relative terms.

2.2 Understanding the Concept of Sustainable Livelihoods

The term 'livelihood' has been widely defined in literature (Ellis 2001, and Niehof 2004, Morris *et al. 2001*). For example, Chambers (1988) defines livelihood as "adequate stocks and flows of food and cash to meet basic needs" (p. 1). This study adopts the definition by Ellis (2000) which states as follows:

> A livelihood comprises the assets (natural, physical, human, financial, and social capital), the activities, and the access to these (mediated by institutions and social relations) that together determine the living gained by an individual or household.

The various assets comprising food security are defined as follows:

Natural capital refers to the natural resource base (land and produce, water and aquatic resources, trees and forest products, wildlife, wild foods and fibres, biodiversity, environmental services). There is a close relationship between natural capital and the vulnerability aspect of food insecurity because most of the livelihood shocks for instance are a result of natural processes that destroy natural capital. Understanding the available natural resources and preserving them for current and future use is important in achieving sustainable live livelihood outcomes (Chambers & Conway, 1992).

Physical capital as defined by Scoone (1995) refers to assets brought into existence by economic production processes such as infrastructure (transport, roads, vehicles, secure shelter and buildings, water supply and sanitation, energy, and communications), and tools and technology (tools and equipment for production, seed, fertilizer, and pesticides).

Human capital as defined by Chambers and Conway (1992) refers to the educational level and health status of individuals and populations (health, nutrition, education, knowledge and skills, capacity to work, and capacity to adapt).

Financial capital refers to stock of cash that can be accessed to purchase either production or consumption goods. The main sources of financial capital are available stock in the form of cash, savings, credit or debt, and regular inflows of money such as labor income, remittances or pensions. Financial capital can be converted into other types of capital that provide people with livelihood options and enable them to adopt different livelihood strategies and achieve livelihood strategies such as purchasing food or acquiring means of production (Cattermoul et al., 2008).

Social capital refers to the social networks in which people participate and from which they can derive support that contributes to their livelihoods. It places emphasis on people and the way they interact with one another and with systems within their communities. It represents the social resources upon which people draw on to achieve their livelihood outcomes (Ashley, 2000). Examples include networks and connections (patronage, neighborhoods, and kinship), relations of trust and mutual understanding and support, formal and informal groups, shared values and behaviors, common rules and sanctions, collective representation, mechanisms for participation in decision-making, and leadership (Scoone 1995:6-7; Chambers & Conway 1992: 10).

It is important to note the dynamic nature of the five capital assets in sustaining people. For instance, while livestock is considered to be physical capital in providing animal traction, it can also generate social capital by providing prestige and connections in the community (Agustina, 2008). Therefore, the livelihood capitals are interconnected as opposed to being separate building blocks.

Recent conceptual and empirical works note that food security is a subset of livelihood security: the latter is a necessary and often sufficient condition of the former. Security of livelihood includes access to the means to produce the food or generate the income to meet those needs (Frankenberger, 1995; Chambers, 1995). Livelihood strategies are the ways in which assets or resources are used to generate access to food. The risk of livelihood failure largely determines the vulnerability component of food insecurity. Indeed, much of the livelihood security literature notes that under circumstances of risky environments, and especially transitory or chronic food insecurity, livelihood decision-making often involves direct tradeoffs between current consumption and future production (Corbett, 1988; Frankenberger, 1995). According to DFID (2000), "*a livelihood is sustainable when it can cope with and recover from stress and shocks and maintain or enhance its capabilities and assets both now and in the future without undermining the natural resource base.*

Livelihood strategies (LS) have been classified according to different criteria. Scoones and Swift (1998) divide rural livelihood strategies into three broad types according to the nature of activities undertaken: agricultural intensification and extensification, livelihood diversification, and migration as illustrated in ***Table 2.2*** below. Notably, LS are not necessarily mutually exclusive and trade-offs between options, and the possibility to combine elements of different options will exist (Scoones & Swift, 1998). Diversification is generally recognized as an important strategy for decreasing livelihood vulnerability, defined by Ellis (2000):

> *Rural livelihood diversification is the process by which rural households construct an increasingly diverse portfolio of activities and assets in order to survive and to improve their standard of living.*

Notably, income diversification and migration have increasingly become important livelihood strategies in rural areas (Dalal-Clayton, Dent, & Dubois, 2003). Combinations of agriculture and non agriculture activities constitute income sources of the household. Agriculture or farm income is derived from activities that centre on natural resources include food and cash crops as well as various forms of livestock products, whereas non-agricultural income sources include remittances, pensions, business, and rents among others (Agustina, 2008). The number of sources and distribution of income among those sources describe the diversity of a household's livelihood. This study sought to identify the livelihood strategies employed by the rural population and determine their effectiveness.

Table 2.2: Types of Livelihood Strategies

Agriculture in/intensification	Livelihood diversification	Migration
-These strategies increase agricultural productivity either by intensifying resource use through the application of greater quantities of labor or capital for a given land area, or by bringing more land into cultivation or grazing. -Whether households pursue this strategy or not depends on agro-ecological potential and the implications for labor and capital. Technical developments in agriculture may also operate as a key determinant. -The availability or not of this option ius determined by the household resources to engage in off-farm livelihood diversification.	-Diversification here may be to broaden the range of on-farm activities (e.g. adding value to primary products by processing or semi-processing them), or to diversify off-farm activities by taking up new jobs. -It may be undertaken by choice for accumulation or reinvestment purposes, or of necessity either to cope with temporary adversity or as a more permanent adaptation to the failure of other livelihood options. -The former motivation might be associated with a wide income-earning portfolio to offset all future types of shocks or stress, whereas; the latter would more likely be a narrower, rehearsed response to a particular type of common stress.	-Migration may be voluntary or involuntary. -As a critical strategy to secure off-farm employment (needs driven), it may rely on and/or stimulate economic and social links between areas of origin and destination. -Kinship structures, social and cultural norms may strongly influence who migrates. -Migration has implications for the asset status of those left behind, for the role of women and for on-farm investments in productivity.

Source: Scoones and Swift, 1998

2.3 Understanding the Concept of Rural Households

As pointed out earlier, this study is about food security in Kenya and it is contextualized around the experiences of rural households in Bogeche sub location, Kisii County. Although much of what the study focuses on could apply to individual experiences and practices (that are nevertheless socially bounded), the household remains a major focal point. However, existing literature suggests that the term 'household' is understood differently by different people. Some of the variations in the meaning of the term are briefly discussed below before moving on to show how the concept is understood and applied in this study.

The 1989 National Population Census in Kenya referred to a household as a person or group of persons who live together in the same dwelling unit or homestead and eat together (Kenya, population Census, 1989). The Rural Household and Expenditure Surveys conducted by the Central Bureau of Statistics (CBS) define a household as constituting one or more persons who eat together and have common cash account (GOK, 1977; 1981b). In their study on rural landlessness in Kenya, Alila et al. (1993) defined a household as comprising a person, or group of persons, generally bound by ties of kinship, who normally reside together under a single roof or several roofs within the same compound and who share a common source of food. Similarly, Janelid (1980) defines a household, as a group of people (which may include both family members and persons other than kin relations) who occupy a housing unit as a collectivity, and interact as a social unit. The interactions of members of a household include sharing residence and meals, using family labor for production and consumption activities, influencing decision-making in the allocation of household resources, exchanging labor with neighbors, and participating in traditional mutual-aid groups or common organizational and recreational activities.

Notably, it is argued that whereas a household denotes common residence and economic cooperation for production, consumption and reproduction, several transformations that have taken place call for the inclusion of household members that are present or absent physically (Netting & Will, 1984). Further, the household model is viewed as inappropriate (for Africa) due to problems associated with defining household membership and maintaining records of people with such high mobility rates, which in turn make precise calculations of production and consumption patterns in terms of household labor constraints and food requirements problematic (Guyer, 1981). Guyer has additionally argued that far from the household being a discrete entity, its boundaries are often very permeable since the unit is embedded within wider structures. Thus, besides overlapping memberships, there is no isomorphic relation between units of production, consumption and investment. The absence of isomorphic relation means that the activities carried out by one household, such as resource flow, cannot be fully explained without resorting to the links and transfers among such units (Omosa, 1998). For example, an individual who eats in one household may sleep in another and contribute resources to yet another, simultaneously or exclusively.

In spite of these conceptual weaknesses, the household remains essential to understanding food security patterns. As a unit, it provides a locus with discernable boundaries and in the case of this study, access to land and subsequent utilization is closely tied to the establishment of a household

in rural Kenya. In using the household as a departure point, this study considers membership as composed of resident and non-resident individuals, who then may be constituted for different purposes, including production, consumption and reproduction. Therefore, although much of the food security strategies that are discussed in this study centre on individuals, they can be said to draw their mandate, real or imagined, from a wider spectrum, mainly household members and related networks. For example, some decisions regarding how a household's food needs will be met are individually constituted but collectively executed and vice versa.

In this study, the household is recognized as a basic unit of analysis which includes a person or group of persons who live together and/or depend on and/or jointly cultivate a common piece of land and/or are answerable to the same head and/or share economic activities necessary for their survival. This definition of a household was adopted for the current study because of its emphasis on provision for primary needs and joint management of resources.

2.4 Understanding the Concept of a Farming System

Farmers view their farms as system in their own right. Farm household is defined as rural households consisting of three basic sub systems which closely interlink: (1) the household as decision making unit, (2) the farm and its crops and livestock activities, (3) the off farm component (FAO, 1990). It also shows the variety of natural resources available to farm families such as land and water as well as human, social and financial capital (Agustina, 2008). Each individual farm has its own characteristics from variations in resource endowment (Agustina, 2008). The household, its resources and the resources flows and interactions at individual farm level are referred as farm system (Dixon, Gulliver, & Gibbon, 2001). The functioning of any individual farm system is strongly influenced by the external rural environment, including policies and institutions, markets and information linkages.

A farming system is defined as population of individual farm systems that have similar resource bases, enterprise patterns, household livelihoods and constraints, and for which similar development strategies and interventions would be appropriate (Agustina, 2008). The classification of farming systems can be based on two criteria which include available natural resource base and dominant pattern of farm activities and household livelihoods. A mixed farming system involves a combination of farm and household activities that are interdependent and interacting with each other to achieve household goals (Beets, 1988). Farming systems can be determined by many factors including climate, policies, institutions, public goods, markets and information among others (Agustina, 2008). This study has classified the farming system of Bogeche sub location based on the dominant farm activities in the area which include maize, tea, and dairy farming.

2.5 **Understanding the Concept of Land and Land Use**

Land has been defined in various ways. The Constitution of Kenya Article 260 defines land to include: the surface of the earth and the subsurface rock; any body of water on or under the surface; marine waters in the territorial sea and exclusive economic zone; natural resources completely contained on or under the zone; and air space above the surface (GOK, 2012). United Nations Programme (2002) defines land as a physical entity in terms of its topography and spatial nature; a broader integrative view also includes natural resources such as the soils, minerals, water, and biota. These resources are organized in ecosystems which provide a variety of services essential to the maintenance of life-support systems and the productive capacity of the environment. Land resources are used in ways that take advantage of all these characteristics. This study adopts the definition of land by Agustina (2008) to mean any ground, soil, or earth regarded as the subject of ownership, including trees, water, and buildings added by humans, the air above, and the earth below. The definition was adopted for this study because it incorporates the aspect of ownership.

Land use is defined by the purposes for which humans exploit the land resources. In simple terms, it entails the human use of land. It has also been defined as "the arrangements, activities and inputs people undertake in a certain land resource type to produce, change or maintain it" (FAO, 1997; UNEP, 1999). Natural scientists define land use in terms of syndromes of human activities such as agriculture, forestry, and building construction that alter land surface processes including biogeochemistry, hydrology and biodiversity (Agustina, 2008). Social scientists and land managers define land use more broadly to include the social and economic purposes and contexts for and within which lands are managed (or left unmanaged), such as subsistence versus commercial agriculture, rented versus owned, or private versus public land. As a result, scientific investigation of the causes and consequences of land-use and land-cover change requires an interdisciplinary approach integrating both natural and social scientific methods.

2.6 How Household Land Size and Use Affects Food and Livelihood Security

2.6.1 How Household Land Size Affects Food and Livelihood Security

There are contradictory findings regarding the implication of household land size on food and livelihood security. According to Shuhao (2005), small land holdings hinder agricultural productivity and thus must be prevented by legislative actions. The costs associated with small land sizes are seen primarily in terms of inefficient resource allocation (agricultural space, labor and capital) and the resulting increase in the cost of production (Shuhao, 2005). In particular, the use of modern machinery is difficult or may be impossible in tiny parcels and may require an excessive amount of manual work in the corners and along the boundaries. A remarkable statistic is that a tractor may spend up to one third of its time turning round on a small parcel (Mcpherson, 1983). Moreover, excessive land subdivision creates complicated boundary network among plots

(hedges, stone walls, ditches) which cost extra money to establish as well as land wastage because a part of a holding remains uncultivated at the margins of the parcels (Mcpherson 1983; Simpson, 1987). Furthermore, the resultant irregular parcel shape prevents proper cultivation of land, especially for some crops (such as vines, olives) which need to be cultivated in series. Additionally, implementation of soil conservation work is harder and construction costs are higher. In addition to the classical land subdivision problems, small fields often have no road access (Mcpherson, 1983). Furthermore, the lack of a road network to access the land parcels prevents the introduction of other agricultural infrastructure such as irrigation and drainage systems. In instances where roads are provided, they often have low geometrical standards which are usually adjusted to the shape of parcels. In addition, this problem causes conflicts among neighboring landowners which may clog up the local courts because a part of a 'front' parcel may be used as a road access or a path to the 'back' parcel (Mcpherson, 1983). As a result of the problems stated above, productivity decreases and in turn leads to food insecurity and a decline in the income of farmers. Therefore, arguments against small land holdings emphasize the need for agricultural commercialization via large farm sizes to attain economies of scale.

Contrary to the arguments above, other authors have supported an inverse relationship between farm size and productivity. Berry and Cline (1979), for example, argue that land subdivision can encourage agricultural intensification thus leading to more yields from a small land parcel. Moreover, small land holdings allow farmers to plant different crops and reduce risks such as crop diseases while encouraging more diversified production (Van Hung *et al.,* 2007). Small land holdings also allow farmers to maximize their self-employment and minimize the amount of hired labor (Tan *et al.,* 2006). In addition, subdivision enables distribution of land to heirs, thereby creating social and economic benefits through offering a sense of belonging and enabling owners to use the parcels to obtain credit through provision of tradable collateral, respectively. To this end, this research hypothesizes as follows (whereby H_0 and H_1 stand for nil and alternative hypothesis, respectively as applied throughout this study):

H_0: *Land size has no effect on food and livelihood security in the study area*

H_1: *Land size is positively correlated to food and livelihood security*

2.6.2 How Household Land Use Affects Food and Livelihood Security

Land use refers to the process of arranging the activities and inputs in a certain land cover type to produce, change or maintain it (Kumba & Francis, 2015). Notably, Kumba and Francis (2015) conducted a study to analyze the influence of agricultural land use or land cover on household food security situation in Keumbu area of Kisii County. From their study, the area experienced a high rate of land use/cover changes leading to significant changes in food production. In particular, forestland and grassland reduced by 58% and 91% respectively, whereas cropland and settlements increased by 11% and 0.6% respectively between 1990 and 2010. Forestland had a strong positive correlation with crop production since forests created conducive environment for agriculture particularly by increasing soil fertility and facilitating the availability of adequate rainfall (Kumba & Francis, 2015). Settlements had a moderate negative relationship with food crop production as farmland was reduced due to land subdivisions, village settlements, shopping centers, and towns. Notably, Kumba and Francis (2015) postulated that if other conditions remain constant, the available agricultural land in Keumbu region will be depleted by the year 2030. Therefore, urgent interventions to control land use are required.

Kumba and Francis (2015) conceptualized agricultural land use as comprising four categories which include cash crop, food crop, fruits and vegetable, and pasture and napier grass. Cash crop encompassed all land used for production of tea, coffee and sugarcane. Food crop was the land allocated to crops such as maize, beans, bananas, sorghum, finger millet, and sweet potato. Fruits and vegetable referred to all the land used to grow avocados, pineapples, paw paws, cabbages, kales, onions, tomatoes, and traditional vegetables. Pasture and napier grass was the land use referring to natural pasture and production of napier grass.

Two agricultural land uses were found to be significantly related to household food security namely: cash crop (P=0.000) and pasture and napier grass (P=0.002). On the other hand, food crop (land use) was not significantly related (P=0.228) to household food security and the situation was similar with fruits and vegetable (P=0.192) production. These findings suggest that engaging in cash crop farming improved the households' food security situation. Cash crops are important sources of household income that could be used to buy food for households or purchase inputs that would boost food production and general agricultural productivity.

Studies have shown that cash crop production can increase food security by enhancing food availability either through household production or by increasing the income available for purchase of food (Schneider & Gugerty, 2010; Achterbosch et al., 2014). In theory, farmers might be better off if they could produce only cash crops and use the earned income to purchase food, however, rural farming households perceive this to be a risk livelihood strategy (Lukanu et al., 2004).

The presence of natural pasture and napier grass is an indication of livestock ownership in a household and this increases a households probability of being food secure. These findings are

consistent with those of Khan and Gill (2009) who found that food availability in the rural areas of Pakistan was significantly associated with increased production of crops and livestock products. Kidane et al. (2005) also found that livestock ownership was positively related to household food security in Ethiopia. This positive correlation is because crop and livestock complement each other in ensuring household food security.

Kumba and Francis (2015) found out that household food security was not dependent on the size of land used for food production. The reason for this finding may have been that the mere allocation of land did not guarantee that adequate amount of food was produced. These findings are similar to those by Kuwornu et al. (2011), which showed that growing of food crops is not a guarantee of household food security. In their study on the food security status of farming households in Central Ghana, Kuwornu et al. (2011) found that the majority (68.8%) of food crop producers were food insecure. However, Babatunde et al. (2007) established that food from own production had a low but positive correlation with household food security status of rural farming households in North Central Nigeria. The implication was that the higher the amount of food from own production the higher the likelihood of food security.

Notably, households prefer to produce food crops even when the returns are higher from market oriented production due to the uncertainty about food prices in the local markets, unfavorable price trends or unknown technology associated with production of commercial crops (Schneider & Gugerty, 2010). The reason why fruits and vegetables were found to be insignificantly related to household food security could be the fact that these crops are allocated with very little land (given the low farm sizes) resulting in low production, therefore, the income generated from their sales does not form an important source of money for the purchase of food (Kumba & Francis, 2015). A study by Tufa et al. (2014) on determinants of smallholder commercialization of horticultural crops in Ethiopia revealed that farm size had a positive and significant influence on farmers' likelihood to participate in horticultural crops market.

In addition, Kumba and Francis (2015) found out that the reduction of forest land due to rising demand for more agricultural land and settlement had impacted negatively on soil fertility leading to a decline in food production. They also established that most of agricultural land was under crops. In the earlier 1990s most people had two to four acres of land under food crops but this reduced with time paving way for cash crops and settlements as population increased (Kumba & Francis, 2015). Cash crops were grown by about 70% of the small scale holders. Due to reduced agricultural land, households in Kisii County have adopted mixed cultivation on small pieces of land so as to maximize the land (Kumba & Francis, 2015). The most highly grown crop, according to Kumba & Francis (2015), is maize. This could be due to the fact that maize can mix with beans, take shorter period to grow and does not take as much space as tea (Kumba & Francis, 2015). Therefore, maize as a staple food in Kenya tends to be given special emphasis among farmers.

This study investigated how various land uses, particularly, tea (cash crop), maize (food crop) and dairy (land used for livestock keeping purposes such as pasture and napier grass production) influence food and livelihood security in Bogeche sub location, Kisii county. It also investigated how other land uses such as forest cover and settlement influence food and livelihood security of the rural population.

From the discussion above, this study hypothesizes the following:

H_0: *Land use has no significant association with food and livelihood security*

H_1: *Land use influences food and livelihood security*

2.7 Effects of Inter-Generational Transmission of Land Rights on Food/Livelihood Security

2.7.1 How Land Rights Affect Food and Livelihood Security

Large numbers of the world's poorest people, especially in Asia and sub-Saharan Africa, live in farming households and depend on the productive use of land for their livelihoods and food security. In almost all developing countries, agricultural productivity makes a major contribution to growth, employment, and livelihoods. Forests, rangelands, and wetlands are important resources for the poor, especially in remote areas and in times of hardship. For all these types of land resource, the rights held by the poor are frequently their most fundamental livelihood asset. Land rights entails the allocation of rights in land; the delimitation of boundaries of parcels for which the rights are allocated; the transfer from one party to another through sale, lease, loan, gift or inheritance; and the adjudication of doubts and disputes regarding rights and parcel boundaries (Karouzis, 1980). These rights may be informal or formal; they may be wide-ranging or quite restricted. Formal rights do not necessarily provide greater security than informal or customary rights (Karouzis, 1980). The security and quality of these rights directly affect land use. Weaker rights may discourage investment and lead to unsustainable use (Igozurike, 1974). People use a wide range of strategies to gain access to land. These include: purchase, often using capital accumulated while working as migrants in urban areas; adverse possession or prescription (the acquisition of rights through possession for a prescribed period of time); leasing, or gaining access to land by paying rent to the owner; sharecropping, or gaining access to land in return for paying the owner a percentage of the production; and inheritance or gaining access to land as an heir.

People who have extensive rights to land are generally more able to enjoy a sustainable livelihood than those who have only limited rights to land; those with limited rights are, in turn, often better off than the landless. Land tenure security exists when landowners and users, including some 50 million smallholder farmers in Sub-Saharan Africa, enjoy clearly defined and enforceable rights to land, whether such rights are based on formal law or customary practices (Thomas, 2006). Studies in Malawi of a pilot land redistribution program based on a willing buyer/willing seller model illustrate the substantial increase in food availability, and thus food security, when formerly landless

or near landless households acquire land or substantially more land (Thomas, 2006). Security of tenure is the certainty that a person's rights to land will be recognized by others and protected in cases of specific challenges (Thomas, 2006). People with insecure tenure face the risk that their rights to land will be threatened by competing claims, and even lost as a result of eviction. Without security of tenure, households are significantly impaired in their ability to secure sufficient food and to enjoy sustainable rural livelihoods. Therefore, land tenure is important in rural development interventions which place an emphasis on building people's endowments of assets so they can enjoy sustainable livelihoods.

As pointed out earlier, a livelihood is sustainable when it can cope with, and recover from stresses and shocks, and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base. In this context, a livelihood comprises the capabilities, assets (including both material and social resources) and activities required for a means of living (Chambers & Conway, 1992). Property rights to land, together with labor, form the most common endowments used to produce food for home consumption as well as cash crops that allow the family or individual to pay for other needs such as health and education. Property rights to land are thus one of the most powerful resources available to people to increase and extend their collection of assets beyond land and labor to the full portfolio necessary for sustainable livelihoods, which entails natural resources, social, human, and financial capital as well as physical assets.

Land rights are often a vital element when rural households balance their capabilities and assets, and determine their resulting strategies to cope with their daily production and food security. However, rights to land are not just a source of economic production, but are also a basis of social relationships and cultural values, and a source of prestige and often power. The resulting social networks that are built up within a specific social and cultural group are a very important asset in ensuring sustainability of livelihoods of rural households.

Land tenure arrangements create incentives for investing labor and resources over the long term and adopting and using new technologies and sustainable land management practices. When rights to land are secure, there is: greater incentive to manage and conserve the land; greater incentive to make long-term improvements to the land and other land-related investments; less potential for conflict and arbitrary eviction; opportunity for land rental and sales markets to transfer land to more productive uses and users; and if combined with cost-effective systems of land administration, opportunity to reduce the cost of credit by leveraging the land as collateral. In addition, land tenure security builds household resilience to climate, environmental, financial, and health shocks by providing a safety net for families. Access to land is frequently critical if vulnerable households are to enjoy sustainable rural livelihoods. Secure access to land, whether through formal, informal, customary or other means, is necessary for rural households to enjoy food security and is an important part of sustainable livelihoods. Land tenure problems are often an important contributor to food insecurity and restricted livelihood opportunities. Secure access to land should

thus be considered when designing solutions to specific rural household livelihood and food insecurity situations. Access to land is closely intertwined with access to other natural resources such as water and trees, which may be essential for people's livelihoods.

Security of tenure cannot be measured directly and, to a large extent, it is what people perceive it to be. The attributes of security of tenure may change from context to context. For example, a person may have a right to use a parcel of land for a 6 month growing season, and if that person is safe from eviction during the season, the tenure is secure. By extension, tenure security can relate to the length of tenure, in the context of the time needed to recover the cost of investment. Thus the person with use rights for 6 months will not plant trees, or invest in irrigation works or take measures to prevent soil erosion as the time is too short for that person to benefit from the investment. The tenure is insecure for long-term investments even if it is secure for short-term ones.

The importance of long-term security has led some to argue that full security can arise only when there is full private ownership (freehold) as, under such tenure, the time for which the rights can be held is not limited to a fixed period. It is argued that only an owner enjoys secure rights, and holders of lesser rights, such as tenants, have insecure tenure because they are dependent on the will of the owner. It is then implied that security of tenure comes only with holding transfer rights such as the rights to sell and mortgage. Equating security with transfer rights to sell and mortgage is true for some parts of the world but it is not true in many others. People in parts of the world where there are strong community-based tenure regimes may enjoy tenure security without wishing to sell their land, or without having the right to do so, or having strictly limited rights to transfer (e.g., transfers may be limited to heirs through inheritance, or sales may be restricted to members of the community). This study investigated how land rights have been transferred between generations over time, and how this transfer has influenced food and livelihood security.

From the discussion above, this study hypothesized as follows:

H_0: *Intergenerational transfer of land rights has no significant influence on a household's food and livelihood security*

H_1: *Intergenerational transfer of land rights negatively influences food and livelihood security*

2.7.2 Gender Issues in the Transfer of Land Rights

Agricultural food production will continue to be a sector dominated by family and household units. Frequently, one of the reasons for misplaced land tenure policies is the failure to understand the complex nature of the kinds of social relations that characterize the "household" in any rural society. Policy interventions in land tenure can generate both positive and negative results. Policy based on accurate information and an appreciation of changing, dynamic contexts is much more likely to lead to the intended results. Denying large segments of rural society more equitable access to land and to the benefits of secure land tenure imposes unanticipated costs. This inequality can

be a major contributing factor to extreme poverty, dependence, social instability including conflicts and civil unrest, rural migration, land abandonment, and many other negative conditions. On the other hand, more equitable access to land and other assets can play a role in stimulating faster and broader-based economic growth.

In most societies, women have unequal access to and control over rural land and associated natural resources. Although both customary law and statutory law vary greatly in different parts of the world, women's individual rights in land and natural resources are generally weak or nonexistent. Women often traditionally gained access to land only through their husbands or through their male kin. Where traditional or customary modes of access are breaking down and are being replaced by market mechanisms, a variety of legal, administrative, and social norms block increased access to or control over land by women. Even where women are specifically intended to benefit from land registration and titling programs, their actual control over land resources, in many cases, remains weak (Schroeder, 1993; Lastarria-Cornhiel, 1995). Communities that currently experience land shortages or rapidly increasing land values may be unable or reluctant to prevent male relatives from claiming land over which females, particularly widowed or single women, have rights. However, in some cases, the males are the ones that lack security of tenure particularly where the women are considered the heirs. For example, Mbaya (2002) and Bosworth (1998) found that under matrilineal system of marriage, a man's rightful heirs are his sister's children in Malawi. In such cases, women's rights to customary land tend to be primary.

Notably, secure household rights may not in themselves improve food security. Household power dynamics often dictate decisions that can support or undermine food security. Studies demonstrate that when women enjoy secure rights to the land they cultivate, they gain improved status within the household, which leads to greater influence over allocation of household resources. Such influence is significant because across cultures, women are more likely than men to spend income on improving household welfare, including nutrition.

As uSaid explains in its Food Security and Gender Factsheet:

> "Women are responsible for nutrition in most homes, including the purchase and preparation of food. When given the opportunity to manage household finances, women are more likely than men to spend on their family's nutritional needs, healthcare, and school fees for children. Therefore, empowering women to increase access to and control over resources is critical to attainting food security in the developing world."

Further, the Fao and Asian development Bank recently concluded, "Gender equality . . . is the single most important determinant of food security." as evidence, gender inequalities are most severe in countries ranking highest on the global hunger index. This conclusion is based on a number of studies including a multi-country study over a 25-year period which found that 55 percent of the gains made against hunger during that period were attributable to improvements in women's situation within society.

NGOs are beginning to recognize the crucial link between women's access and rights to land and food security. For example, care's pathways to empowerment program are based "on the conviction that women farmers possess enormous potential to contribute to long-term food security for their families and substantially impact nutritional outcomes in sustainable ways." In Africa, care is implementing the program in Malawi, Tanzania, Mali, and Ghana using five strategic approaches.

One of those approaches is to foster women's collective access to and control over resources, particularly land, and build the capacity of women's producer groups. Secure property rights for women also bolster their economic opportunities more broadly. In Tanzania, women who reported holding strong property and inheritance rights were nearly three times more likely to be employed outside of the home and 3.8 times more likely to have higher gross earnings in comparison to women who reported weaker property and inheritance rights. In addition, women in communities with stronger property and inheritance rights were 1.35 times more likely to have individual savings. When combined with women's greater propensity to invest their incomes in food, nutrition and education, this bodes well for the health and opportunities of their children. This research investigated gender issues in the transfer of land rights and how they influence land size and use in the study area.

2.8 Factors Influencing the Size and Use of Household Land

Even though causes of land subdivision into smaller parcels may vary from country to country and from region to region, many authors tend to agree that the four main factors triggering this situation are inheritance, demographic characteristics such as age and household size, land markets, and historical/cultural perspectives. These factors also influence the land use. Ultimately, they determine the food and livelihood security of the rural population as demonstrated in the discussion below.

2.8.1 Culture Related to Land Inheritance

Inheritance is one of the most predominant methods of transmission of land rights in rural areas of Kenya. It is also considered a major cause of land subdivision. Inheritance laws applied in most countries facilitate or demand the subdivision of holdings into equal parts among all offspring or in some countries among sons only. This tradition has deep historical roots in old world countries' laws (such as the Napoleonic and Islamic inheritance laws) where the equal distribution of patrimony among heirs was a requirement (Bentley, 1987). As a result, land subdivision has become a continuous process with land holdings and land parcels getting smaller and smaller as they have been dispersed to successive generations. There is empirical evidence that inheritance is the prominent factor for land subdivision in many places such as in medieval England, Netherlands and Cyprus (Bentley, 1987). This strong relationship between inheritance and land subdivision has also been demonstrated in a Portuguese study (Silva, 1983).

The extent to which agricultural land is subdivided as a result of inheritance laws is primarily determined by the family size. Where population is increasing with no commensurate increase in

the cultivated area, farms may get smaller. This is especially the case where partible inheritance is practiced as opposed to primogeniture (whereby the eldest son inherits a whole piece of land without subdivision). In case of the latter, rapid population growth is not necessarily accompanied by the subdivision of farms. When small farms are continuously subdivided, they eventually get too small to provide livelihood, and so a quasi-landless population grows, or where primogeniture is practiced, the younger sons swell the population of the landless (Grigg, 1980).

Inheritance laws also influence land use. Notably, some cultures such as the one of the Gusii community encourage each heir to construct housing units on the inherited land even if they do not live in the area and only visit their rural home occasionally (Omosa, 1998). In such cases, the settlements might become a dominant land use because of inheritance laws. Besides, the size of the inherited parcel may dictate the type of land use especially in cases where certain crops are only suitable if grown on large farms.

This research investigated the extent to which inheritance is a cause of land subdivision in Kisii County. It also sought to find out how inheritance influences the land use in the study area. Additionally, the study explored the culture of the Gusii people that guides inheritance practices.

2.8.2 Demographic Characteristics

The demographic characteristics that influence land size and use as well as food security include age, gender, education, economic activity and household size as discussed below.

Age of household head

Age is an important parameter in social analysis since people of different age groups perform different sets of activities in most societies (Overholt *et al*., 1991). Additionally, age can be seen as a function of knowledge and experience as well as the measure of maturity of an individual. Babatunde et al., (2007a) study in Nigeria, noted that young and energetic household heads cultivated larger farms compared to older and weaker ones, they also sought and obtained off-farm jobs to improve their food security status. They further showed that the age of the head of household has an incidence on the level of food insecurity where expected incomes reduce as the household head gets older. On the contrary, Arene & Anyaeji (2010) observed that older household heads were more knowledgeable in farming activities and thus more food secure than the younger ones. Another perception is that the age of a household head does not have a significant influence on household food security (Nata, Mjelde, & Boadu, 2014). As such, the expected effects of age of household head on food security could be positive or negative. This study, therefore, assessed how the age of household head affects land size and use as well as food and livelihood security.

Gender and Household Food Security

Ncube and Kang'the (2015) reported that African women are the most susceptible to food insecurity because they are mostly denied equal opportunity in various spheres of life including

the job market and education. Accordingly, this study assessed how the variable affects food and livelihood security.

Education and Household

Education provides people with skills required to sustain and improve the quality of life. The level of education of the respondents is regarded as a determinant to household food security since it influences the ability of households to access information and employ technology, which ultimately influences household food security (Ayuk, 1997; Rahman, 2003). Kirimi, Gikunda, Obara, & Kibett (2013) also concluded that education enhances one's ability to adopt modern farming technology and access better economic opportunities. Accordingly, this study posits as follows:

H_0: Education level has no significant association with food and livelihood security

$H_{1:}$ Education level is positively correlated with food and livelihood security

Off-Farm Activity

Off-farm activity is additional work engaged in by household aside farming to supplement household income. Off-farm activity can influence household food security positively or negatively depending on the level and gains from the activity (Babatunde et al., 2007). On one hand, engagement in an activity can generate income thereby enhancing the food security situation of the household. On the other hand, if farmers spend more of their time on off-farm activities at the expense of working on their farm and particularly if the wage they earn does not commensurate with the foregone farm income, their food security situation could be worsened. The expected effect of this variable on food security could be positive or negative.

Population Growth and Household Size

There are two main assumptions regarding the direction and outcome, in the relationship between population growth and land use. One school of thought (Malthusian) argues that population growth will translate into an agricultural crisis, evidenced by land subdivision, environmental deterioration, famine and general poverty (Garnett & Godfray, 2012). However, an alternative school of thought (Boserupian) suggests that population increase will stimulate agricultural growth through the intensification of agriculture, leading to improvements in food availability and general economic development (Garnett & Godfray, 2012). A more balanced approach to the understanding the variables above is that the outcome of the relationship between population growth and food production is not linear. It is dependent on the social structure, mainly the policies governing the allocation and distribution of resources and the level of technological applications (Garnett & Godfray, 2012). As such, the relationship between population growth and food production is conceptualized as one that is mediated by social, political, and economic processes.

Linked closely to population growth is household size because an increase in family members translates to a general rise of the population. Literature provides conflicting results on the

relationship between household size and household food insecurity. On one hand, Mitiku et al. (2012) are of the view that there is surplus labour in developing countries hence the marginal productivity of labour is zero thus making a small household better-off than a bigger one. On the other hand, Muche et al. (2014) asserts that production increases with labour supply implying that bigger households produce higher yields.

To this end, the study posits as follows:

H_0: *There is no significant relationship between household size and food security*

H_1: *Household size is negatively correlated with food security*

2.8.3 Technology and Innovation

According to Agustina (2008), pre-industrial peasant societies increased output through expansion of cultivated area, increasing the frequency of cropping initially through reduced fallow periods and later on, through multiple cropping. However, modern agriculture embraced a shift to higher yielding crops, increasing labor inputs, technological advancement, division of labor and regional specialization, domestic industry, and seasonal migration. Therefore, this study sought to determine how technological advancements and innovations affect food and livelihood security.

2.8.4 Market Forces

Since land is a multi-purpose resource, land markets play an important role in the whole process of ownership restructuring because people wish to acquire a piece of land not only for agricultural activities, but also for other reasons such as investments, enhancing personal prestige and status, and having secure current and future living conditions for the family. Agustina (2008), notes that acquiring land is among the most important aims of many people in different societies all over the world.

In relation to land size, land markets contribute to further subdivision of the existing holdings since, in most cases, farmers purchase land which is not continuous to their existing holdings or they (or other people) may buy pieces of land as shares in other parcels. However, in some cases, land purchase may reduce subdivision and subdivision when farmers acquire neighborhood pieces of land to expand their holdings.

Land markets also influence land use. In particular, people tend to use parcels with high land values for commercial units or settlements as opposed to farming. This phenomenon of converting agricultural land to other uses is especially predominant in rural areas that are close to urban centres.

Market forces also determine what crops farmers grow. In pre-industrial Europe, farmers grew

more cereals and small vegetables (Grigg, 1980). Later, they shifted to crops such as potatoes and maize, until then grown only as livestock feed. This shift in land use was because maize and potatoes had the advantage of higher yields (Agustina, 2008). Farmers are also influenced by market demand. A study on the sweet potato potential in Kenya found that the root crop was neglected in spite of its being highly ecologically adaptive because it lacked market demand (Omosa, 1994). Therefore, market forces can influence land use by placing a higher demand on certain agricultural products. This research sought to find out whether land markets are a cause of land subdivision and diminishing agricultural use in the study area.

2.8.5 Historical and Cultural Perspectives

Historical and cultural perspectives, which prevailed in old communities (such as in Europe), were inevitably the cause of land subdivision. Some authors consider that the current problem of land subdivision is a result of the historical legacy of an ancient field structure. In those times, land subdivision was adaptive to the prevailing conditions, such as keeping small fields for acquiring a family's subsistence, manual or animal cultivation, cheap labor, and small production. However, these conditions are not well suited to current modern agricultural mechanization demands. Accordingly, this study sought to find out whether land subdivision in the study area is influenced by historical and cultural perspectives.

2.8.6 External Factors Influencing Land Use

The pattern of land use and land cover is attributed to complex interactions between the biophysical environment and societal (economic, social, political, and technological) processes at local, regional and global scale (Agustina, 2008). In Senegal, the principal determinant of agriculture land use is climate (Wood, Tappana, & Hadj, 2004). Water factor, soil condition, and government policy were also found to influence land use changes in Ethiopia (Amsalu, Stroosnijder, & Graaff, 2007). In China, urbanization, industrialization, and economic measures were the socio-economic drivers of land use/land cover change (Long, Tang, Li, & Heilig, 2007). Furthermore, externalities related to global change are also becoming a constraint to sustainable land management (Agustina, 2008). The symptoms of the problem of pressure on land resources are manifested both in terms of impacts on people, and in the deterioration of land or other natural resources (Agustina, 2008). Although this study took note of external factors that influence land use such as climate (temperatures, altitude, rainfall availability and reliability, and wind) and topographical features (soils, slope, and elevation), more emphasis was placed on aspects that can be controlled at the household level and through land use policies.

2.9 Policy Interventions for Sustainable Household Food and Livelihood Security

2.9.1 Policies to Control Land Subdivision

Once a Government assesses that land subdivision constitutes a problem for rational agricultural development, there are three strategies to be followed. The first strategy is to promote legislation regarding aspects that affect land subdivision so as to prevent a worsening of the problem. In

particular, legal provisions, most of which are restrictions, involve changing legislation regarding inheritance, minimum size of parcel division, absentee landowners, prevention of transfer to non-farmers, leasing, and imposing a maximum limit on the size of a holding (Demetriou, Stillwell, & See, 2013). Some of these legal restrictions could be considered as non-democratic and unconstitutional in certain countries.

The second strategy is to apply specific land management approaches to tackle certain problems in particular agricultural areas. The main land management approaches used to battle land subdivision in agriculture include land consolidation; land funds and land banking; voluntary parcel exchange; and cooperative farming (Demetriou, Stillwell, & See, 2013). Notably, land consolidation is the prominent land management measure applied as a solution to land subdivision that involves the reorganization of space by reconfiguring the land tenure structure in terms of parcels and landowners and the provision of appropriate infrastructure according to the aims of a scheme (Demetriou, Stillwell, & See, 2013). As a result, production and hence the income of farmers are increased.

Land funds and land banking is the process when a landowner is not interested in extending his landholding but in distributing it to other established farms (Demetriou, Stillwell, & See, 2013). Thus, in such a case, his land may be used as a land buffer. More specifically, a land buffer is available for the improvement of other farms and the construction of agricultural infrastructure such as roads, irrigation and drainage systems (Demetriou, Stillwell, & See, 2013). The land buffer itself is a land fund which can be used as an agricultural policy tool, and its use is referred to as land banking. Land funds and land banking have mainly been used in Western Central European countries such as Germany and the Netherlands (Demetriou, Stillwell, & See, 2013).

Voluntary parcel exchange involves the exchange of parcels among three or more landowners resulting in a more efficient spatial layout since the aim is to group adjacent parcels of each landowner (Demetriou, Stillwell, & See, 2013). Some Western European countries such as Germany and the Netherlands have used this measure for a long time (Demetriou, Stillwell, & See, 2013). Cooperative farming involves the joint cultivation of land by a group of households. It was considered by some Asian countries such as India and Nepal until 1970 as an effective solution to land subdivision, through the creation of economically operational farm units (Demetriou, Stillwell, & See, 2013). However, according to Niroula and Thapa (2007), the practical experience has shown negative results, mainly because of the reluctance of landowners to participate in these programmes. Reluctance is due to conflicting interests and perceptions among landowners and the fear of losing their rights. As a result, the whole attempt has collapsed.

The third strategy is to apply specific land protection policies/programmes to prevent agricultural land from being developed for housing or commercial use. This strategy has been applied in the United States in regions/zones where there is a mixed land use (agricultural and housing). In particular, these policies, such as a purchase of development rights (PDR) programme; a

clustering programme; and a transfer of development rights (TDR) programme, aim to prevent agricultural land subdivision because of urban sprawl (Demetriou, Stillwell, & See, 2013). The PDR programme involves the use of public funds for purchasing and funding to eliminate the development rights on agricultural land (Demetriou, Stillwell, & See, 2013). It is a farmland conservation tool which is considered very effective, is fair to landowners and provides a permanent solution (Demetriou, Stillwell, & See, 2013). The most common disadvantage is its high cost of implementation.

A TDR programme, which is applied at a regional scale, concerns a specific area to be protected from development (the sending area) and an area where development will be allowed to occur (the receiving area). The programme involves the transfer of the development rights of a parcel located in the sending area to another parcel of the receiving area (Demetriou, Stillwell, & See, 2013). This program, which is mandatory, is considered to be the most aggressive in terms of preserving farmland. In contrast to the PDR and TDR policies, which refer to a regional scale, cluster development programs focus on development on a site by site basis. Cluster programs work with the zoning density, reducing minimum parcel sizes and ensuring that a part of the site remains as open space (Demetriou, Stillwell, & See, 2013). Despite this strategy being popular among various communities, it is not regarded as a very effective tool to protect agricultural land bases. A study carried out by Brabec and Smith (2005) showed that TDR and PDR programs are the most successful in terms of the total area of land protected. The clustering program proved unable to achieve the protection of a large amount of land. On the other hand, TDR and PDR programs have achieved better results regarding an increase in the size and the continuity of parcels than the clustering program.

An important point emphasized by Van Dijk (2003) is the fact that any land policy applied in one country may not be useful in another country. Thus, a Government, before considering the adoption of a land policy, should be aware of the prevailing conditions and circumstances of its country; otherwise many problems can arise and failure will be inevitable. This study assessed the strategies discussed above to determine the most suitable for sustainable household food and livelihood security in the area of interest.

2.9.2 Policy Implications of Land Tenure and Food Security

At a minimum, the policy implications of incorporating both tenure rights and food security into the same analysis are that policy in both areas should grant greater recognition of the other. This recognition means that tenure policy should not be based on the presumption that increased production of food (however laudable an objective) will necessarily lead to increased access to food. Similarly, food policy, particularly in predominantly agrarian economies, should not be based on the presumption that land is simply a static endowment, a resource to be allocated. Land and natural resources are gained, lost, and fought over, and tenure rules define much of the battleground on which such conflicts occur.

Policy implications go much beyond mere addition of another variable for policymakers to

consider. A better understanding of food and livelihood security imperatives can improve the quality of land policy analysis. For example, one of the major concerns of tenure policy currently is natural resource conservation. A good understanding of livelihood objectives and strategies in a community within or adjacent to land or natural resources reserved for conservation purposes will inform policymakers of possible alternatives for protecting and preserving resources *with* local populations, not *from* local populations. Similar understanding can help in the design of policies to reduce the degradation of privately owned agricultural lands as well. As Chambers (1988, p. 3) notes:

> Secure tenure and rights to resources and adequate livelihoods are prerequisites for good husbandry and sustainable management. Moreover, sustainable livelihood security is a precondition for a stable human population in the long term; for only when livelihoods are secure does it become rational for poor people to limit family size. Enabling poor people to gain secure and sustainable livelihoods in resource-poor and forest areas is, thus, the surest protection for the environment.

In a similar way, improved understanding of the impact of both evolutionary and statutory changes in tenure rules governing control over and access to land and natural resources will inform food policy. For example, understanding of those households and individuals who may periodically be forced to choose between reduced consumption and asset depletion or degradation, as well as of the circumstances in which they are forced to make such a choice, may help policymakers anticipate and thus mitigate food security crises before they emerge. Understanding of the dynamic interaction between access to land and access to food may also provide food policymakers with a wider menu of tools with which to address food-related problems. First, improved access to credit markets, both for production capital as well as for consumption smoothing, offers the potential to allow poorer households and individuals to participate in higher-return income-generating activities previously restricted to wealthier households which are better able to withstand the associated risks. Second, access to credit in distress situations would also offer food-insecure households a way out of the choice between reduced consumption and asset depletion. Third, tenure policy may be adapted to fit more optimally with dominant livelihood strategies in risky environments.

Land tenure systems are defined by societies. Within such systems, rights in land are identified that, among others, to determine access to specific uses of a certain piece of land and the distribution of the benefits that accrue from these (Groppo, 2003). Although there is wide recognition regarding the importance of land policy in agrarian development, there is no clear and universally applicable blueprint as to what is an appropriate land policy. This lack of a blue print is partly because the efficacy of land policy in encouraging agricultural development depends on socio-cultural and geographical variables that significantly differ from country to country and region to region. Despite such differences, however, using established theories, behavioural assumptions regarding economic agents and drawing on experience from other countries, researchers have tried to define certain basic principles and thereby achieve a land policy that will generate a higher

level of productivity in agriculture, while also maintaining considerations of equity (Nega et al, 2003). The 1975 World Bank Land Policy paper (World Bank, 1975; cited by Nega et al, 2003) shows that the following three basic principles should be considered in informing any land policy. At that time, the World Bank believed that (a) owner-operated family farms were efficient and thus desirable, (b) there should be freely operating land markets to permit land transfers to more efficient and productive users, and (c) there was a need for a more equitable distribution of assets (Deninger & Binswanger, 1999; Nega et al., 2003). These principles are still considered to be largely valid. However, based on experience from various countries that have subsequently implemented land reforms, a number of amendments were made to this position including: (a) a recognition, under certain circumstances, that communal tenure could be a cost-effective mechanism for land allocation compared with formal titling; and (b) that formal titling, when desirable, should be evaluated in terms of both its potential efficiency benefits and its implications for equity and the significance of expanded land rental markets on productivity and agrarian developments in general (B. Nega et al., 2003).

Property rights in land need to have a time horizon long enough to provide investment incentives and to be defined in a way that makes them easy to identify, enforce and exchange. They need to be administered and enforced by institutions that are accessible and accountable and have both legal backing and social legitimacy. Even if property rights in land are assigned to a group, the rights and duties of individuals within this group, and the way in which these rights can be modified and will be enforced, have to be clear. Finally, as the physical and/or legal precision with which property rights are defined will generally increase in line with rising resource values, the institutions administering property rights need to be flexible enough to evolve over time in response to changing requirements (Groppo, 2003). This study sought to explore and recommend appropriate policy interventions in relation to land tenure issues that would ensure sustainable food and livelihoods as well as environment conservation in the study area. The recommendations took into consideration the basic principles identified in the discussion above.

2.9.3 Policy Implications of Livelihood Security Strategies

Studies on livelihood strategies offer varied recommendations. Much of the literature that stresses the importance of livelihood security is conducted in climatically risky and famine-prone areas, particularly in South Asia and sub-Saharan Africa. The studies often analyze the way in which people organize production and consumption under vulnerable circumstances. The more conventional economic development literature tends to be focused on the commercialization of agriculture in productive and less risky areas.

The commercialization of subsistence agriculture has long been one of the mainstays of orthodox economic development policy (Mellor, 1976). Underlying this policy is the theory of the comparative advantage of specialization. Studies of evolutionary change in land tenure institutions note that commercialization of agriculture constitutes one of the major driving forces behind

privatization and individualization of rights in land (Boserup, 1981; Barrows & Roth, 1990; Troutt, 1994). However, while the link between land tenure and commercialization of agriculture was widely accepted, questions arose about the impact of commercialization on food consumption and nutritional status, particularly in the wake of the introduction of green revolution technology. Notably, the "cash-crop hypothesis" suggested a negative link between commercialization of agriculture and nutritional status. In particular, the hypothesis states that an increase in cash leads to a decline in subsistence food at the household level and hence increased market vulnerability and food insecurity (Dewey, 1980; Eicher & Baker, 1982). A study, reflecting over a decade's research on this question in a variety of locations, largely refuted this hypothesis (von Braun & Kennedy, 1994). The study concluded that "integration of traditional smallholder agriculture into the exchange economy is part of a successful development strategy," and suggested that "the developing world cannot afford the inefficiencies of resource allocation, especially of human and land resources, that subsistence agriculture entails…"(von Braun & Kennedy, 1994 pp. 365, 366). The overall policy recommendation of von Braun and Kennedy (1994) is that commercialization of agriculture (specialization toward comparative advantage at the farm or household level) should be supported, and that land policy, particularly land tenure, is one of the crucial elements of support to agricultural commercialization, provided that the tenure systems grant land rights to women.

Von Braun and Kennedy (1994) do not specifically advocate privatization of landholdings as the preferred strategy. One of the case studies included in their research in fact notes that, under certain circumstances, the introduction of cash cropping increased landlessness (Bouis & Haddad, 1990). However, the World Bank makes it clear that the combination of commercialized production, the liberalization of markets, and the privatization of land rights are the three primary pillars of its agricultural development policies in the 1990 (World Bank, 1994; World Bank, 1993). While analysis of the commercialization of subsistence agriculture is usually not a topic of research in much of the rest of the livelihood security literature, it is certainly one of the livelihood options that has received a great deal of attention from economic planners and, together with policies aimed at the privatization of land holdings, can be characterized as the most common livelihood strategy that links land tenure to improved welfare, greater food security included.

Notably, the terms "livelihood strategies" and "coping strategies" have been defined in many different ways, but recent conceptual work helps to categorize these usages. Davies (1993) notes the difference between coping strategies (dealing with short-term insufficiency) and adaptive strategies (adjusting to longer-term changes in the physical or economic environment through changes in production or income generation). This study assessed the viability of the livelihood strategies discussed above (commercialized production, the liberalization of markets, and the privatization of land rights) for the area of study.

2.9.4 Policy Disincentives

Food deficit countries are generally considered to have unsuitable policies that give rise to conditions such as unplanned population growth, low technological applications, inefficient institutions, and underutilized resources (Omosa, 1998). These conditions are presumed to render such countries food insecure. Notably, modernization theories argue that the hungry are short of food because of their refusal to embrace commercial values (Omosa, 1998). Whenever commercialization is reported to have taken place without a corresponding improvement of the food security situation, the blame often shifts to the institutions responsible for policy implementation. In particular, the institutions are considered to be inefficient and tied to peasant rationality that does not acknowledge the scope and scale of commercial transactions (Omosa, 1998). As such, unsuitable policies and inefficient institutions are to a large extent responsible for the marginalization of smallholder economies and subsequent food insecurity. Affected countries are then urged to re-orient their economies by investing in resource mobilization, re-focusing on how these resources are utilized, liberalizing trade, and undertaking institutional reforms (Green & Faber 1994, p.4). In addition to eliminating free or subsidized services and control of public enterprises, these governments are compelled to promote tradable commodities. The latter recommendation is seen as only possible if countries forgo policies which engender subsistence production so as to specialize in export crops where they supposedly enjoy a comparative advantage (Braun et al., 1993; World Bank, 1994).

In Kenya, the Structural Adjustment Programs (SAPs) were first introduced in the 1980s (Omosa, 1998). In the agricultural sector, major policy reforms have included liberalization of markets both for farm produce and inputs, withdrawal of subsidies on these inputs, including extension services, the privatization of parastatals, and subdivision of State farms. These reforms are premised on the assumption that liberalization will give way to efficacy which will then result in adequate food, among other benefits. At the household level, the assumption is that production for the market will bring about food surpluses, and for households that enjoy better returns in alternative resource use, incomes earned will enable them acquire staple food on the market (Omosa, 1998). The overriding assumption, therefore, is that market-oriented policies lead to enlarged opportunities. The question however is whether these reforms alone are capable of promoting access to food at the rural household level.

Contrary to the commonly held views discussed above, high dependence on agricultural export commodities (at the expense of food production) can result in undesirable vulnerability to the external shocks and stress imposed by the vagaries of international market. Adedeji (1988) notes that rather than making poor people less vulnerable, SAPs are achieving the reverse. The reforms are resulted in reduced standards of living due to high commodity prices following reductions or total elimination of government subsidies. Therefore, while reforms such as market liberalization may result in economic growth, it could also lead to further marginalization of the poor and collapse the peoples' food and livelihood strategies.

Furthermore, whereas modernization of the production process assumed a central place in the agricultural policies of many governments including Kenya, and a substantial amount of resources continue to be directed in pursuit of this goal, the breakthrough in agricultural innovation and, in particular, the discovery of Green Revolution technologies has not led to the realization of 'food for all' (Omosa, 1998). One of the main disappointments is that modernization has not been embraced in totality and hunger continues to abound (Omosa, 1998). In addition, even where there is evidence of positive outcomes, food insecurity is still widespread. The persistence of food insecurity in spite of agricultural modernization poses n a direct challenge to technology as the overriding answer to entitlement failure (Omosa, 1998). Therefore, while there may be hope on the food production front, there is also despair in terms of the absolute number of food insecure people.

Pre-occupation with the functioning of the production process is based on the assumption that once supply is assured (through commercial farming), food security will ensue. This, however, fails in several ways. By concentrating on supply versus decline, advocates of commercialization of agriculture fail to give attention to the difference between food supply and ability to access this food (Omosa, 1998). As rightly argued by Sen, by concentrating on the question of numbers, the Food Availability Decline (FAD) and associated approaches to food security have overlooked the reality, primarily; who can command the food that there is and how much of it. As such, the supply-demand configuration arising from modernization approach does not explain how food insecurity can develop even in situations where there is no decline in food availability, nor does this approach explain why some groups have to starve while others can feed themselves, and what allows one group rather than another to get hold of the food that exists (Omosa, 1998). Furthermore, whereas the policy orientations of most developing countries may account for their poor food security status, it does not explain fully why commodity relations have not given way to desired results. For instance, food surpluses have not automatically ensued even within 'modernized' enterprises, nor has movement into industry reduced the number of people that are possibly dependent directly on subsistence production for their food needs (Omosa, 1998). Besides, markets have not entirely increased opportunities. Accordingly, this research considered the failures of past policies to avoid recommending strategies that would duplicate the inefficiencies.

2.10 Policy, Legislative, and Institutional Frameworks Relating to the Management of Agricultural Land in Kenya

Policies and laws determine directly and indirectly the size and use of land and thus influence household food and livelihood security. This section will explore the policies and laws that have influenced the management and administration of land in Kenya since 1954.

2.10.1 Policy Context of the Study

The Swynnerton Plan of 1954

The Swynnerton plan was a colonial agricultural policy used to restructure land ownership in African areas. The policy provided for progressive African farmers to grow cash crops. Although the Swynnerton Plan recommended that 'the people must not put all their eggs in one basket because it may crack on the rocks of depression, pests and diseases, or on their own apathy, or general inability to cope with a difficult crop,' mixed farming was seen as only necessary until such a time that the people attained sufficient returns from cash crops (Swynnerton, 1953, p.13). The plan also led to the adoption of European-like land tenure systems where permanent land ownership was conferred to the indigenous Africans. In advocating these changes, the Swynnerton Plan argued that 'sound agricultural development was dependent upon a system of land tenure which would make available to the African farmer a unit of land and a system of farming whose production would support his family at a level, taking into account perquisites derived from the farm, comparable with other occupations. An indefeasible title would then encourage the farmer to invest his labour and profits into the development of his farm and this would enable him to offer the title as security against financial credit" (Swynneton, 1953, p.9). Furthermore, the Plan promoted agricultural production through provision of infrastructure and inputs in the areas considered to be of high agricultural potential. The major failure of the Plan was the neglect and marginalization of Arid and Semi-arid areas (ASAL) which led to imbalances in development between different regions. The plan is relevant to this study because it highlights the need to investigate how agricultural land use influences food and livelihood security, especially by assessing the profitability of cash crops in comparison to food crops. In particular, this study assessed how tea farming influences food and livelihood security in comparison to maize production in Bogeche sub location, Kisii County. The study also investigated how land tenure affects food security in the study area.

The Development and Use of Land (Planning) Regulations of 1961

The regulations named above were a subsidiary legislation of the Land Planning Act Cap 303. The purpose of the Act was to make provision for planning the use and development of land. It required that planning applications need to have regard to health amenities and convenience of the community, generally and the proper planning and density of development and use of land in the area. The regulations were used in guiding land subdivision in former European farming areas, and land use along major trunk roads and in the peri-urban areas. It also created a Central Authority to guide use and development of land. This study sampled some of the former European farming areas to determine the current status and future options in relation to land size and use.

Sessional Paper No. 10 of 1965

Sessional Paper No. 10 of 1965 is famous for the concept of African Socialism. It defines African Socialism as a term describing a political and economic system that is positively African; one that is not imported from any country nor is it a blueprint of any foreign ideology but capable of

incorporating useful and compatible techniques from whatever source. The principal conditions that this system must satisfy are that, it must draw on the best of African traditions; it must be adaptable to new and rapidly changing circumstances; and it must not rest for its success on a satellite relationship with any other country or group of countries (Kenya SP No. 10 1965, p.2-3). Sessional Paper No. 10 highlights the importance of developing policies that recognize the African culture as opposed to borrowing practices of foreign countries. As such, this study sought to understand the local context and propose policy recommendations that are applicable to the rural population of Kisii County.

Sessional Paper No. 4 of 1981

Sessional Paper No. 4 of 1981 on National Food Policy (the first official attempt to directly address Kenya's food security), argues that intensified production is necessary so as to enable the country maintain a position of broad self-sufficiency in the main foodstuffs without using scarce foreign exchange on food imports, to achieve a calculated degree of security of food supply for each area of the country, and to ensure that these foodstuffs are distributed in such a manner that every member of the population has a nutritionally adequate diet (Kenya SP No. 4 1981, p.2; SP No.2 1994, p.4).

Therefore, at the policy level, food security is equated with national self-sufficiency. This seems to echo the strategy that was adopted at independence in 1963, when it was argued that food self-sufficiency was a prerequisite to self-reliance, a development paradigm that was adopted by most African governments upon re-gaining self-rule. At the time, Kenya's food security was viewed in terms of bringing more land under cultivation, and this was seen as dependent on the availability of labor. It was hence envisioned that:

> 'if every person on the land cultivated one extra row, the output of the nation would be substantially larger. If people who are unemployed in cities would return to their land, further increases in output could be achieved. Idleness, whether of land or labor cannot be countenanced in a nation that needs every ear of maize, grain of wheat and pound of cotton-self-reliance and independence mean the ability and willingness to do things for ourselves' (Kenya SP No. 1 1965, p.24)

One of the major goals was to enable households to gain access to the main factors of production, mainly land. Access to land was planned to be achieved through redistribution and resettling of the displaced and affirming ownership in the former 'African Reserves.' Although this land tenure system was a reversal of colonial policy, to the extent that it aimed at making land available and without setting a minimum size, it borrowed a lot from what had been proposed by the colonial government. The privatization of land meant that access was hence restricted and, much as the policy position qualified this by allotting some share of responsibility to society, this was never to be. Privatization has continued to safeguard the interests of individuals in Kenya to date.

Although the settlement program at independence had important psychological effects, over time, the performance of the agricultural sector and food production in particular was found not to depend on access to land alone. The government, therefore, urged that such access be complemented with the necessary discipline and sacrifice that goes with hard work. Prosperity was perceived to anchor around land development and its doors were described as open to only those who prefer to work hard and regularly and also follow the advice of government officers' (Kenya SP No. 1 of 1965).

The call to work hard and take government advice into consideration were necessitated by an emerging fear that the period of transformation would impact negatively on agricultural production. The transformation entailed moving from large to small scale production. Notably, a substantial number of African farmers were assumed to have begun their operations with little previous experience in producing for the market. They also had insufficient working capital to run the farms at a high level of production. In addition, despite having acquired some parts of the former white highlands, government realized that Kenya's greatest but untapped potential lay among smallholders, and most of them inhabited the former non-scheduled areas. There was, therefore, an attempt to aim at projects and program that were assumed to create, enhance and sustain the potential to make food available.

In conclusion, the policy highlights the importance of food security; terming it as a prerequisite for a nation's self reliance. It also recognizes that smallholder farmers have a considerable influence on Kenya's economy. In addition, the policy points out that access to land alone cannot enhance food security without agricultural intensification and efficient utilization of labor. This study therefore, took into account how other variables besides access to land impact household food and livelihood security. Agricultural intensification and utilization of labor are among the additional variables that were considered.

The Kenya Vision 2030

Kenya Vision 2030 is the country's development blueprint covering the period 2008 to 2030. It aims at making Kenya a globally competitive and prosperous country with a high quality of life by 2030, that is a newly industrializing, "middle income country providing high quality life for all its citizens by the year 2030" by improving economic, social and political pillars. Vision 2030 has identified agriculture as one of the key sectors to deliver the 10 per cent annual economic growth rate envisaged under the economic pillar. This goal will be achieved through efficient use of resources, tracking of land use pattern, raising human resource productivity to international levels, transforming key institutions in agriculture to promote household and private sector agricultural growth, improving yields in key crops, increasing small holder specialization in the cash crop sector to at least 2-3 key crops per plot and increasing productivity of crops and livestock. Other strategies will include introducing of new land use policies through better utilization of high

and medium potential lands by farmers. One of the agriculture flagship project is developing an agriculture land use master plan while the environment flagship project is mapping land use pattern in Kenya. This study assessed the current situation such as the overall productivity level of the different farm enterprises, and the land size that is being utilized, and proposed better ways of utilizing the rural land resources.

Sustainable Development Goals

Sustainable Development Goal number two aims to end hunger, achieve food security, improve nutrition and promote sustainable agriculture. According to the SDG review report of 2017, efforts to combat hunger and malnutrition have advanced significantly since 2000. The report highlighted that ending food insecurity will require continued and focused efforts, especially in Asia and Africa. More investments in agriculture, including government spending and aid are needed to increase capacity for agricultural productivity. This study will generate information that will be useful for guiding investments in revolutionizing agricultural productivity in rural Kenya. The information includes optimal land sizes to sustain households in the mixed farming system, the land uses and practices that are positively correlated to food, nutrition and livelihood security, the land tenure transmission rights procedures that can lead to sustainable management of land resources, and settlement patterns that enhance efficient land utilization.

Science, Technology and Innovation Strategy of Africa (STISA 2024)

According to the African Union (2014), continued food insecurity directly affects 239 million Africans, with 30% to 40% of children under the edge of 5 years continuing to suffer from chronic under-nutrition at a critical stage for both survival and cognitive and physical development. To alleviate poverty and spur social and economic transformation on the continent, the African Union (AU) has put emphasis on the development of the rural economy and agriculture through instruments such as the Comprehensive Africa Agriculture Development Program (CAADP). In January 2013, the Heads of State and Government of AU, together with representatives of international organizations, civil society organizations, private sector, cooperatives, farmers, youths, academia and other partners, unanimously adopted a declaration to end hunger in Africa by 2025. As part of the strategy to end hunger, the AU has formulated the Science, Technology and Innovation Strategy of Africa (STISA, 2024) which has six priority areas of intervention. The aim of this study is to generate information that is useful for promoting food and nutrition security. This study is, therefore, beneficial towards the realization of priority area No.1 which is eradication of hunger and achieving food security.

The Agricultural Sector Development Strategy (ASDS) 2010–2020

The Agricultural Sector Development Strategy (ASDS) is the overall national policy document for the sector ministries and all stakeholders in Kenya. It is a revision of the Strategy for Revitalizing Agriculture (SRA). Agriculture is noted to be inevitably the key to food security and poverty reduction and overall development and growth of the sector is anchored in

two strategic thrusts: increasing productivity and developing and managing key factors of production.

ASDS acknowledges that land is the most important resource in agricultural production. As such, limited availability of productive land is a major constraint to increased agricultural production. The strategy further highlights a lack of coherent land use policy that has led to uneconomic land subdivisions and poor land-use practices. This study aims to generate information that will help Kenya to achieve her vision of a food-secure and prosperous nation as envisaged by ASDS.

National Food Security and Nutrition Policy (NFSNP)

NFSNP identifies food security as a basic human right. To achieve food and nutrition security, NFSNP sets the overall goal as being to ensure that all Kenyans throughout their lifecycle enjoy at all times safe food in sufficient quantity and quality to satisfy their nutritional needs for optimal health through sustainable domestic production increases for diversified & affordable food that meet basic nutrition requirements. To meet this goal, Kenya has to increase her agricultural production. Land, being a limited resource and most important factor of production, needs to be protected in fertile agricultural areas. This study aims to propose effective land management practices that will ensure the basic human right is met.

The Millennium Development Goals (MDGs)

The Millennium Development Goals (MDGs) are eight international development goals that all 193 United Nations member states (including Kenya) and at least 23 international organizations agreed to achieve by the year 2015. They include: Goal 1: Eradicate extreme poverty and hunger; Goal 2: Achieve universal primary education ; Goal 3: Promote gender equality and empower women; Goal 4: Reduce child mortality rates; Goal 5: Improve maternal health; Goal 6: Combat HIV/AIDS, malaria, and other diseases; Goal 7: Ensure environmental sustainability and Goal 8: Develop a global partnership for development (United Nations Development Program, 2000). These goals are interconnected (International Land Coalition, 2000). Therefore, for Kenya to achieve the MDGs especially the first goal on eradication of poverty and hunger, efficiency in the management of land is required. This study sought to help the country meet goal 1 of the MDGs.

National Land Policy

Since independence until 2010 when a National Land Policy was formulated, Kenya had been without a clearly defined or codified National Land Policy. This lack of an overall policy for a long time, together with the existence of many land laws, some of which are incompatible, has resulted in a complex land management and administration system. From the advent of colonialism, Kenya has been grappling with the land question, which subsequent government regimes have been unable to or are unwilling to solve. These land issues have resulted in environmental, social, economic, and political problems including deterioration in land quality,

squatting and landlessness, disinheritance of some groups and individuals, urban squalor, under-utilization and abandonment of agricultural land, tenure insecurity, and conflict. To address these problems, the Government of Kenya formulated a National Land Policy in 2010 with the aim of guiding the country towards a sustainable and equitable use of land.

The policy, therefore, provides broad principles and guidelines on land use management issues recommending the formulation of a National Land Use Policy. Furthermore, the policy recognizes that use of land in urban and rural areas has been a major concern to all Kenyans. Some of the key problems that need to be resolved at land use policy level as noted by National Land Policy include emergence of land use conflicts as a result of competing land uses, uncontrolled subdivision of agricultural land particularly in the high potential areas of the small farm sector, low land productivity, deterioration in land quality as a result of poor land use practices, indiscriminate sale and purchase of land, lack of alternative land uses and planning for diversification of the rural economy and unmitigated urban sprawl. Other problems include unproductive and speculative land holding especially, by the elite; and uncontrolled development and a general disregard for planning regulations, among others. In addition, problems of unsustainable production, inadequate land use planning, and poor environmental management. These problems emphasize further the fact that Kenya does not have effective land use management and planning tools. This study aimed to generate information that will be useful in the formulation of a sound National Land Use Policy.

2.10.2 Legal Context of the Study

The Constitution of Kenya (2010)

The Constitution of Kenya is the supreme law of the Republic and binds all persons and all State organs at both levels of government. The Constitution under Article 43 (1) (c) recognizes food as a human right. In addition, chapter 5 on Land and Environment recognizes the need for the land to be held, used and managed in a manner that is equitable, efficient, productive and sustainable, aimed at sustainable and productive management of land resources. Specifically, article 66 gives the State power to regulate the use of any land, or any interest in or right over any land, in the interest of defense, public safety, public order, public morality, public health, or land use planning. Parliament is mandated to enact legislation ensuring that investments in property benefit local communities and their economies. Article 67 establishes the National Land Commission and its mandate include having oversight responsibilities over land use planning throughout the country among other functions. Article 68 gives parliament power to revise, consolidate and rationalize existing land laws; revise sectoral land use laws and enact legislation to prescribe minimum and maximum land holding acreages in respect of private land and regulate the manner in which land may be converted from one category to another. Therefore, this study's overall objective of determining appropriate land size and use for household food security is anchored in the Constitution.

The Land Act, 2012

The Land Act of 2012 gives effect to Article 68 of the Constitution, to revise, consolidate and rationalize land laws; to provide for the sustainable administration and management of land and land-based resources and for connected purposes. This Act repealed The Way leaves Act, chapter 292 and The Land Acquisition Act, chapter 295. The guiding values and principles of land management and administration are provided in article 4 and include sustainable and productive management of land resources, transparency, participation, accountability, democracy and inclusiveness of the people in decision making process, among others. This provision, if implemented, would ensure effective and meaningful public participation in land use decision-making: a vital component to ensure sustainability in agricultural land conversions. The National Land Commission, under article 8(d), may require certain public land to be used for specific purposes. Article 159 gives Cabinet Secretary the mandate to commission a scientific study to determine minimum and maximum acreages of private land for various land zones in the country. These provisions may help in guiding land institutions to make sustainable land use conversion decisions. This study thus sought to generate information that can be used by the Land Commission as to determine the minimum farm sizes that can be agriculturally sustainable as provided for in the Land Act.

The Land Registration Act, 2012

The Land Registration Act enables the government to revise, consolidate and rationalize the registration of titles to land, to give effect to the principles and objects of devolved government in land registration and for connected purposes. This Act repealed the following Acts of Parliament; The Indian Transfer of Property Act of 1882, The Government Lands Act, chapter 280, The Registration of Titles Act, chapter 281, the Land Titles Act, chapter 282 and The Registered Land Act, chapter 300, laws of Kenya. Article 94 allows partition/sub-division of land among tenants in common. However, article 95 gives Registrar of titles ancillary powers to prohibit sub-division if the resultant parcels are less in acreage than minimum prescribed under The Land Act, 2012. In addition, Article 76 gives the Registrar of titles power to impose a restriction for the prevention of any fraud or improper dealing or for any other sufficient cause, either with or without the application of any person interested in the land or restricting dealings with any particular land. Proper implementation of the provisions in this Act could reduce agricultural land sub-divisions into uneconomical units.

National Land Commission Act No. 6 of 2012

The National Land Commission Act (Kenya, 2012b) outlines the functions and powers of the National Land Commission (NLC) as well as qualifications and procedures for appointments to the Commission. The Act gives effect to the objects and principles of devolved system of land management and administration and for connected purposes.

The Physical Planning Act, Chapter 286, Laws of Kenya

The Physical Planning Act (PPA) provides for the preparation and implementation of physical development plans and for connected purposes. Under this Act, the local authorities have power to prohibit or control the development of land and buildings, subdivision of land and implementation of approved physical development plans among others, in the interests of proper and orderly development of its area. Consequently, no person should carry out development within the area of a local authority without a development permission granted by the local authority. The competence and capability of local authorities is thus important for the realization of the goals envisaged in the country's legislations. If implemented well, the PPA can protect agricultural land from inefficient management such as subdivision into uneconomic units.

The Land Control Act, Chapter 302, Laws of Kenya

The Land Control Act provides for controlling transactions in agricultural land. The land control boards are given powers to grant or refuse permission for dealings in agricultural land such as sale, transfer, lease, mortgage, exchange, partition or other disposal. The land control boards are supposed to consider the following before granting permission to alter agricultural land: they should have regard to the effect which the grant or refusal of consent is likely to have on the economic development of the land concerned or on the maintenance or improvement of standards of good husbandry within the area; act on the principle that consent ought generally to be refused where the person to whom the land is to be disposed of is unlikely to farm the land well or to develop it adequately or is unlikely to be able to use the land profitably for the intended purpose owing to its nature or already has sufficient agricultural land; and in the case of the division of land into two or more parcels, the land control boards should refuse permission where the division would be likely to reduce the productivity of the land or where the parties who want to buy the land are not Kenyans. The Land Act is relevant to the current study because its major focus on protecting agricultural land from inefficient farming practices, especially the aspects of land subdivision and use that constitute the core of this research.

The Agriculture Act, Chapter 318, Laws of Kenya

The Agriculture Act aims to promote agriculture by providing for the conservation of soil and its fertility and stimulating the development of agricultural land in accordance with the accepted practices of good land management and husbandry. The Act establishes boards (Central Agricultural Board, Provincial Agricultural Board and District Agricultural Board) with various mandates, among them, to develop agricultural policy. Article 184 gives the Minister for agriculture power, on the advice of the Central Agricultural Board, to make general rules for the preservation, utilization and development of agricultural land, including for controlling the erection of buildings and other works on agricultural land. Information generated from this study is thus helpful to develop a national agricultural policy as envisioned in this Act.

The Local Government Act, Chapter 265, Laws of Kenya

The local government Act provides for the establishment of authorities for local government and defines their functions. Article 166 gives local authorities power to prohibit and control the

development and use of land and buildings in the interest of the proper and orderly development of its area. Therefore, if implemented well, the Act can control development and promote effective and sustainable land use.

Environmental Management and Coordination Act (EMCA)

The Environmental Management and Coordination Act (EMCA) (Kenya, 1999b) focus is on appropriate legal and institutional framework for management of the environment. The law has created a comprehensive institutional and organization system for administration and enforcement of compliance in environmental management. In particular, the Act established the National Environment Management Authority (NEMA) and its statutory committees. The law advances the principle that environmental sustainability is the foundation for social, economic, cultural and spiritual advancement. Therefore, by seeking to ensure sustainable utilization of agricultural land, this study reinforces the principle of environmental sustainability that is upheld by EMCA.

Water Act 2002

The Water Act (Kenya, 2002a) is the law for management, conservation, use and control of water resources as well as acquisition and regulation of rights to use water. The law also provides for the regulation and management of water supply and sewerage services. The Act established the Water Resources Management Authority (WRMA) to enforce protection of water resources. According to Drèze and Sen (1989), access to clean water is a component and indicator of food security. This study assessed the availability of clean water in the study area.

Public Health Act

The Public Health Act (PHA) (Kenya, 1986a) borrows its legal basis from the common law doctrine of nuisance and seeks to resolve the problem of sanitation and related public health hazards. The doctrine of nuisance makes it an offence for any landowner or occupier to allow nuisance or any other condition liable to injury and danger to health to prevail on land. The Act provides for inspection of buildings for their sanitary conditions, construction standards and ventilation of buildings, drainage of land and keeping of animals. According to Drèze and Sen (1989) health indicators such as mortality rates are components of food security. Accordingly, implementation of the provisions of the PHA will enhance food security.

County Government Act No. 17 of 2012

Under Constitution (Kenya, 2010a), Article 6 and the first Schedule have emphasized on devolution and decentralization of powers and resources at the national level to 47 counties. The county government Act (Kenya, 2012c) states that county planning shall integrate among others, environmental and spatial planning. The principles of planning shall take into consideration future generations and shall protect and use natural resources in a manner that is in alignment with

national and county governments' policies. Therefore, county governments have a critical role in ensuring better management of land resources in their jurisdiction.

2.10.3 Institutional Context of the Study

Ministry of Lands, Housing and Urban Development

These ministries are jointly responsible for the supervision of land management matters and the provision of basic services such as water supply, housing, and sanitation infrastructure; all relevant to the attainment of household food and livelihood security.

Ministry of Education

The Ministry of Education's has the mandate to educate children and adults on sustainable utilization of natural resources including land and water. Furthermore, it is responsible for imparting knowledge on nutrition and hygiene considerations in the preparation of food. By educating the public on these matters, the ministry of education complements the Ministry of Health as well as the Ministry of Environment, Water and Natural Resources.

Ministry of Environment Water and Natural Resources

The Ministry of Environment Water and Natural Resources (MEWNR) is the ministry in charge of the water sector and is therefore responsible for the overall management of water resources and general government policy on the water sector in the country. The Ministry was established with the goal of conserving, managing and protecting water resources for socio-economic development. The Act is relevant to this study because, as pointed out earlier, access to clean water is a component of food security.

National Land Commission

The functions and powers of the Commission are outlined in Article 67(2) and include management of public land on behalf of the national and county governments, to recommend a national land policy (NLP), to advise the national government on comprehensive programme for the registration of titles in land throughout Kenya, conduct research related to land and the use of natural resources, and make recommendations to appropriate authorities. This study is thus useful to the National Land Commission in its endeavor to formulate a National Land Use Policy.

Kisii County Government

The devolved system created 47 counties in the country, Kisii County being one of them. The role of the county government includes coordinating integrated development planning within the county and ensuring that the county plans are in alignment with the national planning framework. The County government is also tasked with the responsibility of providing basic services to the residents of Kisii. These services include basic education, housing, health, water, and sewerage services, refuse and garbage collection, planning and development control among other services: all of which are components of wellbeing that are linked with food and livelihood security.

National Environment Management Authority (NEMA)

The National Environment Management Authority (NEMA) was established under EMCA as the principal instrument of government in the implementation of all policies relating to the environment. The mandate of NEMA is to exercise general supervision and co-ordination over all matters relating to the environment. The core functions of NEMA relevant to this study include, but not limited to, the following: a) Promote the integration of environmental considerations into development policies, plans, programmes and projects, with a view to ensuring the proper management and rational utilization of environmental resources, on sustainable yield basis, for the improvement of the quality of human life in Kenya; b) To establish and review land use guidelines; c) Examine land use patterns to determine their impact on the quality and quantity of natural resources; d) Carry out surveys, which will assist in the proper management and conservation of the environment; e) Undertake and coordinate research, investigation and surveys, collect, collate and disseminate information on the findings of such research, investigations or surveys; and f) Publish and disseminate manual codes or guidelines relating to environmental management and prevention or abatement of environmental degradation. Therefore, this institution is relevant to the current study especially in relation to ensuring sustainable land use.

2.11 Theoretical Background

This section reviews relevant theories and models that can be used to analyze the food security situation.

2.11.1 Food Availability Approach

The food availability approach is certainly the oldest one and still the most influential. Although the core ideas of this approach could be traced back to the Venetian thinker Giovanni Botero (1588), it was Thomas Malthus (1789) that popularized it, and, in fact, it also known as the Malthusian approach.

The approach is focused on the (dis)equilibrium between population and food: in order to maintain this equilibrium the rate of growth of food availability should be not lower than the rate of growth of population. Consequently, in this view food security is merely a matter of aggregate (per capita) food availability. In a closed economy, this depends mainly on food production and stocks, whereas in an open economy, food trade can also play a significant role.

Until the early 1970s, this was the reference approach for the international community, both at political and academic level. This is well reflected in the definition of food security given at the World Food Conference of 1974: "*Availability at all times of adequate world food supplies of basic foodstuffs to sustain a steady expansion of food consumption and to offset fluctuations in production and prices"* (UN, 1974).

The policy implications of this approach are twofold: On the "demand side", the need to reduce the population growth rate (fertility rate) through appropriate policies; and on the "supply side", the

need to boost (per capita) food production through policies that increase agricultural productivity. Although the World Food Summit (WFS) of 1996 adopted, with a large consensus, a much broader and advanced definition of food security that includes, besides availability, other fundamental dimensions of food security such as access and utilization of food, a narrow sectoral focus on agricultural supply, productivity and technology still dominates the international food security discourse and practice.

2.11.2 Income-based Approach

The long-lasting view of food security as a problem of food availability has been partly re-visited within a more macro-economic approach. The focus on food sector, (initially focusing on agricultural production only, and later included food trade), has been criticized by economists for being too concentrated on one single economic sector. Recognizing that the economy is composed of many interdependent sectors, food security cannot be viewed as an exclusive problem of the agricultural/food sector. Consequently, the first attempt to broaden the discipline was an attempt to shift the analysis towards national economies as a whole. This effort was aimed at bringing in the analysis variables such as Gross Domestic Product (GDP), economic growth, eventually, but not necessarily, highly dependent on food production. In a market-economy, a stronger economic system can allow the import of goods such as food. This macro-economic framework was also more consistent with old and very influential economic theories such as Ricardo's comparative advantages, according to which each country has to specialize in the sector in which it has an advantage given by the abundance of a specific productive asset or by lower costs of production. This whole approach might be considered as a way to include within the food security framework the national "means" to increase aggregate food availability.

However, the most important shift was from food availability at macro-level to income at micro-level (Reutlinger & Selowsky, 1976; Haq, 1976; Griffin & Khan, 1977). The approach is very similar to the one traditionally used to assess poverty. While poverty was conceived as a lack of enough income necessary to buy a bundle of goods to guarantee the survival (or minimum standard of living) of a person, food insecurity is implicitly assumed as a sub-category of poverty (often referred to as "food poverty"), that is, lack of enough income necessary to buy at the given conditions the amount of food required (Sibrian et al., 2007; Sibrian, 2008). In particular, the different foods are converted into calories (*characteristics* of the food): if people's calorie availability is lower than a threshold identified by international nutritionists, they are considered food insecure.

Through household surveys providing information on income, it is theoretically possible to estimate the amount of food consumed, under the assumption that poorer households use a larger proportion of their income to buy food. Food is, then, converted in calories: if household calorie availability is lower than the "required" minimum one, some or all the members are food insecure. The specific problem related to this method consists in the assumption of a given income-calorie elasticity.

More useful are the household expenditures surveys, from which it is possible to sort out the amount of expenditures on a (limited) number of food items. Many applied economists have

estimated the calorie contents of each food item and then aggregate them in order to have the total amount of calories available for household members.

The main shortcomings of both these procedures are the several assumptions made to move from income to food security: 1) from income/expenditure to food though price per unit information; 2) from food to calorie through equivalence tables; 3) from calorie availability to food security/insecurity depending on the threshold. With respect to the unit of analysis, potentially income could be estimated for individuals. However, there are problems related to children, whose food security depends also on adults' income. Furthermore, all the surveys mentioned above are conducted at household level. For all these reasons, it is reasonable to state that the household is the unit of analysis within this approach. This implies assuming a certain distribution, usually equal distribution or distribution according to biological needs, among the members. Finally, this method could better suit an ideal market economy in which nobody works in subsistence agriculture. Given the fact that these measurements are often realized in rural areas of low-income countries, where the dominant part of the population is in subsistence agriculture, the method is not totally reliable. Moreover, the expenditure surveys tend to underestimate expenditures on food because the value of food produced at home or gathered locally is often not recorded (Frankenberger, 1992, p. 96). Nonetheless, the model is useful to this study because it points out that food security is does not only depend on food availability, but is also influenced by the income levels and expenditure patterns of the household.

2.11.3 Basic Needs Approach

In the second half of 1970s, the International Labour Organization (ILO) proposed a new model of development; the *basic needs approach*, with the intention of incorporating also non-economic dimensions of development (ILO, 1976). The problems of poverty, unemployment, and under-employment, registered in periods of rising economic growth, were the primary causes of the policy shift. Later on, two economists: Streeten (1981) and Stewart (1985) contributed to re-launch this approach.

The advocates of the basic needs approach viewed development as a process that seeks to ensure that to all the people meet their basic needs. The fulfillment of basic needs was a precondition for a "full-life", composed of material and non- material elements (Stewart, 1985). Given the practical nature of this approach, it was necessary to give a minimal interpretation to the full life, that is, to make a small list of basic needs that governments and development agencies could use. Although the list presented by different authors is slightly different, in most of the cases it included food, together with shelter and clothing (Denton, 1990). As argued by Magrabi et al. (1991: 65), "Food is a basic need – probably the most basic need of all." Similar conclusions were drawn by authors

in different disciplines such as Maslow (1943) in psychology, and by authors in the human rights literature. In particular, the definition of "basic rights" as those necessary for the enjoyment of all other rights given by Henry Shue (1996) has led many authors to include primarily the "human right to adequate food" (Kent, 2005).

This discourse in development literature has heavily affected the debate on food security, giving birth to the so-called food *first view* (Maxwell & Smith, 1992; Maxwell, 1996). This approach focuses directly on whether people eat *enough* food, and contributed to make a further step in shifting the analysis from the macro level to the micro level. Food is seen as the priority (and probably the only) element of food security. This is the main approach behind the view of food security as "Consumption of less than 80% of WHO average required daily caloric intake" (Reardon & Matlon, 1989) and as "The ability to satisfy adequately food consumption needs for a normal healthy life at all times" (Sarris, 1989).

There are different ways to assess food security coherently with this framework. The first one entails the food frequency assessment, which can be realized by simply asking people the number of meals eaten per day or even the frequency of consumption of different food items. These surveys are easy to conduct; however, focusing on the frequency and not on the quantity consumed makes more complex to derive the calorie equivalent. The second method is based on the direct observation of food consumption. All the household members are observed during meals in order to have a direct information on all food consumed. The final calorie availability is obtained by weighting the food. Notably, none of these methods has explicitly stressed the linkage between the basic needs approach and the food first approach to food security.

The individual unit of analysis is perfectly compatible with the food first approach. However, food frequency assessments are usually conducted at household level, while direct observation and assessments looking at the diet are often realized at individual level (also for children). Therefore, in the last two cases, it is not necessary to assume a function of food distribution within the household. This point is particularly important because by observing directly the conditions of women, it cannot be assumed that they receive the same amount of food as men. This problem usually referred to as "gender bias" in the development and food security literature has been found in many developing countries (Chen et al., 1981; Das Gupta, 1987; Harriss, 1995).

The main advantage of the food first approach as compared to the (micro) income-based approach consists in the possibility to focus directly on the commodity of interest (food), rather than on the income necessary to buy it. This way one does not need information on current price per unit and, at the same time, there is no need to look at whether the person has physical or social problems in purchasing food. Finally, by concentrating on what is actually eaten, the food first approach implicitly recognizes (and does not underestimate) the food grown at home rather than purchased in the market. In conclusion, this approach draws attention to short-term food security: it reveals whether households have enough food to feed all its members in a given time, or, eventually, in the past. However, it does not provide much information on potential food deprivations in the

future. The model is relevant to this study because it points out that food security is a basic need and thus the problem of food insecurity must be addressed urgently. It also reveals that food availability and income levels cannot be accurate indicators of food security without assessing the consumption of food. Furthermore, the approach introduces the aspect of considering the frequency of food intake to determine household food security levels despite the inherent challenges of using the method.

2.11.4 Sustainable Livelihoods Approach

The Sustainable Livelihoods (SL) framework is not just an approach to food security, but is a more general model used for development and poverty analyses. Though the concept was certainly used previously, the "emphasis on livelihood" was given in the 1980s by Chambers (1983) who, in his seminal book, introduced the basic elements of this approach, with a focus on rural development and poverty. Subsequently, the approach has been elaborated and expanded by Chambers and other scholars (Chambers, 1995; Ellis, 2000; Scoones, 2005). The SL framework has been more successful among development organizations than in the academic world. In fact, due to its flexible, holistic and pragmatic nature; it has been adopted by NGOs, governmental agencies, and UN agencies.

The SL framework has many commonalities with the basic needs approach and the entitlement approach. Like the former, it focuses on "gaining a living" (Chambers and Conway 1992: 5), that is "the necessities of life", rather than on human development in a broader sense – i.e. human flourishing. With the entitlement approach it shares the focus on the "means" of securing a living: in fact, the SL framework is mainly concerned with the (tangible and intangible) assets commanded by a household, which are very similar to the concept of "endowments" in the entitlement approach. The assets are classified in five categories: natural capital, physical capital, human capital, financial capital, social capital. Although the approach is presented as people-centered, the so-called "pentagon of assets" is actually the core concept of the SL framework.
The SL framework has been applied to a variety of development issues, including food security (WFP, 1998; Young et al., 2001; Devereux et al., 2004; Hussein, 2002). There are two distinctive features of the general SL framework that give to it some advantages in the analysis of food security over previous approaches. The first is its long-term perspective; the second is the attention to the context (political, economic, physical, social, cultural, etc.), although the latter is often confined to the agricultural activities and the rural areas, and seldom it considers macroeconomic or economy-wide issues. The combination of these two analytical features with the study of the household assets brings into food security analysis three interrelated concepts that are peculiar to the SL framework and neglected in previous approaches:

1. Considering explicitly risks and shocks, adverse trends and seasonality leads to the concept of *vulnerability*, that according to Chambers (1995: 175) "means not lack or want but exposure and defenselessness. It has two sides: the external side of exposure to shocks, stress and risk; and the internal side of defenselessness, meaning a lack of means to cope without damaging loss";

2. The idea of *sustainability*, strongly related to vulnerability and resilience, is one of the core principles of the SL framework: "a livelihood is sustainable when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future" (DFID, 1999);
3. *Coping strategies*, that "represent a set of activities that are undertaken, in a particular sequence, by a household in response to exogenous shocks that lead to declining food availability" (Curtis, 1993: 3, based on Davies, 1993). Coping strategies are included in the more general *livelihood strategies*, which are the combination of activities that people choose to undertake in order to achieve their livelihood goals.

The SL concepts have also been widely used for food security measurement, especially in humanitarian emergencies (Maxwell, 1995; Maxwell et al., 1999, 2003) and famines (Howe & Devereux, 2004).

Notwithstanding this approach is more comprehensive than previous approaches, and is also policy and project-oriented. However, it has some shortcomings in the analysis of food security. Although the term "capabilities" is cited, the actual starting point of the framework is the household's "pentagon of assets" and related livelihood strategies, and not "what life we lead and what we can or cannot do, can or cannot be" (Sen, 1987: 16). Consequently, (1) the SL approach, like the entitlement approach, is more suitable for analyzing food crises and emergencies, famines, or extreme food poverty, rather than more general food security and development issue; (2) freedom and agency issues are in fact overlooked; (3) the variable relationship between people and food (what people can respectively make of a given basket of food) (Sen, 1985: ch. IV), is not thoroughly analyzed, and therefore the "utilization" dimension of food security is neglected; (4) finally, as the unit of analysis of this approach is the household or the community but not the person, intra-household inequalities in the distribution and access to food (that often hit women and children) could be overlooked.

2.11.5 The Entitlements Approach

A useful approach to begin an understanding of these complex phenomena is Sen's entitlement's model, which holds that food security flows from possessions and these stem from endowments which then constitute one's entitlements (Sen, 1995). According to Sen, entitlements fall into any one of the following four categories: ownership through commodity exchange (*trade-based entitlement*), the right to own what one grows on the farm (*production-based entitlement*), the sale of one's labor power for purposes of earning an income so as to purchase food (*own-labor entitlement*), and the right to own what is given by others (*inheritance and transfer entitlement*). Among the model's strongest tenets is the assertion that food insecurity can exist without any substantial decline in the general supply of food and, even when food shortages are widespread, they do not affect everyone uniformly. Different groups and individuals have different commanding powers and an overall food shortage only brings out these contrasting powers. In recognition of variability in endowment, the 'entitlements approach' advocates a greater

refinement of the categories of those affected or not affected by food shortages (Sen, 1981). To a large extent therefore, this approach explains how food security is gained, and why some groups starve while others do not. In other words, it highlights what enables some and not others to access adequate food.

2.11.5.1 Exchanging Mappings: Translating Endowments into Food

Endowments in themselves do not bring about food security; they only provide the potential to obtain adequate food. What becomes of this potential, that is, whether one's endowment or ownership bundle translates into adequate food depends on what Sen refers to as 'exchange mappings.' This refers to the network of relations that govern how much food one is able to obtain through cultivation/exchanging with nature, or through purchasing and hence an exchange with others, or through seeking and receiving assistance/transfers (Sen, 1981, p.2). For example, the food security of households that seek to obtain their food through cultivation is assumed to be determined at the point of harvesting. However, prior to this, such exchange depends on whether the farmer owns sufficient amounts of the main factors of production, namely, land, labor and capital, to enable him to exchange adequately. On the other hand, in exchanging with others, a person's exchange entitlement, given his ownership bundle, is influenced by employment opportunities, returns to non-labor assets relative to the cost of food, what a person can produce with his own labor-power and the resources he can buy and manage, the cost of purchasing resources and the value of what he can sell, and obligations that he must attend to (Sen, 1981, p.4). In his later works, Sen argues that transfers and inheritance also constitute entitlements, to such an extent that in countries where the social security system is operational, a drop in exchange entitlement does not occur because the affected persons can benefit from state intervention (Sen, 1995, p.57).

Food security is, therefore, assumed to depend on the entitlement relations that govern possession and use. This relation refers to what people own and what this ownership can command. In addition to the significance of addressing what constitutes possessions, it is also critical to know how and whether this can raise adequate food. As aptly described by Sen,

> 'a barber owns his labor power and some specialized skill, neither of which he can eat, and he has to sell his hairdressing service to earn an income to buy food. His entitlement to food may collapse even without any change in food availability if for any reason the demand for hairdressing collapses and if he fails to find another job or any social security benefit. Similarly, a craftsman producing, say, sandals may have food entitlement squashed if the demand for sandals falls sharply, or if the supply of leather becomes scarce, and starvation can occur with food availability in the economy unchanged. A general laborer has to earn his income by selling his labor power (or through social security benefits) before he can establish his command over food in a free-market economy; unemployment without public support will make him starve. A sharp change in the relative prices of sandals, or

> haircuts, or labor power (that is, wages) vis-à-vis food can make the food entitlements of the respective group fall below the starvation level (Sen, 1981, p. 155).

Consequently, ability to command enough food depends on one's endowment (ownership bundle) and, subsequently, on the exchange entitlements mapping (the function that specifies the set of alternative commodity bundles that the person can command respectively for each endowment bundle). For instance, a farmer who owns land, labor and other productive resources could be faced with several possibilities. The farmer could choose to grow his own food, or he can purchase food using a wage earned from selling his labor or growing other crops that can be marketed for cash, or he could benefit from inheritance and transfers. Sen, therefore, concludes that such possibilities (which he refers to as available commodity bundles) stand for the exchange entitlement of the farmer's endowment (Sen, 1981, p. 45-46). The pattern that an exchange entitlement mapping takes is, however, conditional. It depends on the legal, political, economic, and social characteristics of the society in question and on people's positions within it (Sen, 1981, p.46). Richards has further argued that the functioning of these entitlements depend on 'beliefs, created in political practice, about who ought to get what, under what circumstances, and the embodiment of those beliefs in legal and economic process such as land tenure rules, notions of family obligation, wage rate, and rules of market transaction, among others. Such standards are contingent and time-bound (they are specific to particular historical circumstances). Consequently, they do not (and cannot be expected to) work according to absolute standards of equity nor can they be predicted from an economic model' (Richards, 1983, p.46)

Hence, food security possibilities cannot be defined in universal terms. Even within the same ownership position, exchange entitlements will be different depending on what economic prospects are open to each person and this depends on the mode of production and the person's position relative to production relations (Sen, 1981, p.4-5; Devereux, 1993a, p.143; 149). In Kenya, smallholder farmers face at least two possibilities: to grow some or all their food, or through incomes generated on-farm and/or off-farm, to obtain required food on the market. Therefore, assessing the food security of these households demands a look at what they have and what this can command while exchanging with nature or with others.

2.11.5.2 Loss of Entitlement

A collapse in one's entitlement results from a breakdown in the network of entitlement relations and this, according to Sen, is an income of an unfavorable shift in the exchange entitlement mapping, or a loss of possessions (Sen, 1995, p.54). In other words, people can fail to secure adequate food because they own nothing, or because what they own cannot be exchanged for adequate food. Although this explanation makes several assumptions, among them, that supply is guaranteed and adequate and, secondly, that resources in possession will be used in the purchase of food, it does account for the existence of hunger, particularly amidst plenty. As argued by Dreze and Sen, if people go hungry on a regular basis all the time, or seasonally, explanations lie with an entitlement system that fails to give these persons adequate means of securing food (Dreze & Sen,

1989, p.24). Consequently, a fall in wages, a rise in food prices, loss of employment, a drop in the price of goods that one produces and sells, make it no longer possible for those concerned to acquire enough food. However, in order to understand the precise influences that make it possible or not possible to acquire enough food, one needs to examine the conditions of these exchanges and the forces that govern them (Sen, 1995, p.50).

A collapse in exchange entitlements translates into food insecurity. Some people go hungry because what is in their possession cannot be exchanged for the food that is otherwise available. Drawing examples from Tete Province in Mozambique, Raikes shows that, in 1984, people died of starvation despite there being no overall food deficit in this well-watered highland area with significant food surpluses (Raikes, 1988, p.91). This situation emerged because those holding food surpluses needed to exchange them for goods that were not available in Mozambique (at the time). Consequently, the major proportion of food was sold across the border in Malawi in exchange for consumer goods, and none of this food moved to the southern part of the province which is much drier and poorer. This breakdown in entitlement relations occasioned a shift in exchange mappings, and a subsequent failure to command existing sources of food. Raikes, however notes that in general, 'the people that suffer worst food shortage are primarily those who have no (or insufficient) land for own production of food, are forced into dependent relationships to kin or non-related households through custom or lack of jobs, and specifically those whose rights within such relationships are the weakest. The level of savings is also an important factor since those especially vulnerable to famine are often those whose savings are least held in forms whose value falls drastically (in terms of food) when most needed (Raikes, 1988, p.70).

In circumstances where one's possessions are unlikely to attract the food on the market, exchanging directly with nature is then seen as providing a better bargain. It is argued that in the Sahel, unlike the farmers or the pastoralists who rely on what they produce and are therefore subjected only to variations in output resulting from climatic considerations and other influences, the cash crop producer is, in addition, subjected to shifts in the market for the commodities that he produces (Sen, 1981, p.126-127). Additionally, given that demand for cash income at the rural household level outstrips supply, this situation continues to necessitate that households avoid spending limited cash income on what they can grow (Netting, 1993; Garine & Koppert, 1988). However, inability to store sufficient quantities over long periods of time soon translates into food insecurity and especially during the annual 'hungry season,' a time when the value of assets is also lowest (Devereux, 1993a, p.43).

It is, therefore, argued that constant food shortages will be found among the absolutely poorest strata and that this is related to a lack of income, since it occurs even when there is plenty of food for those who can afford it (Raikes, 1988, p.70). For instance, in an attempt to turn Sudan into a breadbasket for Saudi Arabia, and following the devaluation of its currency, a greater amount of the country's sorghum was diverted from the domestic food market to exports as livestock fodder in Saudi Arabia (Raikes, 1988, p.70). Besides, while the price of grain increased by a factor of four

during the 1984 famine in Sudan, that of livestock fell to a tenth of their previous level, rendering herders helpless (Raikes, 1988, p.87; quotign D'Souza & Shobam 1985, p. 521). Evidently, some legally guaranteed rights of ownership, exchange and transaction bring forth economic systems that go hand in hand with some people failing to acquire enough food for survival (Dreze & Sen, 1989, p.20).

Similarly, whereas the 1972-74 famine in Ethiopia was occasioned by failure of the main rains of 1972, resulting in an obvious decline in harvests, this only transformed into a famine situation due to negligence by the Ethiopian government and the international community to intervene in time (Sen, 1981, p.87). Citing the example of the Wollo region, Sen argues that what took place there was, in addition to being a direct entitlement failure, a result of a collapse of income and purchasing power as demonstrated by the inability of people to attract food both in their midst and from elsewhere in the country (Sen, 1981, p.94; p.99; p.101). In addition, much as the 1984-85 famine had been foreseen, there was no adequate response, given the aversion of Western governments to the political regime in Ethiopia at the time (Raikes, 1988, p.85). That there was a prolonged delay is evident from the fact that during this famine. 'People stayed in their villages so long as they had any money to purchase food. When all had been spent and all chattels sold, houses were pulled down and the wooden frames sold at the roadside for the pitiful sums they would fetch as firewood. Finally, destitute families set out on the roads with only inadequate clothing and remaining silver pieces, both family heirlooms and their absolutely last security. Those who succumbed were those with least chattels, smallest houses and least silver and, as always in such situations, items had to be sold for a fraction of their normal value' (Raikes, 1988, p.86).

In linking food security to entitlements, it has been shown that loss of entitlement to food can arise from a breakdown in the network of relations governing exchange with nature or with others and this results from a shift in exchange mappings, or a loss of possessions necessary to effect exchange or due to failure to effect transfers. However, it has also been seen that entitlement relations vary, to the extent that what one owns, and how much it can command at the exchange mapping level varies from place to place. It is a product of the social, historical and political processes that have taken place over time, and how the individuals concerned have responded to these changes. This study, therefore, looked at the interplay of external and internal processes of change and how these have come to influence people's ability to command adequate food.

2.11.5.3 The Relevance of Sen's Approach to the Study of Household Food Security

Given all the considerations above, employing this approach rather than the previous ones improves the assessment from many points of view. First, unlike the food availability approach, the entitlement model attempts to explain the presence of large food insecurity and undernutrition in countries with sufficient food per capita. The difference between the entitlement theory and the income-based approach is smaller considering that income an important means to gain access to food. As argued by Sen (1983: 756), "In dealing with starvation and hunger, the focus on incomes, though defective, is not entirely disastrous. Besides, it is better than the focus on total food output

and population size. However, given that income is not the only, and not necessarily the most important instrument to access food and that it is hardly measured in rural areas of developing countries, a focus on entitlements is preferable. Moreover, income reflects the short term economic status of an individual/household, while the full set of assets provides more information on a long-run wealth and vulnerability to food insecurity.

As compared to the food first approach, the entitlement approach permits to predict future food deprivations: a lower amount of assets, for example, means that the person might have more problems in the future to access enough food. Furthermore, by examining a large entitlement set, the model recognizes that issues such as drinkable water and health care are as important as food for household food security. The approach also introduces a useful dimension to the study of food security: the need to treat the search for food and subsequent success or failure as resulting from a network of relations. The entitlements approach presents the search for food as embedded within a larger framework such as the social, economic and political processes in a given region. Therefore, it radically moves away from a food first perspective to stress the complex and multidimensional nature of food security.

However, although the entitlements approach comes closest to explaining why and how some succeed while others fail to obtain adequate food, this perspective nevertheless has limitations. Sen actually admits that by concentrating on entitlements, something of the total reality is obviously neglected in the approach. However, he also poses the question, how important are these ignored elements and how much of a difference is made by their neglect (Sen, 1981, p.50). In a later publication, Sen seems to have accommodated some of the criticism by stating that the entitlements approach by itself does not provide, nor is it intended to provide, a detailed explanation of any famine, and such an explanation would require supplementation by more specific theories, so as to account for shifts in entitlements (Dreze & Sen, 1989).

One weakness of the model is that it is more useful for extreme cases such as hunger (Omosa, 1998). Additionally, Sen conceptualizes state transfers as central to food security and, by so doing; he puts the role of the state at the centre of entitlements. However, in addition to these being non-existent in most of Sub-Saharan Africa, both social security and public provision may not always work when those at risk have no legal right to demand provisions or if they are not well mobilized to meet this demand. Many countries are plagued with maldistribution of relief food supplies, with little resistance from those entitled to these supplies, because relief food has remained a gift, a non-entitlement. Furthermore by conceptualizing entitlements, most of the exchange mappings remain only potentially effective commands (Gasper, 1993, p. 26), which may or may not lead to adequate food. For example, in exercising the legal rights to own land, many farming communities in Kenya have subdivided their land parcels beyond economic utility. The subsequent failure to produce enough on the basis of land size thus falls within the existing legal framework, as also does the fact that productive land lies idle elsewhere and those much in need have no legal right to utilize it. There is, therefore, a need to go beyond current legal provisions in order to focus on the origins and shifts in such entitlements. This challenge leads to a deeper understanding of the ways in which

individuals and households lose their entitlements precisely because of the existence of these legal provisions.

In his analysis of various famines, Sen concentrates on the nature of these entitlement failures but leaves out the more important component, the sources of failure. He does this by exploring the economic backgrounds of those who became destitute, but fails to account for why some occupations were not as rewarding, nor how those occupying such positions could have negotiated their survival prior to these distresses (de Gaay Fortman, 1990: 27-28 in Gasper 1993, p.12). Therefore, by treating entitlements as 'given,' Sen fails to explain how these relations are determined and how they develop over time (Devereux, 1988, p.272; 1993a, p.80). Moreover, as a result of looking only at the nature of entitlements, Sen ends up concentrating on 'proximate causes' such as market prices and incomes, rather than the 'underlying causes' (de Waal, 1990; cf Osmani, 1991), that is, how entitlements are generated and destroyed and why only some become vulnerable when these entitlements collapse. Moreover, by restricting himself to an analysis by strata, Sen leaves out the possible variations that arise within a stratum, in spite of the supposed similarity in endowments. Such similarities include equal wages, uniform land sizes or more generally, a shared job description. Consequently, in reducing the search for food into a single relationship, the approach leaves out the possibility of a multiplicity of networks and therefore a co-existence of several exchange mappings. Smallholders in rural Africa, for example, often pursue several possibilities simultaneously and the search for food is interwoven within wider livelihoods. Hence, by focusing on occupation, the entitlements approach neglects the more important processes in the search for food, namely social relations.

In spite of the recognition that famine is the culmination of various 'events', Sen gives little attention to the processes of change during famine. He, therefore, overlooks the role of other intervening elements, to the extent that the victims of the famines that he describes appear passive (de Waal 1990, p.472), although he does attempt to highlight migration and the search for employment as some of the immediate responses. Consequently, despite Sen's acknowledgement that deaths only occur at the end of a famine (Sen, 1981, p.5), the entitlements approach tends to capture only the end result, famine .However, in real life, starvation is preceded by several processes pertaining to how people choose to use available opportunities. For instance, it has been argued that culture, habit, skill, and preference may limit its choices in spite of existing potential entitlements. For example, some people may prefer to balance their increased risk through under-nutrition while they maintain assets such as livestock (Gasper, 11993, p.5; Devereux, 1993b, p.52; Drevereux, 1990, p.84; de Waal, 1989a, p.7; Swift, 1989, p.10).

Lastly, Sen makes an unrealistic assumption that in the face of food shortages, households whose entitlements lie with exchanging with nature (cultivation) will reduce their demand for non-food commodities that are likely to occasion selling some of their food stocks (Omosa, 1998). He further argues that direct entitlements are not affected by sales, most likely because his argument is based on the erroneous assumption that only surpluses are marketed. On the contrary, food insecurity can take place without any drop in direct entitlements, that is, the ratio of food harvest to actual

demand. For instance, households could harvest adequate food but end up with shortages as a result of engaging in practices that deplete these stocks, such as making sales or giving out food assistance (Omosa, 1998). At the entitlement mapping level, however, such households would appear to have a productive exchange mapping, though in practice this might be non-existent (Omosa, 1998). This particular weakness of Sen's approach coincides, rather unfortunately, with assumptions made by those who advance the food availability paradigm. Likewise, government policy has often gone astray because of stopping just here, assessing food security on the basis of potential output.

An important contribution of Sen's approach is that it offers a useful starting point for exploring answers to questions such as, who is food secure and who is not, why has 'regular' hunger persisted for some and not for others and what opportunities exist in terms of unexplored entitlements? Overall, the discussion above points out that, according to the entitlements approach, the food security position of households and individuals is determined at the exchange mapping level and this depends on the command that they enjoy over existing sources of food.

2.11.6 The Capability Approach

A number of experts have expressed concern as to why the theories developed by Sen around his studies of famines do not yet generate related practical tools. The Capabilities Approach was developed to address the shortcomings of the entitlement theory. In the beginning of the book, Jean, Drèze and Amartya (1989) explain why the entitlement approach is not sufficient for a general approach to hunger issues and therefore why people should move beyond food entitlements toward nutritional capabilities: "The focus on entitlements, which is concerned with the command over *commodities*, has to be seen as only instrumentally important, and the concentration has to be, ultimately, on basic human capabilities" (Drèze and Sen 1989: 13). "Capabilities" are defined as the substantive freedoms that one enjoys to lead the kind of life he or she has reasons to value, or the real actual possibilities open to a person. From this capability "set", a person chooses his or her "functioning", the particular beings (like being well-nourished) and doings he or she enjoys at a particular point of time. The approach gave birth to the Human Development paradigm. Hence, Human Development can be seen as the process of expansion of people's capabilities. In opposition to the traditional welfare economics, this paradigm does not use income as the informational basis to assess well-being.

This change of perspective derives from the crucial distinction between *means* and *ends* of development emphasized by Sen, that applies also to the study of hunger: "A more reasoned goal would be to make it possible to have the capability to avoid undernourishment and escape deprivations associated with hunger" (Drèze and Sen 1989: 13), that is, the capability to be free from hunger. By switching the focus from "command over food" to "nutritional capabilities," this approach goes beyond the "access" dimension of food security, which is the main concern of the basic needs, entitlement and SL approaches, and includes also the "utilization" dimension. This is one of the most important innovations of the capability approach to food security.

Drèze and Sen explain why access is not sufficient and utilization is crucial:

> The object, in this view, is not so much to provide a particular amount of food for each. Indeed, the relationship between food intake and nutritional achievement can vary greatly depending not only on features such as age, sex, pregnancy, metabolic rates, climatic conditions, and activities, but also access to complementary inputs
>
> (Drèze & Sen, 1989, p. 13).

In their book, Drèze and Sen (1989) cite a number of fundamental complementary inputs: health care and medical facilities; clean drinking water; sanitation; eradication of infection epidemics; basic education. However, this is not (and it could not be) an exhaustive list. The variable relationship between food intake and nutritional achievement is a case of general theoretical issue thoroughly analyzed by Sen (1985): the conversion factors and rates, that is, the fact that the conversion of personal income, resources and commodities into well-being and freedom "depends crucially on a number of contingent circumstances, both personal and social" (Sen, 1999: 70), such as: personal heterogeneities, environmental diversities, variation in social climate, differences in relational perspectives, distribution within the family. Paraphrasing Sen (1999: 71), these different sources of variation in the relation between resources and well-being make income, entitlements or livelihoods a limited guide to food security. This problem is particularly relevant when dealing with the food security of disadvantaged people or of socioeconomic groups in unfavorable circumstances or conditions. The above mentioned features of the capability approach to hunger make it one that better incorporates the dimensions of food security (availability, access, and utilization).

2.11.6.1 Relevance of the Capabilities Approach to Food Security

The aim of this section is to provide useful preliminary insights in order to carry out an in-depth analysis of food security at the household level using the capability approach as the theoretical framework of this study.

Table 2.11 presents the different informational bases, data needs and, finally, the food security dimensions that should be considered in the analysis of household food and livelihood security situation. It entails three phases: 1) analysis of *food entitlements*; 2) analysis of *basic capabilities* for food security; 3) analysis of the *capability to be food secure*.

In the first phase (analysis of food entitlements), is necessary to collect information on the three key components of entitlements: endowments, exchange conditions, and production possibilities. In particular, this information should include data on variables such as employment status, type of employment, assets, savings, and possible claims on the state or other local institutes for cash transfer or food assistance. For the other two elements of the entitlements, information should be collected on the prices of the highest possible number of goods and services, and on the skills and

professional knowledge of the individual or household members. The information mentioned above is useful for examining whether households have access to enough food for survival presently and in the near future.

The first phase should also encompass an analysis of the variations of endowments and exchange conditions in the recent period. The former could be obtained by asking people whether they have bought or sold some important assets, whereas the latter can be collected through other official or non-official statistics. This analysis is just an example of a broader study of "coping" and "adapting" strategies to understand the set of strategies people employ during crises and "normal" periods as suggested by the SL framework. Through this complex analysis, one can incorporate not only what people *have* but also what people *do* as agents of their future. Notably, such analysis provides information on another food security dimension, that is, stability. If people have a seasonal job, the prices of the commodity they offer have large fluctuations, or if they reported to sell some key productive assets, it is safe to assume that the household is largely vulnerable to food insecurity, though maybe having enough calorie intakes at the time of survey.

The second phase consists in the analysis of some basic capabilities. First of all, one needs to take into account other factors beyond food entitlements that affect the capability to be free from hunger, intended as the capability to have *enough* food/calories. These are the institutional and environmental conversion factors, which are, to a high extent, beyond the person's control. Institutional conversion factors are the set of rules, norms, and customs that allow, for instance, converting a certain amount of income into an adequate amount of food. If, for example, a woman is not "allowed" to leave the house and go to the market alone, she will not be able to spend her income to purchase food. Environmental conversions factors are those affecting, for example, the conversion of food production for food growers into actual food (in the case of subsistence agriculture) or income (in the case of food sold in the market) given the productive possibilities and the exchange conditions. Natural disasters and climate fall in this category.

Moreover, access to food is not enough to understand food security, thus one has to move further to a broader analysis of basic capabilities such as being in a good health, being educated, and being able to take part in household decision making and community life. To carry out this analysis, it is necessary to collect or find already existing data on: 1) school enrolments, educational achievements, literacy, participation to adult literacy courses and other non-formal education programmes; 2) access to health services, sanitation, morbidity to main diseases, self-reported health status; and 3) the capability to take a shared or autonomous decision within the household on subjects such as budget and food allocation (empowerment-type questionnaires), and participation in community life.

Ultimately, the capability to be food secure is a more complex capability, which depends on the interaction among the "basic capabilities". In this case, for "basic" and "more complex" capabilities it means that the former are *foundational* to the latter. This interpretation of the

"capability to be food secure" is close to what Dreze and Sen (1989) define as "capability to be adequately nourished." This definition is coherent with the 2001 FAO definition of food security, which is the most advanced one as well as the one that mostly recognize the close relationship between food security and nutrition.

Enjoying all the basic capabilities is necessary but not sufficient to be food secure. Further data on the *utilization* of food should be collected. These data should provide information on the nutrition knowledge of the person, on the quality and variety of the diet, and possibly on her hygienic and cooking practices. As an example, having *enough* calories, but obtained from one single type of food cooked in such a way not to derive the right nutritional contents from it are likely to lead the person to be food insecure. Therefore, in this phase it is necessary to enlarge the informational basis. The questionnaire should incorporate a set of questions on knowledge about the benefits of micronutrients and other nutrition-related aspects.

Finally, a person might have enough food and of the right quality, but not being able to eat it because of cultural or religious reasons, or because she does not like the taste, or she is simply not used to eat that food. Drawing from Crocker (2008):

> For example, the taste of an available grain may be too different from that to which are accustomed. Evidence exists that people who receive extra cash for food sometimes fail to improve their nutritional status, apparently because they choose to consume nutritionally deficient foods. If food is to make a difference in people's nutritional and wider well-being, it must be food that the individuals in question are generally willing and able to convert into nutritional functioning. This is not to say that food habits cannot be changed. Rather, it underscores the importance of nutrition education and social criticism of certain food consumption patterns. If people find food distasteful or unacceptable for other reasons, even nutritious food to which people are entitled will not by itself protect or restore nutritional well-being (Crocker 2008: ch. 8).

Crocker's example above also underscores why information on religious beliefs and cultural attitudes especially with reference to foods and on local food habits should be collected.

Table 2.11: Application of the Capability Approach to Food Security

Steps	What is Measured	Food Security Dimension	Informational Basis	Variable
1	**Food Entitlements**	**Access to food + Stability**	Endowments: labor force, productive assets, wealth (non-productive assets, savings), non- tangible resources (e.g., memberships)	Employment status, type of employment, large set of assets (mainly livestock, land and house- related assets), legal claim to public provision of food or income transfer from the state. For the stability dimension: variation of endowments and strategies (coping strategies, adaptation)
			Exchange conditions: prices of food items, wages, and prices of other non-food goods and services	Wages from primary and secondary income generating activity, price of different food items/groups and prices of other goods and services.
			Production possibilities: Skills and Technology	Professional skills
2	**Basic Capabilities**	**Access to food and other food security-related items + Stability**	**Being free from hunger** (according to Sen, it means having *enough* calories for survival). This depends on another set of variables: Quantity of food, food groups; calorie intake; Sex, age; and Law, rules, norms	Quantity of food, food groups, calorie intake Sex, age Law, rules, norms Climate, frequency of natural disasters
			Being educated (basic education which depends on accessibility of formal and non-formal training)	School enrolments, educational achievements, literacy, participation to adult literacy courses and other non-formal education programs.
			Being in good health (depends among other things on health care)	Access to health services, sanitation, morbidity to main diseases, self-reported health status.
			Being able to take part in household decision making and community life	Participation in household decision making, participation in community life (questionnaire).
3	**Capability To Be Food Secure**	**Access to food + Stability + Utilization**	It is given by the interaction between the capability "being free from hunger" with the capabilities "being in a good health" and "being educated". In addition, it depends on food *utilization* and *cultural/social acceptability*	Diet quality, diet diversification, Nutrition knowledge (through questionnaire focusing on micronutrients), and hygienic practices. Cultural and religious beliefs with respect to food products.

The analysis of food security through the capability approach allows a more comprehensive examination of the phenomenon. While the income-based approach would take income as focal variable, the entitlement/capability approach provides information on how income is used to ultimately reach the capability to be food secure depending on personal and external conversion factors, food choices and behaviors. Unlike the food-first approach, the capability approach takes into account the quality, utilization and social acceptability of food, and the interaction with other basic capabilities such as health and education. The capability approach also differs from the "mechanical" view of food insecurity as a lack of micronutrients or other food properties generally advocated by nutritionists. By analyzing the phenomenon through the three steps described in ***Table 2.11,*** this study aims at identifying the root causes of food insecurity with the acknowledgment that food security is a component of general wellbeing. Food insecurity, within the framework, can be the result of lack of land, education, health or other basic capabilities that constitute people's wellbeing. Using the words of David Crocker (2008: ch. 8),

> "Instead of identifying hungry people simply by a lack of food intake and mechanically monitoring individuals or dispensing food to them according to nutritional requirements, the focus should be on nutritional functioning and those "nutrition-related capabilities that are crucial to human well-being."

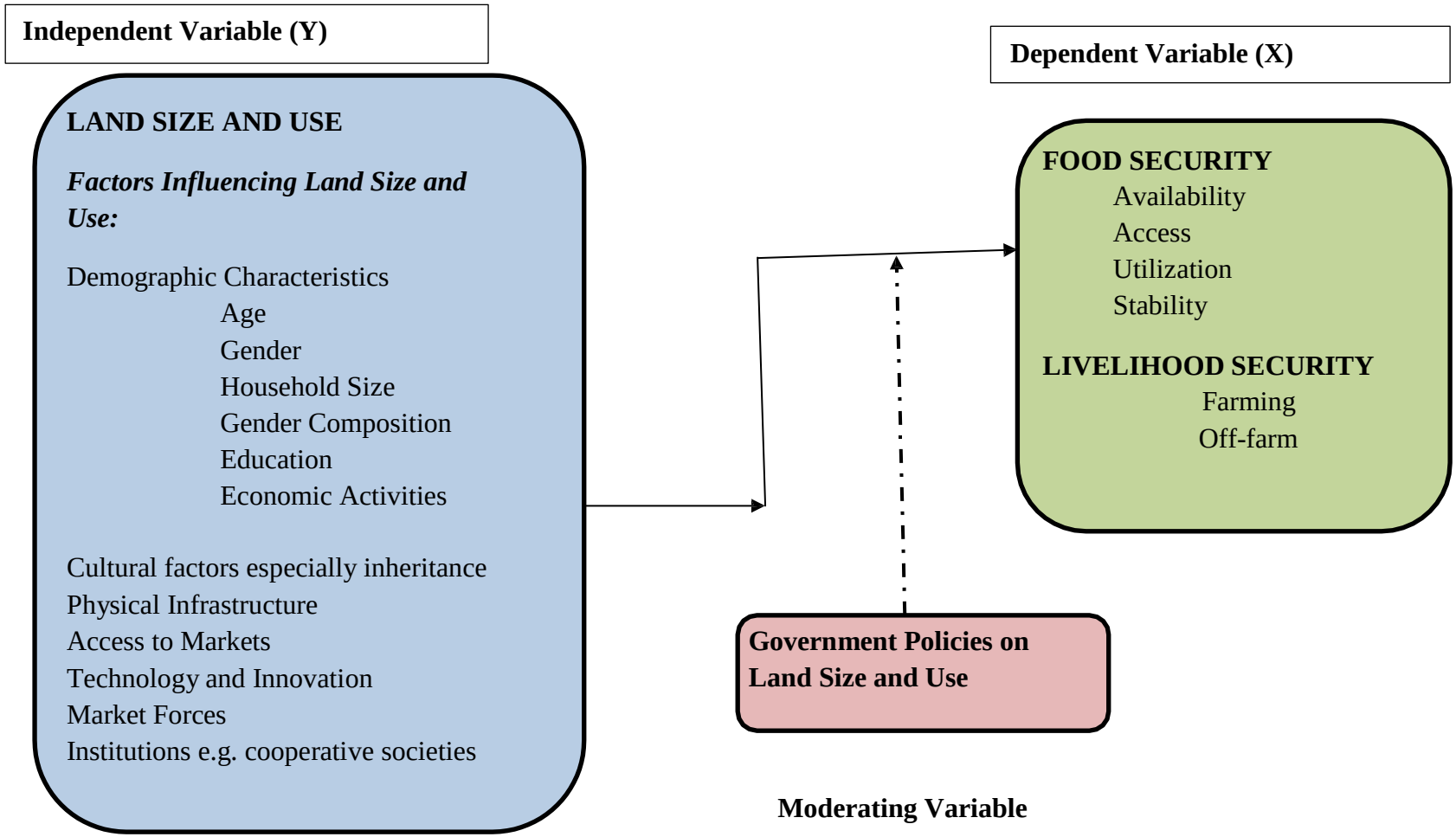
Another element that is implicitly incorporated in all the steps of the capability framework for food security is "agency", that is, "the ability of people to help themselves and also to influence the world" (Sen, 1999: 18-19). People are clearly constrained by the institutional and environmental factors, which are to a high extent outside their control. However, their actions can affect their life and their likelihood to escape poverty and food insecurity. A person might choose to "help herself" by, for example, diversifying her income-generating activities or adopting coping strategies for their long-run food security. To the opposite, a person could choose to "influence the wellbeing of others" like their children, at the expense of her own wellbeing. Finally, she could act just to "influence the world", by taking decisions, which could also reduce her wellbeing.

The discussion on agency leads to examine another point, which has not been previously emphasized. ***Table 2.11*** above outlines the linkages between different *capabilities*; however, one would be interested in knowing whether a person or a household is actually food secure, that is, whether her *functioning* "being food secure" is activated. Whether or not the capability moves into the functioning depends exclusively on people's *choice*. Although being food secure is such a basic capability that the largest proportion of the people having such capability would decide to activate the related functioning, there might be cases in which people would *choose* not to be food secure. It can be the case of a person "deciding" to fast or, as already outlined in previous paragraphs, a person making inter-temporal choices in order to ensure long-run food security. This situation can be properly captured only by examining simultaneously capabilities and functionings (Sen, 1987).

However, for evident reasons the attention of policy-makers should be ideally given to people having a low capability to be food secure (in the short and long run), without a further need to analyze the functionings. By following the three steps procedure described in ***Table 2.11*** it is possible to sort out those people that result as undernourished although not having constraints to access food and food-related items.

In conclusion, the capability-based analysis of food security requires a larger informational basis than any other previous approach. However, the previous paragraphs have considered only the "ideal" number of variables to be used during the three phases of the study. In the field, most researchers face constraints in timing and costs. Accordingly, it is always possible to use a lower informational basis and still make a reliable analysis of food security built on the capability framework. It is only important to keep the most relevant elements, and maybe reducing the number of variables for each factor, or the complexity of data collection. The key point is not *how many* variables should be focused on, but *which* variables: in this sense, the capability approach provides new important insights.

2.12 The Conceptual Framework



Source: Author, 2018

3. RESEACH METHODOLOGY

3.0 Overview of the Chapter

The methodology of a research work is a collective term for the established procedure of undertaking scientific research (Mugenda, 1999). It entails figuring out the applicable steps, techniques, and strategies for carrying out studies (Kothari, 1990). Researchers need to apprehend the assumptions underlying various strategies and methods as well as the criteria for figuring out which strategies are relevant to specific research issues (Kothari, 1990). According to Mugenda (1999), a study's technique must be systematic, valid, reliable, and generalizable. On this section, the specific approaches used herein are discussed.

3.1 The Research Design

A study's design is the arrangement of situations for collection and analysis of research information in a manner that aims to combine relevance to the study's goals with time and financial limitations (Mugenda, 1990). In brief, the function of a research design is to allow collection of as much evidence as possible with minimum expenditure and time (Kothari, 1990). As such, a study's layout consists of an outline of what the researcher will do from the early stages of writing the hypothesis and its operational implications to the final ones of understanding and deciphering records.

There are various designs for conducting scientific studies including exploratory, diagnostic, and descriptive (Kothari, 1990). This work specially employed the descriptive and diagnostic research designs. The former refers to those studies that are concerned with describing the characteristics of a particular individual or group, whereas the latter involves determining the frequency with which something occurs or whether certain variables are associated (Kothari, 1990). From this distinction, it is evident that the two designs are closely related. In fact, the description of phenomena is almost always followed by a diagnosis. Therefore, in this study, the two designs were used simultaneously and interchangeably. According to Kothari (1990), most of the social research comes under the descriptive category. The descriptive design is also referred to as a survey design because it takes into account all the steps involved in a survey concerning a phenomenon to be studied (Kothari, 1990).

The descriptive design is usually prepared with consideration for the objectives of the study and the availability of resources (Kothari, 1990). It follows a rigid structure that entails formulating the objective of the study, designing the methods of data collection, selecting the sample, collecting the data, processing and analyzing the data, and reporting the findings. Each step in this structure is briefly discussed below.

The first step is to specify the objective with sufficient precision to ensure that the data collected is relevant. Then comes the question of selecting the methods by which the data is to be obtained (Kothari, 1990). Several methods (observation, questionnaire, interviewing, and examination of

records), with their merits and demerits are available for the purpose. While designing data collection procedures, adequate safeguards against bias and unreliability must be ensured with due concern for the economical completion of the research study. Whichever method is selected, questions must be well examined and made unambiguous (Kothari, 1990). Interviewers must also be instructed not to express their own opinion and observers must be trained so that they can uniformly record a given item of behavior (Kothari, 1990). Kothari (1990) also proposes that it is always desirable to pre-test the data collection instruments before they are finally used for the study purposes. In other words, the research design uses "structured instruments."

In most of the descriptive/diagnostic studies, the researcher takes out sample(s) and then uses the findings to make statements about the population on the basis of the sample analysis or analyses (Kothari, 1990). More often than not, the sample has to be designed. Usually, one or more forms of probability sampling, or what is often described as random sampling is used. To obtain data free from errors introduced by those responsible for collecting them, it is necessary to supervise closely the staff of field workers as they collect and record information. Checks may be set up to ensure that the data collecting staff perform their duty honestly and without prejudice. As data is collected, it should be examined for completeness, comprehensibility, consistency, and reliability (Kothari, 1990).

The data collected through the survey design must be processed and analyzed. The analysis includes steps such as coding the interview replies, observation; tabulating the data, and performing several statistical computations (Kothari, 1990). To the extent possible, the processing and analysis procedure should be planned in detail before actual work is started. Statistical computations such as averages, percentages and various coefficients must be worked out (Kothari, 1990). The appropriate statistical operations and tests of significance should be carried out to safeguard the drawing of conclusions concerning the study. Last of all comes the task of reporting findings. The layout of the report needs to be well planned so that all things relating to the research study are well presented in simple and effective style (Kothari, 1990).

In summary, descriptive/diagnostic research has clear characteristics including a rigid design for protection against bias and maximizing reliability, use of random sampling, pre-planned design for analysis, structured or well thought out instruments for collection of data, and advanced decisions about operational procedures.

3.2 Justification of the Study Area

The choice of Kisii County as the area of study stems from a practical observation that the high potential rural setting, which was once a food basket for the country, is currently food insecure. In Kisii County, it is not uncommon to find households going hungry not long after the harvest period. The Gusii, a group of people who were once relatively food secure, seem no longer able to meet the basic need. Another reason for choosing Kisii is that the county is among the most densely populated high potential agricultural areas in Kenya. Furthermore, the county has relatively high rates of land

subdivision. However, due to time and financial constraints, only a representative part of Kisii County was studied instead of the whole.

3.3 Application of the Case Study Method

In this study, the case study method was used as a justification for choosing a limited geographical scope (a sub location) for in-depth analysis. The method is a form of analysis wherein careful and complete observation of an individual, family, institution, cultural group or an entire community is done; efforts are made to study each and every aspect of the concerning unit in minute details and then, from case data, generalizations and inferences are drawn (Kothari, 1990). A major characteristic of the case study is that a researcher can take a single social unit or more of such units for the purpose of studying them comprehensively (Kothari, 1990). It is a method of study in depth rather than breadth. The method is essentially an intensive investigation of the particular unit under consideration (Kothari, 1990). The object of the case study is to locate the factors that account for the behavior patterns of the given unit as an integrated totality (Kothari, 1990). Therefore, the method places more emphasis on the full analysis of a limited number of events or conditions and their interrelations.

Generally, the study extends over a long period of time to ascertain the natural history of the unit so as to obtain enough information for drawing correct inferences (Kothari, 1990). According to Kothari (1990), the method allows a complete study of the social unit covering all facets. It helps one to understand the complex of factors that are operative within a social unit as an integrated totality. Besides, mere quantitative information is not collected, rather, every possible effort is made to collect information concerning all aspects of life. As such, case study deepens one's perception and gives a clear insight into life. Notably, in the case study method, an effort is made to know the mutual inter-relationship of causal factors (Kothari, 1990). Moreover, the method results in fruitful hypotheses along with that data which may be helpful in testing them, and thus enables the generalized knowledge to get richer (Kothari, 1990). In its absence, generalized social science may become handicapped.

Another advantage of the case study is that, being an exhaustive study of a social unit, the case study method enables one to understand fully the behavior pattern of the concerned unit. Besides, a researcher can obtain a real and enlightened record of personal experiences which would reveal man's inner strivings, tensions and motivations that drive him to action along with the forces that direct him to adopt a certain pattern of behavior (Kothari, 1990). The method also enables researchers to trace out the natural history of the social unit and its relationship with the social factors and the forces involved in its surrounding environment (Kothari, 1990). Moreover, the researcher can use one or more of the several research methods under the case study approach depending upon the prevalent circumstances (Kothari, 1990). In other words, the use of different methods such as depth interviews, questionnaires, and schedules is possible under the case study method. Additionally, this method is a means to understand well the past of a social unit because of its emphasis on historical analysis. Furthermore, it is also a technique to suggest measures for improvement in the context of the present environment of the concerned social units.

However, the method has various limitations including that the danger of false generalization is always there and it can only be used in a limited sphere (Kothari, 1990). In other words, it is not possible to use the case study in a big society. Despite the stated limitation, the method has been used widely in several disciplines, particularly sociology. Most of the limitations can be removed if researchers are always conscious of these and are well trained in the modern methods of collecting case data and in the scientific techniques of assembling, classifying and processing the same (Kothari, 1990). Besides, case studies, in modern times, can be conducted in such a manner that the data are amenable to quantification and statistical treatment (Kothari, 1990). This ability to employ quantitative techniques on case studies explains why the approach was chosen for this study.

3.4 The Sampling Design

According to Kothari (1990), all items under consideration in any field of inquiry constitute a 'universe' or 'population.' A complete enumeration of all the items in the 'population' is known as a census inquiry. It can be presumed that in such an inquiry when all the items are covered, no element of chance is left and highest accuracy is obtained. However, such an inquiry involves a lot of time, money, and energy. As such, only a few items from the universe were sampled for the purpose of this study. Sampling is the process of selecting part of a whole in cases where exhaustive assessments are impractical or impossible (Mugenda, 1999). A sampling design is a definite plan for obtaining a sample from a given population that is pre-determined before any data collection begins (Kothari, 1990). Sampling the part should be done in such a way as to accurately represent the whole (Mugenda, 1999). The sampling design for this study is explained below.

3.4.1 Sampling the Sub Location

This research was limited in geographical scope to a sub location. The use of a sub location administrative unit for the study is because it is practicable and reasonable considering time and financial constraints. Besides, the official population data of 2009 national census is organized according to sub-locations as opposed to wards.

To sample the sub location, multistage cluster sampling design was adopted. Kothari (1990) proposes that if the total area of interest happens to be a big one, a convenient way in which a sample can be taken is to divide the area into a number of smaller non-overlapping units and then randomly select a number of these smaller areas (usually called clusters), with the ultimate sample consisting of all (or samples of) units in these small areas or clusters. Therefore, in cluster sampling, the total population is divided into a number of relatively small subdivisions and then some of these clusters are randomly selected for inclusion in the overall sample. An advantage of cluster sampling is that it reduces the cost of conducting research by concentrating surveys in selected clusters (Kothari, 1990).

The multi-stage sampling is a further development of the principle of cluster sampling. Ordinarily, multi-stage sampling is applied in big inquiries extending over a considerably large geographical area such as an entire country (Kothari, 1990). Under multi-stage cluster sampling, the first phase

may entail selecting large primary sampling units such as states, followed by districts, then towns and finally certain families within towns. Under this sampling technique, the total area is first divided into a number of smaller non-overlapping areas, generally called geographical clusters, then one or a number of these smaller areas are randomly selected, and all units in these small areas are included in the sample (Kothari, 1990). In this study, multistage sampling was employed by first subdividing the entire of Kisii County into non-overlapping clusters that constitute sub locations.

All the sub locations in Kisii County were listed for purposes of sampling. In the first phase, purposive sampling was used to isolate the rural from the urban sub locations of Kisii County. The urban sub locations were avoided for this study because people in these areas are likely to be less dependent on farming for their livelihoods. To arrive at the specific sub location, a list of all the rural sub locations in Kisii County was prepared and Bogeche was randomly picked as the representative unit. Bogeche sub location was further subdivided into clusters constituting of villages. The simple random sampling technique that was used to select the sub location is similar to the one that is described in section **3.4.6** for sampling individual households from the villages.

3.4.2 The Unit of Analysis

The sampling unit for this study constitutes the household. The household is chosen as a unit of analysis because decisions about production, investment, and consumption are primarily taken at the household level. Most food security and livelihoods indicators use 'households' as the sampling unit, whereas nutrition surveys especially anthropometric ones use children under 5 years of age (1990). Therefore, to collect data for determining household food and livelihood security such as incomes, assets and coping strategies, individual household units were sampled.

3.4.3 The Sample Frame

The sampling frame or source list for this study constitutes all the names of households within Bogeche sub location. The list was obtained from the assistant chief of the sub location. The 2009 census data, which indicates that the sub location has 1744 households, was not be used as the sample frame for this study because it is outdated and does not capture the changes that may have occurred over the last nine years.

3.4.4 The Sample Size

A sample size refers to the number of items to be selected from the universe or population to constitute a sample. The first step in determining any sample size is to clearly define the set of objects, technically called the 'universe', or 'population' to be studied (Kothari, 1990). The universe for this study is finite and entails all the households in Bogeche sub location.

Kothari (1990) notes that choosing the sample size is a major problem before the researcher because it should neither be excessively large, nor too small but optimum. An optimum sample is

one which fulfils the requirements of efficiency, representativeness, reliability and flexibility (Kothari, 1990). While deciding the size of a sample, researchers must determine the desired precision and also an acceptable confidence level for the estimate (Kothari, 1990). The size of the population variance should also be considered. In case of larger variance, usually a bigger sample is needed. The size of the population also limits the sample size. Moreover, the parameters of interest in a research study must be considered (Kothari, 1990). Another factor that dictates the size of sample is the cost. Budget constraint must invariably be taken into consideration when deciding the sample size.

According to Kothari (1990), there are two approaches for determining the size of the sample. The first approach entails specifying the precision of estimation desired and then determining the sample size necessary to ensure it. The second approach uses Bayesian statistics to weigh the cost of additional information against the expected value of the new information. The first approach is capable of giving a mathematical solution, and as such is a frequently used technique of determining the sample size (n). The limitation of the first technique is that it does not analyze the cost of gathering information vis-à-vis the expected value of information. The second approach is theoretically optimal but is seldom used because of the difficulty involved in measuring the value of information (Kothari, 1990). This study employed the first and commonly used approach.

To determine the sample size using the approach, Kothari (1990) proposes the following formulae:

$$n = \frac{z^2 . p . q . N}{e^2 (N-1) + z^2 . p . q}$$

Where, **n**= the desired sample size
Z= the standard normal deviate at the required confidence level
N= size of population
e= acceptable margin of error (the precision)
P= the proportion of the target population estimated to have the characteristic being measured
q=**1-p,** 1-p = the proportion of the population without the characteristic being measured

The value of P can be obtained by estimating it based on personal judgment or as the result of a pilot study. In this study, the value of P is estimated to be .02 based on a pilot study. The population (N) as obtained from the records of the assistant chief in Bogeche (**see appendix N**) is 506 households. The confidence level for this study is chosen to be 95% (1.96 critical value), the acceptable margin of error (e) is estimated at 2% of the true value.

Therefore, the sample size is calculated as follows:

$$n = \frac{1.96^2 \times .02 \times (1-.02) \times 506}{.02^2 (506-1) + 1.96^2 \times .02 \times (1-.02)} = \mathbf{137}$$

From the computation above, the sample size for this study is **137** households.

3.4.5 Determining the Sample Size for Each Village

To select a sample from each village, this study used the proportional sampling technique. Kothari (1990) proposes that in case the clusters do not have the same number of elements, it is appropriate to use a random selection process where the probability of each cluster being included in the sample is proportional to the size of the cluster (Kothari, 1990). The actual numbers selected for each cluster in this manner do not refer to individual elements, but indicate which clusters and how many from each are to be selected by simple or systematic random sampling techniques. The results of this type of sampling are equivalent to those of a simple random sample and the method is less cumbersome and relatively cheaper (Kothari, 1990).

In this study, the sample size for the entire Bogeche sub location is computed to constitute 137 households (*see section **3.4.4***). The sample size for each village was proportional to the number of households in the village when compared with the cumulative total (506 households in the entire sub location). Notably, Bogeche sub location constitutes 7 villages. The names of each village and the total number of households in it are given as follows: Kegwanda I (114 households), Kegwanda II (43 households), Bogeche central (66 households), Moremani I (42 households), Moremani II (42 households), Igwero I (74 households) and Igwero II (125 households) (**see appendix N**).

Using the proportional sampling technique, the computation of the sample size for each village is as follows:

Kegwanda I:

114/506 ×137= **31**

Kegwanda II:

43/506×137=**12**

Bogeche central:

66/506×137=**18**

Moremani I:

42/506×137=**11**

Moremani II:

42/506×137=**11**

Igwero I:

74/506×137=**20**

Igwero II:

125/506×187= **34**

3.4.6 Sampling the Households from Each Village

To sample the households, random sampling technique was employed. Under probability or random sampling, every item of the universe has an equal chance of inclusion in the sample (Kothari, 1990). It is, so to say, a lottery method in which individual units are picked up from the whole group not deliberately but by some mechanical process. Here, it is blind chance alone that determines whether one item or the other is selected (Kothari, 1990). The results obtained from random sampling can be assured in terms of probability because one can measure the errors of estimation or significance of the results obtained from a random sample. This fact brings out the superiority of random sampling design over the deliberate sampling design. Random sampling ensures the law of Statistical Regularity which states that if on average the sample chosen is a random one, it will have the same composition and characteristics as the universe (Kothari, 1990). This reason makes random sampling the best technique of selecting a representative sample.

This study used the simple random sampling technique. The implications of the sampling method is that, in case of a finite population, it gives each element in the population an equal chance of inclusion in the sample and all choices are independent of one another (Kothari, 1990). Moreover, it gives each possible sample combination an equal probability of being chosen (Kothari, 1990). A phone application named 'random sample generator" was be used to select households randomly from each cluster (village). The application requires researchers to input the total number of the units that they wish to sample and indicate their range. For example, to select the specific households from Kegwanda I village in Bogeche sub-location, the researcher would input the desired sample size, which is 31 households (as computed in section ***3.4.5*** above), and provide the range to be between 1 and 114 (the total units in the list of households for the village). The application is automated and would thus generate 31 random units between 1 and 114 that would then be selected from the list for purposes to conducting schedule interviews.

3.4.7 Other Samples

In addition to the households samples described above, extreme case sampling was also be done whereby 3 oldest men and the 3 oldest women in the sub-location were identified for interview. The oldest people provided pertinent information about intergenerational land transmissions and their implications on household food and livelihood security. They also provided information on how land size and land use practices have evolved. Additionally, administrators especially the assistant chief and village elders were sampled to offer their perceptions of the subject. Moreover, various groups were interviewed including professionals, women, men, and youths. All the aforementioned categories including oldest people, administrators, and the various groups were sampled using non-probability sampling methods. The oldest people and administrators were selected using the purposive sampling technique. In this sampling method, the researcher's judgment is used for selecting items which are considered as representative of the population or the ones that have useful information to the study (Kothari, 1990). The oldest people were selected because they are likely to

have important information for the study. The participants of the various groups were chosen through convenience sampling approach in which participants that are readily available are invited.

According to Kothari (1990), when several methods of sampling such as the ones described in this study are employed, the method is called mixed sampling. Notably, it is recommended that one should resort to random sampling so as to eliminate bias and estimate sampling error (Kothari, 1990). However, purposive sampling is considered desirable when the universe happens to be small and a known characteristic of it is to be studied intensively (Kothari, 1990). The sample design to be used must thus be decided by the researcher taking into consideration the nature of the inquiry and other related factors.

3.5 Quantitative and Qualitative Data

This study used both quantitative and qualitative data. The former involves the generation of data in numerical form which can be subjected to rigorous quantitative analysis in a formal and rigid fashion, whereas the latter is concerned with subjective assessment of attitudes, opinions, and behavior. The main research tool used to collect quantitative data is a questionnaire or schedule, whereas qualitative data is often collected using focus group discussions and depth interviews. The use of both qualitative and quantitative data is preferred for this study because while aspects such as farm sizes can be analyzed quantitatively, others like the culture and perceptions of people in relation to land use are best obtained through the qualitative approach.

3.6 Data Collection Methods

Sources of data are classified as either primary or secondary. In this study, both sources of data were used to complement each other. In descriptive research design, primary data is collected through surveys (Kothari, 1990). The surveys may involve observation or direct communication with respondents through ways such as personal interviews (Kothari, 1990). The main primary data collection methods included observation, collection through schedules, and personal interviews. The interviews can be classified as either key informant or round table discussions. Additionally, data collection techniques including mapping and photography were used. Secondary data was obtained through document reviews. These methods and techniques are discussed in detail below.

3.6.1 Observation Method

Observation is a method in which people use all their senses including sight, hearing, smell, touch, and taste to gather information (1990). It becomes a scientific method of data collection when it serves a formulated research purpose, is systematically planned and recorded, and subjected to checks and controls on validity and reliability (Kothari, 1990). The method entails watching peoples' behavior, events, or noting physical characteristics in their natural setting without involving any respondents. Observation offers valuable insights into the environmental and social context of an area. It is particularly useful to gather additional and sensitive information without asking the affected people. It is also useful for cross-checking information obtained through other methods (such as interview schedules) with on-ground observations in the study area (Kothari, 1990).

Moreover, information obtained using the method is not complicated by either the past behavior or future intentions or attitudes but relates to the current happenings (Kothari, 1990). Furthermore, the method is independent of the respondent's willingness to participate (Kothari, 1990). As such, it is relatively less demanding of the respondents' cooperation as is the case with the interview or questionnaire method. However, observation has various limitations including that it is expensive, information obtained through it is quite limited, and its success is dependent on the researcher's experience. Kothari (1990) notes that when using the observation method, researchers should keep in mind things such as: what should be observed; how the observations should be recorded; or how the accuracy of observation should be ensured.

According to Kothari, when observation is characterized by a careful definition of the units to be observed and a standardized style of recording information, it is called structured. Structured observation is considered appropriate in descriptive studies, whereas exploratory studies tend to use relatively unstructured observational procedures (Kothari, 1990). This study used the structured observation method to gather data on dominant land uses, farm sizes, settlement patterns, housing typologies, and off-farm economic activities among others. In particular, an observation checklist was formulated to ensure that all the data that needs to be captured through visualization is obtained (***see appendix I***).

3.6.2 Collecting Data through Schedules

In this study, schedules were used to collect data from household members. Data collection through schedules is similar to the questionnaire except that schedules are filled by enumerators that have been appointed for the purpose. According to Kothari (1990), a major difference between questionnaires and schedules is that the former is usually sent through mail to informants to be answered as specified in a covering letter without further assistance from the sender, whereas the latter is generally filled out by the researcher or enumerator who can interpret questions and explain difficult concepts to the respondents when necessary. The enumerators go with the schedules to respondents and ask the questions in the order in which they are listed. They then record the replies for each question in the schedules (Kothari, 1990). In certain situations, schedules may be handed over to respondents and the enumerator may help them in recording their answers to various questions (Kothari, 1990).

This method requires the selection of enumerators for filling up schedules or assisting respondents to fill up schedules and as such enumerators should be selected carefully (Kothari, 1990). The enumerators should be trained to perform their job well. The nature and scope of the investigation should be explained thoroughly to them so that they may understand the implications of different questions in the schedule. Enumerators should be intelligent and must possess the capacity of cross-examination in order to find out the truth. Above all, they should be honest, sincere, hardworking, and patient (Kothari, 1990). To ensure sincere work, occasional field checks on the work of the research assistants was done.

This method of data collection is useful in extensive enquiries and can lead to fairly reliable results (Kothari, 1990). Moreover, it is likely to generate immediate and complete responses faster than the questionnaire and thus reduces chances of non-response (Kothari, 1990). Furthermore, unlike the questionnaire, schedules do not demand that the respondent must be literate. The method is, however, quite expensive and often adopted in investigations conducted by governmental agencies or established organizations (Kothari, 1990). Population census all over the world is conducted using this method.

3.6.3 Personal Interviews

Personal interviews require the interviewer to ask questions generally in a face-to-face contact with the other person or persons (Kothari, 1990). The interviews can be classified as either structured or semi-structured (Kothari, 1990). This research used both categories of interviews to collect data.

Household surveys were conducted using structured interviews. Such interviews involve the use of a set of predetermined questions and standardized techniques of recording (Kothari, 1990). Therefore, structured interviews are easy to administer and lead to standardized responses that can be analyzed easily. However, the method does not allow researchers to obtain additional information beyond the one required in the schedule.

Semi-structured interviews were used to collect data from key informants and focus group discussions. According to Ritchie et al. (2013), open ended or semi-structured interviews allow research participants to describe situations in their preferred way with the aid of promptings from researchers. As such, this method will enable researchers to obtain detailed information that can enhance qualitative analysis. However, semi-structured interviews require trained interviewers to guide respondents without imposing their views on the research participants (Davies & Hughes, 2014). Besides, it is difficult to generalize the results because they are context-specific (Ritchie et al., 2013).

The reason for using both individual and group interviews is to get responses in the respondents' original words (thoughts). Round table discussions with various groups provided pertinent information on food and livelihood trends and land issues in the study area. Hand written responses were complemented by audio records to ensure that all the information gathered under each aspect of interest is exhausted. Details on how individual and group interviews were conducted are discussed below.

3.6.3.1 Focus Group Discussions (FGDs)

FGDs are small group discussions led by a facilitator who guides the group through a series of questions on a specific topic or series of related topics. Focus group participants are encouraged to interact with each other expressing opinions, relating similarities and differences in experiences and perspectives. The group dynamic encourages participants to respond to one another and generate new ideas or highlight conflicting attitudes that may be missed in a one-on-one interview (Kothari,

1990. Focus group discussions are an effective way to understand the local conception of community and household food security. Focus group participants were selected based on specific characteristics such as gender, age, job, and position. Some focus groups benefit most from similar characteristics (such as all women, the same age, caste or religious group) whereas others from diversity (such as different ages with both mother- and daughter-in-laws). Cultural and social norms as well as research topics are also important considerations when creating a focus group (Kothari, 1990.

Patton (1990) recommends 5-8 persons for focus group discussions. A total of 4 focus groups constituting of professionals, men, women, and youths was conducted. The group of professionals involved teachers, nurses, and physical planners among others. The community groups consisted of men aged between 35 and 70 years; women (35-70 years) and youths (18-35 years). Each FGD had a minimum of 5 and a maximum of 10 people.

The photo below illustrates some of the FGDs conducted for this study.

Plate 3.6.3.1 (a): Youth Focus Group Discussion

Source: Field Survey, 2018

Plate 3.6.3.1 (b) Men Focus Group Discussion

Source: Field Survey, 2018

3.6.3.2 Key Informant Interviews

Key informant interviews were used to yield qualitative data. The schedules were semi-structured to provide room for flexibility, follow up to original questions, and pursuing of new lines of questioning. The interviews were conducted for elderly men and women (over 70 years) and administrators particularly village elders and the assistant chief of the area. The elderly people provided the oral history of the study area in relation to how land size and use have evolved and impacted household food and livelihood security overtime. They also gave account of how land right transmissions have affected land size and use in the study area. Village elders and the assistant chief provided information on food and livelihood trends, and institutional memory on land issues including nature and prevalence of land related conflicts and resolution mechanism in the study area among other aspects.

3.6.3 Document Reviews

Document reviews were used to collect secondary data. Secondary data refers to the information that has already been collected and analyzed by someone else (Kothari, 1990). It may either be published or unpublished data. Published data is often available in various publications of the local, national and foreign governments as well as international bodies and their subsidiary organizations. Other sources of published data include technical and trade journals, books, magazines and newspapers, public records and statistical reports, historical documents, and publications of various associations connected with business and industry (Kothari, 1990). Unpublished data may be obtained from

letters, biographies and autobiographies, trade associations, labor bureaus, and scholarly/research writings among other sources (Kothari, 1990).

This study reviewed documented information on land use patterns and the agricultural activities in the study area. The sources of this information included government documents, public health reports on nutritional status, books, and journals. Land use change data was gathered from analysis of aerial photographs since 1956, remotely sensed image data of land sat, and spot images of land use and land cover changes over the last 60 years. Other documents that were reviewed include past studies, population census reports, population structure maps, rainfall maps, temperature maps, dominant crop maps, and soil maps. Case studies from other countries that have had high population growth and land subdivision problems in the rural areas were also reviewed to gather information on how they solved the problems.

The use of secondary data sources presents various advantages. One of the benefits is that the method minimizes duplication of efforts, particularly when the available information is adequate (Mugenda, & Mugenda, 2003). Moreover, secondary data complements primary data and provides valuable information that can be used to analyze trends over the years. However, Matthews & Ross (2014) argue that while secondary research provides a wide scope of understanding, the method is less effective when conducting context-specific studies.

Given the abundance of secondary data, Kothari (1990) notes that researchers must be cautious in determining which information to use. The data requires thorough scrutiny because it is possible that it may be unsuitable or inadequate in the context of the problem that the researcher intends to study. Accordingly, Kothari (1990) observes that it is never safe to take published statistics at their face value without knowing their meaning and limitations. Therefore, the researcher must ensure that the secondary data is reliable, suitable, and adequate. The reliability of data can be tested by asking pertinent questions including: Who collected the data? What were the sources? Was it collected using proper methods? When was the research conducted? Was there any bias in compilation? What level of accuracy was desired? Was the accuracy level achieved eventually? The suitability of data is relative because one that is suitable for one inquiry may not necessarily be so for another. As such, the researcher must carefully scrutinize the definition of various terms and units of data collection used in the secondary sources (Kothari, 1990). Similarly, the object, scope, and nature of the original enquiry must be studied to determine whether they are suitable for the current study (Kothari, 1990). To determine adequacy, the level of accuracy achieved in the secondary source is tested. Furthermore, if the information in the secondary source is related to a narrow or wider area than the one desired for the study, it may be considered inadequate for the present enquiry (Kothari, 1990). To overcome these problems, this study tested the credibility of the secondary sources and avoided over reliance on a single source. The use of many sources facilitated comparison of data to ensure validity and reliability of the information.

3.7 Data Collection Techniques

Research techniques refer to the behavior and instruments that are used in performing research operations such as making observations, and recording and analyzing data among others (Kothari, 1990). Research techniques differ with research methods in that the latter refers to the behavior and instruments used in selecting and constructing the former (Kothari, 1990). As such, research techniques are a sub-set of research methods. The techniques used in this study include, mapping, photography, and audio-visual recording.

3.7.1 Mapping

Mapping was used to identify specific characteristics in a defined geographical area such as climate, agro ecological zones, livelihood zones, trade linkages, institutions and location of markets, and to represent them spatially. Modern mapping technology particularly the use of GIS was highly exploited.

3.7.2 Photography

Photography was also used to amplify evidence of the observed features. The technique entailed taking photos of various aspects in the study area including land uses, off-farm economic activities, and housing typologies among others. Appendix ***J*** is a structured photography checklist that was used for this study. Taking photos of people entailed seeking their consent first.

3.7.3 Audio-Visual Recordings

This technique entailed using video and audio recording devices to supplement writing or documentation of responses during the field survey. Notably, consent had to be sought from participants before filming or recording them.

3.8 Ethical Considerations

Before embarking on field work, permission was sought from relevant authorities and administrators such as the University of Nairobi and the assistant chief of the study area. Additionally, identification and training of research assistants was done. The training entailed teaching the assistants how to administer research instruments. They were also be taught to observe confidentiality and seek informed consent from respondents during the survey. The respondents' privacy and dignity was protected. The respondents were assured that the information obtained through the survey would treated confidentially and for the purpose of the research only.

3.9 Test of Validity, Reliability, and Practicality

3.9.1 Test of Validity

Validity is the most critical criterion and indicates the degree to which an instrument measures what it is supposed to measure (Kothari, 1990). According to Orodho (2009), the concept of validity in research deals with the question of how the findings of the study adequately represent reality.

Content validity is the extent to which a measuring instrument provides adequate coverage of the topic under study. If the instrument contains a representative sample of the universe, the content validity is good. Its determination is primarily judgmental and intuitive (Kothari, 1990). In this research, validity was upheld through using probability sampling methods and multiple data generation strategies such as structured schedules, focus group discussions, and semi-structured key informant interviews. The multiple data collection instruments allowed for triangulation to ensure validity of the findings.

3.9.2 Test of Reliability

Reliability is the extent to which an instrument yields consistent results overtime (Mugenda & Mugenda, 2003). The reliability of the data collection instruments was assessed by conducting a pilot study in selected patches of the neighboring sub location to the study area. Particularly, 15 schedules were administered in Amabuko sub location during the pilot study. The purpose of pre-testing is to detect possible flaws in the measurement procedure and to identify ambiguously formulated research instruments. The instruments may be edited in the light of the results of the pilot study. In addition, systematic coding and recording technique were used to ensure that different researchers can be guided in carrying out a similar analysis. Kothari (1990) also proposes that reliability can be increased by using trained and motivated persons to conduct the research and broadening the sample of items used. As stated earlier, the research assistants for this study were trained beforehand. Besides, checks were conducted occasionally to ensure that the research assistants adhered to the requirements.

The photos below show the training of research assistants and reviewing findings of the pilot study, respectively.

Plate 3.9.2 (a) Training of Research Assistants

Source: Field Survey, 2018

Plate 3.9.2 (b) Reviewing Findings of Pilot Study

Source: Field Survey, 2018

3.9.3 Test of Practicality

The practicality of a measuring instrument can be judged in terms of economy, convenience, and interpretability (Kothari, 1990). In other words, the measuring instrument ought to be economical, convenient, and interpretable. Economy consideration suggests that some trade-off is needed between the ideal research project and that which the budget can afford (Kothari, 1990). The length of a measuring instrument is an important area where economic pressures are quickly felt. Although more items give greater reliability, in the interest of limiting the interview or observation time, only a few items can be used for research purpose. Similarly, data-collection methods to be used are dependent at times upon economic factors. Convenience test suggests that the measuring instrument should be easy to administer (Kothari, 1990). For this purpose, one should give due attention to the proper layout of the measuring instrument. For instance, a questionnaire with clear instructions is certainly more effective and easier to complete than one which lacks these features. This study used clear and concise research instruments that do not take up a lot of time to administer.

Interpretability consideration is especially important when persons other than the designers of the test are to interpret the results. The measuring instrument, in order to be interpretable, must be supplemented by a detailed instructions for administering the test; scoring keys; evidence about the reliability; and guides for using the test to interpret results. To enhance interpretability, this study recruited research assistants that understand the local language (*Ekegusii*) because majority of the respondents in the study area are not conversant with English. Moreover, to avoid errors associated with wrong translation of the questions into the local language during interviews, the research instruments, particularly the household schedule was translated into the local language (***see appendix M***). This strategy not only ensures that the original meaning of the question is retained but also eliminates the strain associated with interpreting each question to the respondents during interview.

3.10 Data Analysis and Presentation

Data analysis entails the examination of what has been collected in a survey and making inferences. Quantitative and qualitative data was analyzed using different techniques as discussed below.

3.10.1 Analysis and Presentation of Quantitative Data

Quantitative data was edited, cleaned, classified, and coded before tabulation and drawing of statistical inferences. Editing or cleaning is the procedure that improves the quality of data for coding. Coding refers to the process of assigning numerals or other symbols to answers so that the responses can be put into a limited number of categories or classes (Kothari, 1990). Such classes should be appropriate to the research problem under consideration. They must also possess the characteristic of exhaustiveness (there must be a class for every data item) and mutual exclusivity, which means that a specific answer can be placed in one cell only in a given category set (Kothari, 1990).

Coding is necessary for efficient analysis and through it the several replies may be reduced to a small number of classes which contain the critical information required for analysis. Kothari (1990) proposes that coding decisions should be taken at the designing stage of the questionnaire. Pre-coding the questionnaire choices is helpful for computer tabulation as one can enter responses to the computer directly from the original questionnaires. However, in case of hand coding, some standard method may be used. One such standard method is to code in the margin with a colored pencil. The other method can be to transcribe the data from the questionnaire to a coding sheet (Kothari, 1990). Whatever method is adopted, Kothari (1990) suggests that one should see that coding errors are altogether eliminated or reduced to the minimum level.

Tabulation is part of the technical procedure wherein the classified data is put in the form of tables (Kothari, 1990). A great deal of data, especially in large inquiries, is tabulated by computers. Computers not only save time but also make it possible to study large number of variables affecting a problem simultaneously (Kothari, 1990). The coded data was entered into the computer by two independent data clerks for analysis. Quantitative data was analyzed through the aid of the Statistical Package for Social Sciences (SPSS). SPSS package is considered suitable because it is able to handle a large amount of data and given its wide spectrum in the array of statistical procedure which is purposefully designed for social sciences.

Analysis work after tabulation generally entails computation and generation of both descriptive and inferential statistics through the application of well-defined statistical formulae (Kothari, 1990). Descriptive statistics used frequencies such as means and percentages. Inferential statistics entailed testing the hypotheses that were formulated earlier. Various tests such as Chi square, t-test, and f-test have been developed by statisticians for the purpose (Kothari, 1990). The hypotheses of this study were tested through the use of one or more of such tests depending upon the nature and object of research inquiry. Hypothesis-testing resulted in either accepting the hypothesis or rejecting it. The

findings were presented graphically using, tables, bar charts, pie-charts, and graphs as was deemed appropriate.

3.10.2 Analysis and Presentation of Qualitative Data

Qualitative data was analyzed using the content analysis technique. Content-analysis entails evaluating the contents of documented or verbal materials (Kothari, 1990). The evaluation is done by measuring the proportion and pervasiveness (an index of the intensity) of the content. This study used the method to analyze qualitative data such as oral recordings of the elderly people's interviews. The analysis entailed counting the number of times certain key concepts or ideas appear. Qualitative data was categorized into themes and sub-themes in accordance with research objectives and reported in narrative form along with quantitative presentation. Verbatim quotes and narratives by the informants were presented to provide actual feelings and views on the socio-economic and environmental determinants to household food security. The qualitative data was used to complement quantitative data.

3.11 Generalizations and Interpretation

If a hypothesis is tested and upheld several times, it may be possible for the researcher to arrive at generalizations or build a theory. In fact, the real value of research lies in its ability to arrive at certain generalizations (Kothari, 1990). If the researcher had no hypothesis to start with, he or she might seek to explain the findings on the basis of some theory (Kothari, 1990). This explanation is known as interpretation. The process of interpretation may quite often trigger off new questions which may in turn lead to further research (Kothari, 1990). Accordingly, this study drew conclusions from the findings and proposed areas of further research, if necessary.

4. PROFILE OF THE STUDY AREA

4.1 Overview of the Chapter

This chapter entails a review of the historical, geographic, climatic, and socio-economic context of the study area. The discussion is useful for understanding the factors that influence land size and use in Kisii County, especially Bogeche sub location.

4.2 Position and Size of Kisii County

Kisii is one of the forty seven counties in Kenya. It shares common borders with Nyamira to the North East, Narok to the South, and Homabay and Migori counties to the West as shown in ***Map 4.2***. It lies between latitude 0030' and 100 South, and longitude 34038' and 350 East. The county occupies an area of 1,317.5 Km², making it the second smallest in Nyanza region after Nyamira. Bogeche sub location only occupies a small fraction of the county at about 11 km².

4.3 Administrative and Political Units of Kisii County

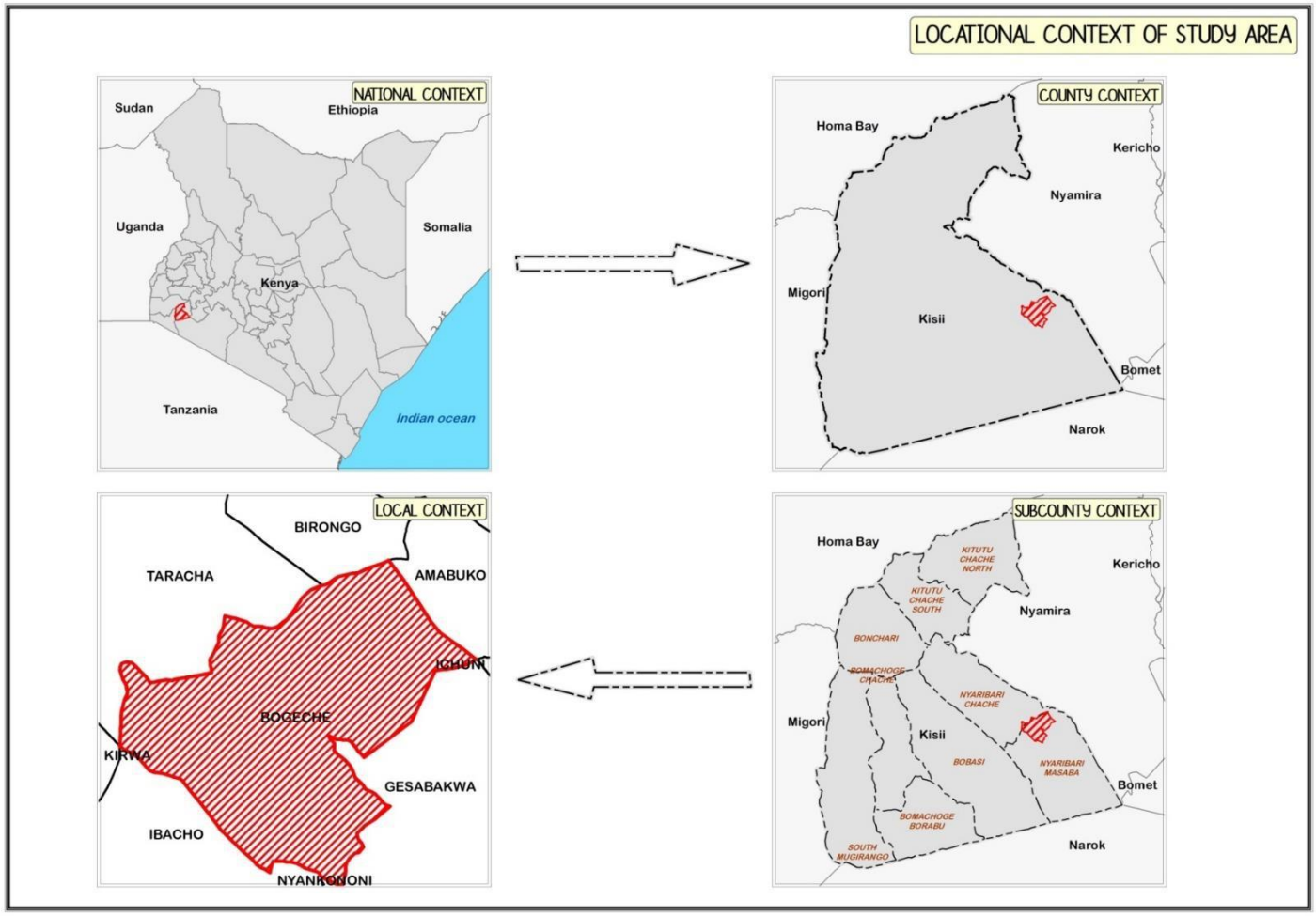
Kisii County is divided into various administrative units. In particular, it has 9 sub-counties, the largest one being Kisii Central (238.7 Km²), which hosts Kisii town. Gucha is the smallest sub-county with an area of 58.8Km². The sub counties are further split into 24 divisions, 75 locations, and 190 sub locations as shown in ***Table 4.3.*** The county has 9 constituencies (political units) as listed in **Table 4.3** and shown in ***Map 4***.3

Table 4.3: Administrative and Political Units

Constituencies	Sub-Counties	Area (Km²)	Divisions	Locations	Sub - locations
Nyaribari Masaba	Masaba South	161.	5	16	48
Nyaribari Chache	Kisii Central	238.	3	12	33
Kitutu Chache South					
Kitutu Chache North	Marani	123.	1	6	13
Bonchari	Kisii South	127.	3	5	14
Bomachoge Chache	Gucha South	204.	4	13	27
South Mugirango	Gucha	58.8	1	5	8
Bobasi	Nyamache	162.	2	9	25
	Sameta	78.0	1	4	10
Bomachoge Borabu	Kenyenya	162.	4	5	12
TOTAL	**9**	**1332.7**	**24**	**75**	**190**

Source: Kisii County Development Profile, 2013

Map 4.3: Location of Kisii County in Kenya



Source: Author, 2018

4.4. Population and Demographic Features

4.4.1 Population Size and Composition

According to the 2009 Population and Housing Census, the County population is 1,152,282 comprising 550,464 males and 601,818 females. This population was projected to show incremental growth over an 8 year period such that by 2017, it will be at 1,367,049 with 660,810 males and 706,239 females as illustrated in ***Table 4.4.1*** below. Notably, the growth rate between 2015 and 2017 was estimated to be 2 percent.

The youthful population (15-30years) was estimated at 385,143 in 2012 representing 31.4 percent of the total county population. The youth constituted about 61 percent of the unemployed population in the county. This population was expected to increase to 437,692 in 2015 and 518,775 in 2017 as shown in ***Table 4.4.1***.

The county's labor force (15-64 years) was estimated at 695,024 people in 2012 comprising 318,510 males and 376,513 females (see ***Table 4.4.1***). This age group represented 57 percent of the total county population (Kisii County, 2012). Most of the labor force is unskilled with 25 percent engaged in formal employment. The rest of the population is engaged in the informal sector. The main type of self-employment is in agricultural related activities. Others are engaged in the hospitality industry, small and medium scale business activities as well as the *juakali* sector (Kisii County, 2012).

From the discussion above, the projections reveal that the county's population is increasing at a high rate. As such, more pressure on limited resources especially land, is expected. Besides, the population of women is higher in comparison to that of men. The ratio calls for policies that acknowledge the role of women in relation to household food and livelihood security and promote gender equity especially in regards to access and control of resources, particularly land. In addition, the demographic composition shows that most of the youths are unemployed and majority of the labor force is heavily dependent on agriculture. Accordingly, to realize sustainable food and livelihood security for the rural population, access to adequate agricultural land is vital.

Table 4.4.1: Population Projection by Age Cohort and Gender

	2009			2012			2015			2017		
Age Group	**Male**	**Female**	**Total**	**Male**	**Female**	**Total**	**Male**	**Female**	**Total**	**Male**	**Female**	**Total**
0–4	97,645	96,729	194,374	103,683	102,710	206,393	110,094	109,062	219,156	114,587	113,512	228,099
5–9	85,748	84,786	170,534	91,050	90,029	181,079	96,680	95,596	192,276	100,626	99,497	200,123
10-14	77,141	76,753	153,894	81,911	81,499	163,410	86,976	86,539	173,515	90,525	90,070	180,595
15-19	66,682	68,192	134,874	70,805	72,409	143,214	75,184	76,886	152,070	78,252	80,024	158,276
20-24	46,460	64,682	111,142	49,333	68,682	118,015	52,383	72,928	125,311	54,521	75,905	130,426
25-29	36,163	47,985	84,148	38,399	50,952	89,351	40,773	54,102	94875	42,437	56,310	98,747
30-34	29,490	33,742	63,232	31,314	35,828	67,142	33,249	38,043	71,292	34,606	39,596	74,202
35-39	24,162	29,261	53,423	25,656	31,070	56,726	27,242	32,991	60,233	28,354	34,338	62,692
40-44	17,569	20,529	38,098	18,655	21,798	40,453	19,808	23,146	42,954	20,617	24,091	44,708
45-49	18,805	21,571	40,376	19,968	22,905	42,873	21,202	24,321	45,523	22,067	25,313	47,380
50-54	14,314	15,929	30,243	15,199	16,914	32,113	16,138	17,959	34,097	16,797	18,692	35,489
55-59	10,690	10,719	21,409	11,351	11,382	22,733	12,052	12,085	24,137	12,544	12,578	25,122
60-64	8,351	8,696	17,047	8,867	9,234	18,101	9,415	9,804	19,219	9,799	10,204	20,003
65-69	5,255	6,061	11,316	5,580	6,436	12,016	5,924	6,833	12,757	6,166	7,112	13,278
70-74	4,501	5,661	10,162	4,779	6,011	10,790	5,074	6,382	11,456	5,281	6,643	11,924
75-79	3,096	3,753	6,849	3,287	3,985	7,272	3,490	4,231	7,721	3,633	4,404	8,037
80+	4,175	6,602	10,777	4,433	7,010	11,443	4,707	7,443	12,150	4,899	7,747	12,646
	550,464	**601,818**	**1,152,282**	**597,934**	**639,032**	**1,236,966**	**634,899**	**678,547**	**1,313,446**	**660,810**	**706,239**	**1,367,049**

Source: KNBS, Kisii 2012

4.4.2. Population Distribution

The major town centers in the County are Kisii Town, Keroka, Suneka, Ogembo and Tabaka. It is projected that the population of these centers will more than double within the medium term as shown in ***Table 4.4.2*** below. The total population of the major town centers was 125,241 in 2009 and was projected to reach 132,982 by 2012, and 146,968 by 2017. Kisii Town has the largest population given that it is home for major businesses, institutions of higher learning and banks. Tabaka's population is expected to increase rapidly due to the soap stone mining in the area, while Suneka's grow this attributed to its location along the Kisii-Migori highway, coupled with its close proximity to Kisii Town, which makes it easier for its residents to commute to work in Kisii. The closest town to the study area is Keroka. If the population of Keroka continues to increase at the same rate as the one projected in table 4.4.2, Bogeche sub location may be infiltrated by urban sprawl by the year 2025. However, at the moment the sub location remains largely rural.

4.4.3 Population Density and Distribution by Constituency

The County population is unevenly distributed amongst its nine (9) constituencies. The population distribution and densities by Constituency are presented in ***Table 4.4.3*** below. The County's average population density in 2012 was 939 persons per square kilometer. The population density ranges from 800 in Nyaribari Masaba Constituency to 1,344 in Kitutu Chache South. The high population density in Kitutu Chache South is influenced by its strategic location along the Kisii-Kisumu highway and close proximity to Kisii Town that has made the area conducive for business growth. Bogeche sub location is situated in the least populated constituency of Nyaribari Masaba with a density of 884 persons per square Kilometre. As pointed out earlier, the sub location was chosen for this study because of its typical rural characteristics. ***Table 4.4.3*** below shows the population distribution and density in each constituency.

4.4.4. Human Development Indicators

Human Development Indicators (HDI) measure the welfare of the community in terms of living a healthy quality life (measured by life expectancy), being educated (acquisition of knowledge) and having a decent standard of living (measured through poverty levels).

The poverty level in the County is placed at 51 percent compared to the national poverty index which is at 43.8 percent. This level is high considering that the County is among the high agricultural potential areas in the country. Life expectancy in the County is estimated at 56 years compared to the National indicator of 53 percent. The adult literacy level in the County is estimated at 71.5 percent as compared to that of the national level at 79.2 percent.

Human development indicators are relevant to this study because, as pointed out earlier, they are closely linked with food and livelihood security. For example, education levels are major determinants of livelihoods. As such, the 51 percent poverty level indicates that the study area is considerably food insecure.

Table 4.4.2: Population Distribution for Major Town Centres

	2009 Census			2012 Projected			2015 Projected			2017 Projected		
Town Centre	**Male**	**Female**	**Total**	**Male**	**Female**	**Total**	**Male**	**Female**	**Total**	**Male**	**Female**	**Total**
Kisii	31,329	30,563	**61,892**	33,266	32,452	**65,718**	35,323	34,459	**69,782**	36,764	35,866	**72,630**
Suneka	2,620	2,900	**5,520**	2,782	3,079	**5,861**	2,954	3,269	**6,223**	3,074	3,403	**6,477**
Ogembo	1,714	1,761	**3,475**	1,819	1,869	**3,688**	1,932	1,985	**3,917**	2,011	2,066	**4,077**
Tabaka	6,100	6,600	**12,700**	6,477	7,008	**13,485**	6,877	7,441	**14,318**	7,158	7,745	**14,903**
Keroka	19,647	22,007	**41,654**	20,862	23,368	**44,230**	22,152	24,813	**46,965**	23,056	25,825	**48,881**
Total	**61,410**	**63,831**	**125,241**	**65,206**	**67,776**	**132,982**	**69,238**	**71,967**	**141,205**	**72,063**	**74,905**	**146,968**

Source: Kisii County, 2012

Table 4.4.3: Population Distribution and Density by Constituency

Constituency	Area km.	2009 (Census)		2012 (Projected)		2015 (Projected)		2017 (Projected)	
		Population	Density	Population	Density	Population	Density	Population	Density
Bobasi	240.5	190,074	790	201,827	838	214,307	890	223,053	927
South Mogirango	204.2	159,049	779	168,884	827	179,327	878	186,645	914
Nyaribari Chache	134.3	142,389	1,059	151,193	1,124	160,543	1,194	167,095	1,242
Kitutu Chache South	104.4	132,131	1,266	140,301	1,344	148,977	1,427	155,057	1,485
Bomachoge Borabu	115.1	107,199	931	113,827	989	120,866	1,050	125,799	1,093
Nyaribari Masaba	161.9	122,070	754	129,618	800	137,633	850	143,250	884
Bonchari	127.0	114,615	902	121,702	957	129,228	1,017	134,501	1,058
Kitutu Chache North	123.8	103,869	839	110,291	890	117,111	945	121,891	984
Bomachoge Chache	106.3	93,530	880	99,313	934	105,454	992	109,758	1,033
Total	**1,317.5**	**1,152,282**	**875**	**1,236,966**	**939**	**1,313,446**	**997**	**1,367,049**	**1,038**

Source: Kisii County, 2012

4.5 Physical and Topographic Features of the Study Area

Physical and topographic features include the slope, elevation, drainage, and soil characteristics among others.

4.5.1 Elevation

Kisii County is characterized by a hilly topography with several ridges and valleys. The most outstanding hills in the county include Nyamasibi (2,170m), Sameta (1,970m), Kiamwasi (1,785m), Kiong'anyo (1,710m), Kiongongi, Kiombeta, Sombogo, Nyanchwa, Taracha, and Kegochi. The area can be divided into three main topographical zones. The first zone covers areas that lie below 1,500m above sea level located on the western boundary and include parts of Suneka, Marani, and Nyamarambe. The second zone covers areas lying between 1,500-1,800m above sea level located in the Western parts of Keumbu and Sameta Divisions, Eastern Marani, and Gucha River basin. The third zone covers areas with a high elevation of over 1,800m above sea level in parts of Eastern and Southern Keumbu, Masaba and Mosocho. Bogeche sub location (found in Masaba) falls in the topographical area with an elevation of about 1800m above sea level. The hilly topography of Bogeche sub location is illustrated in ***Map 4.5.1.1(a)***, ***4.5.1 (b)***, and ***4.5.1 (c)*** below.

4.5.2: Slope

The general slope of the land is from east to west, with depressions and valleys. The slope determines the drainage patterns of the area.

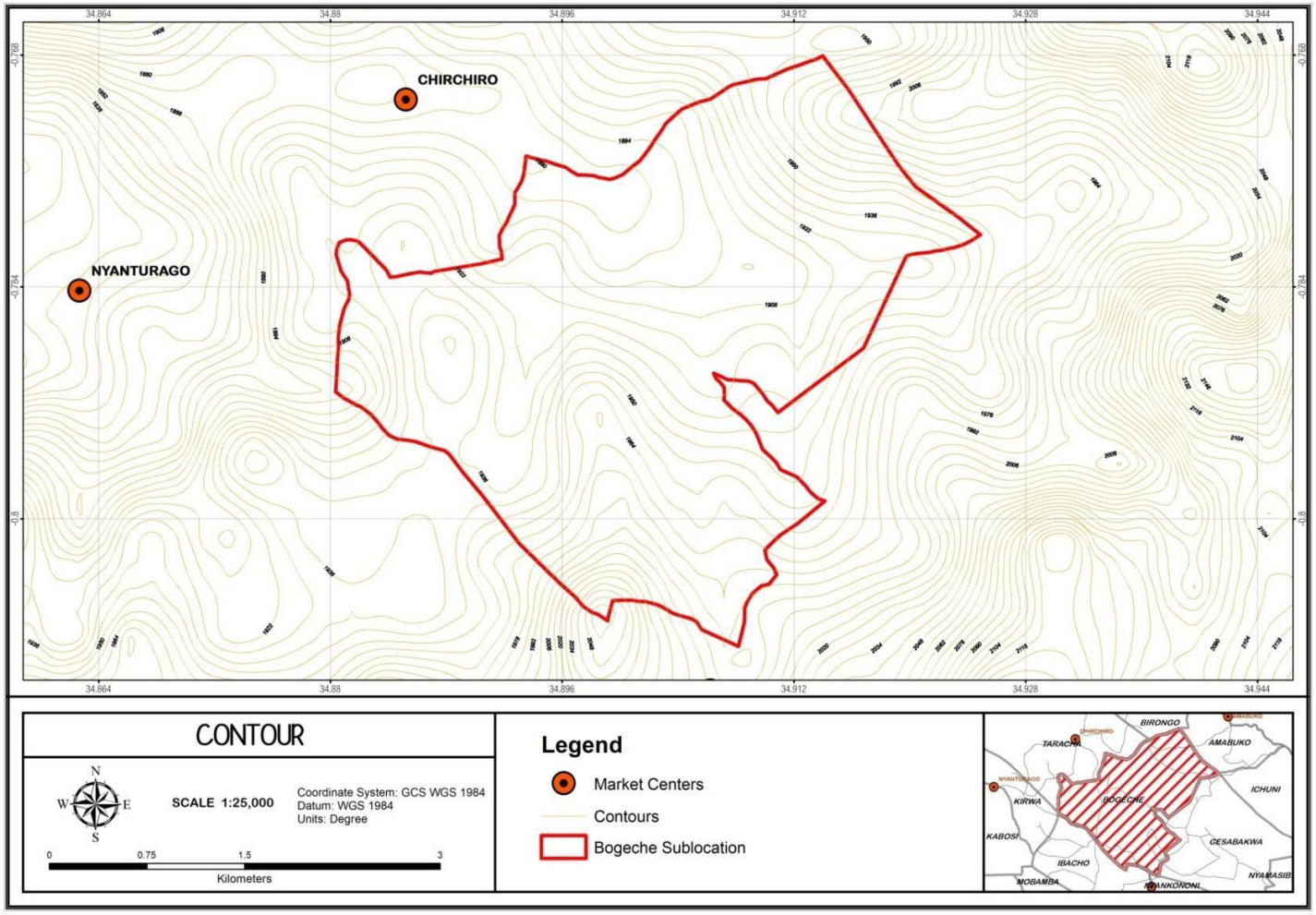
4.5.3 Soils

Seventy five percent of the County has red volcanic soils (nitosols) which are deep inorganic matter. The rest of the County has clay soils which have poor drainage (phaezems), red loams and sandy soils. In the valley bottoms, there are black cotton soils (verisols) and organic peat soils (phanosols). The growth of cash crops such as tea, coffee, and subsistence crops such as maize, beans, and potatoes are supported by the red volcanic soils. Overall, about 78 percent of the County is arable of which 57 percent is under crop. Bogeche sub location largely constitutes of red volcanic soils. The soil PH is between 4.6 and 4.8, the latter being the most prevalent as illustrated in ***Map 4.5.3*** below. The acidic PH is suitable for crops such as tea.

4.5.4 Vegetation

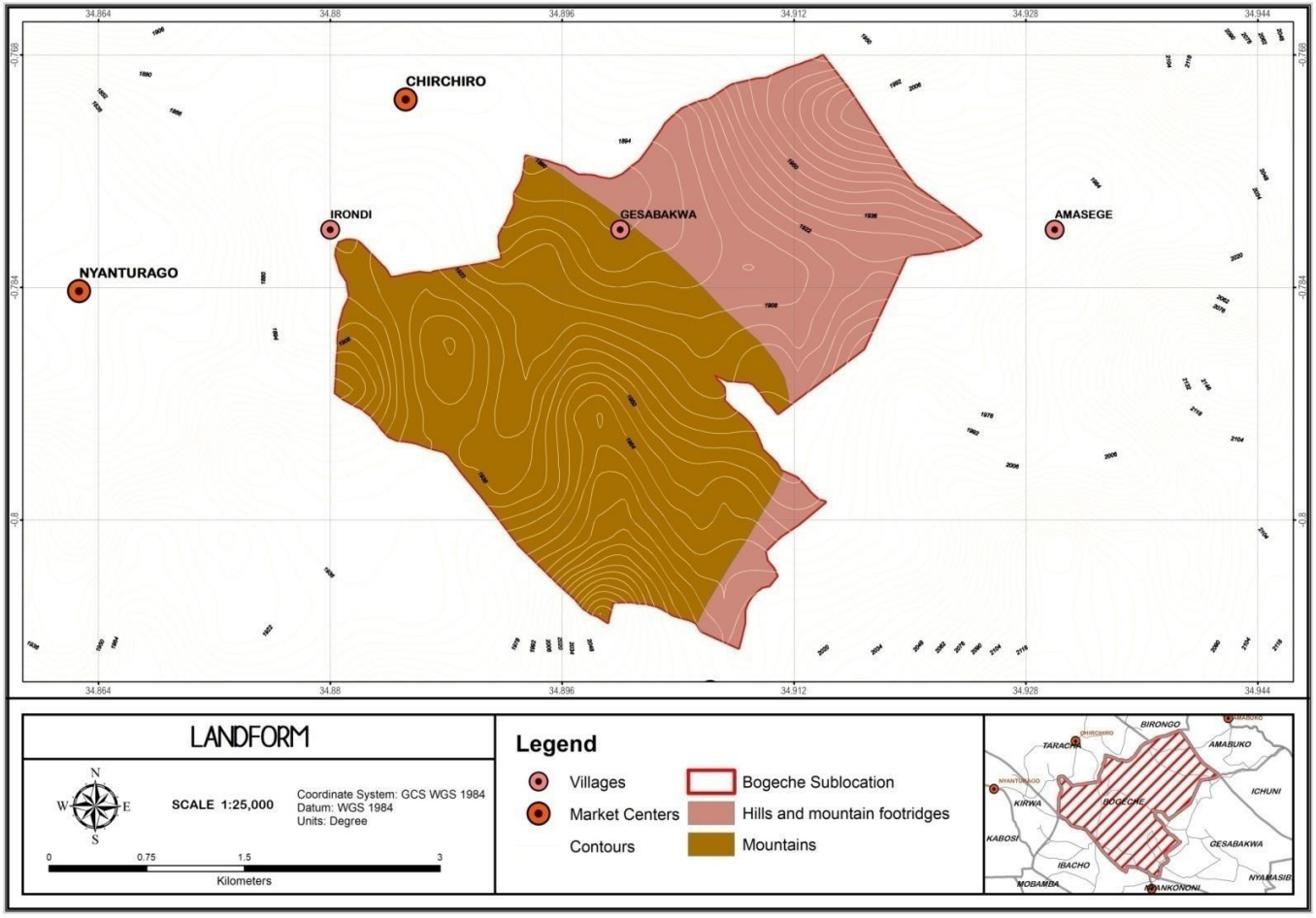
The area's vegetation is woody and bushed grassland with scattered or grouped trees. Most of the vegetation has, however, been replaced by crops and exotic trees (Kisii County, 2012). This study investigated how the variation in vegetation influences household food and livelihood security.

Map 4.5.1 (a): Contours of Bogeche Sub Location



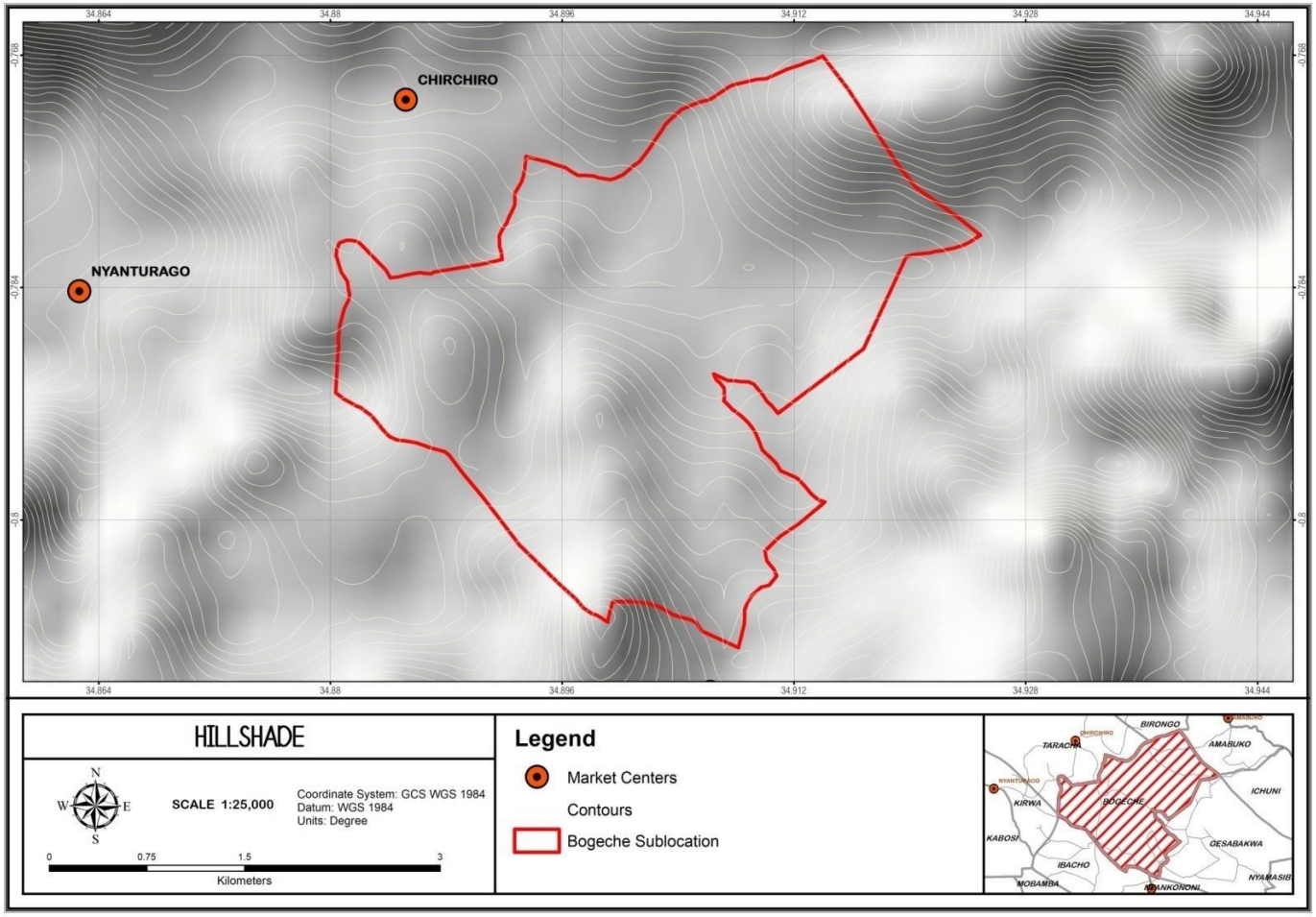
Source: Author, 2018

Map 4.5.1 (b): The Landform of Bogeche Sub Location



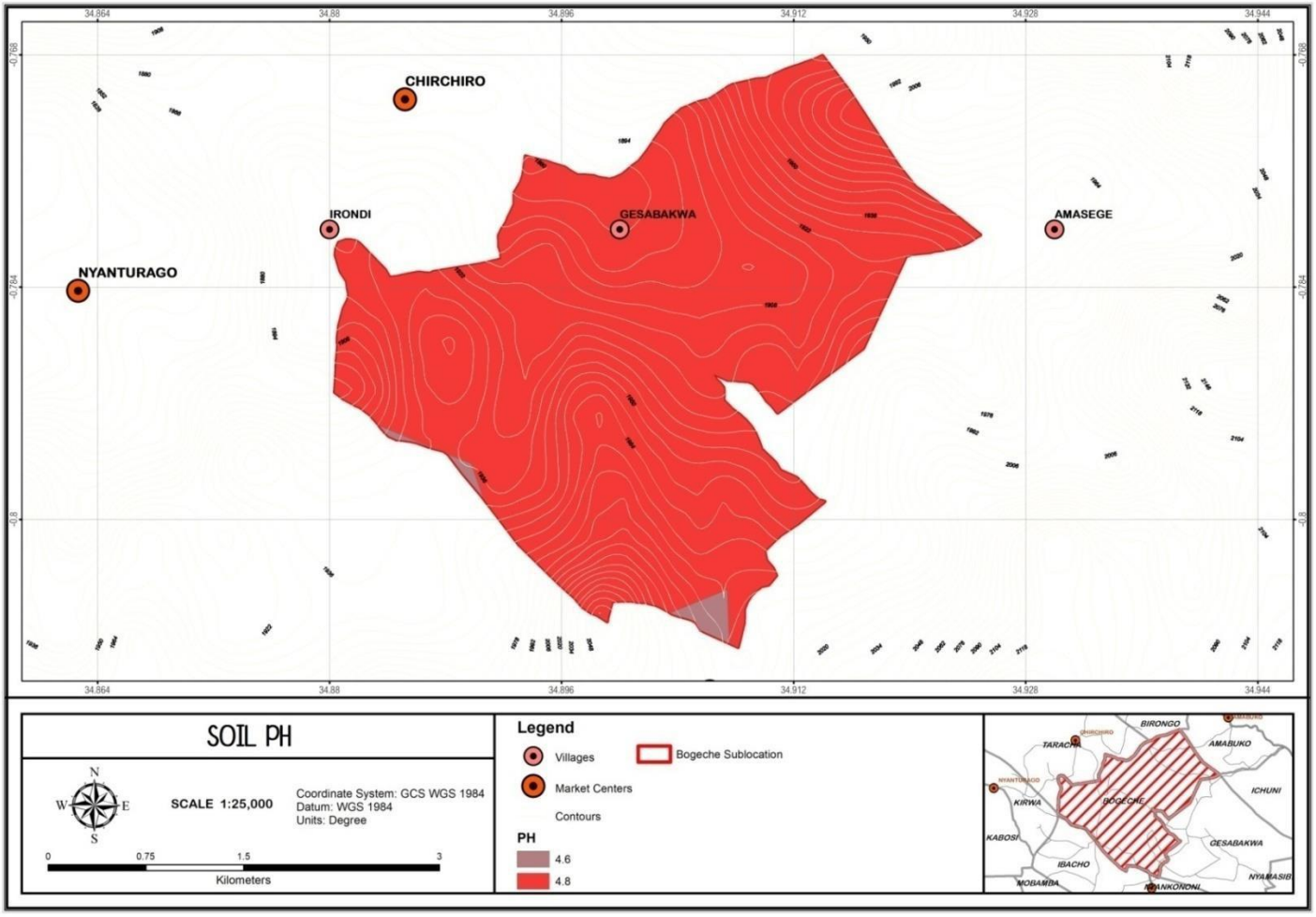
Source: Author, 2018

Map 4.5.1 (c): The Hill Shade of Bogeche Sub Location



Source: Author, 2018

Map 4.5.3: Soil PH



Source: Author, 2018

4.6 Water, Drainage and Sanitation

4.6.1 Water Resources

There are numerous water supply schemes in Kisii County from rivers, protected springs and wells/boreholes. Not all the water is treated. The main schemes are the Kisii Water Supply, Nyakomisaro, and Birongo (covering an area of 60km^2; a treatment capacity of 100,000m^3; with 1,910 connections of which only 446 are active). It is estimated that out of 244,866 households in Kisii County, 9,844 households are connected to piped water of which 7,578 are communal systems (Kisii County, 2013). Availability of water is a component of food security because food cannot be prepared without water.

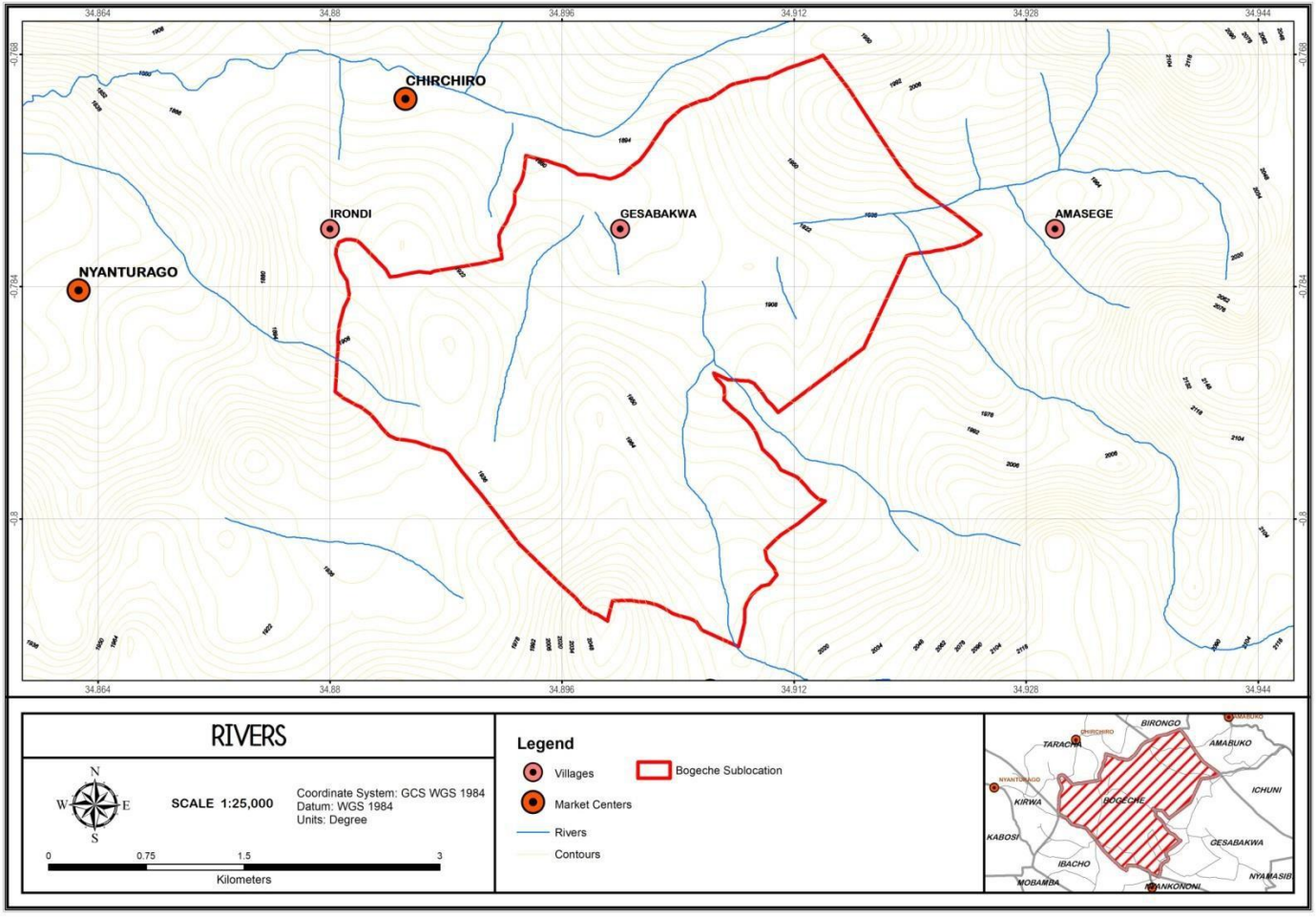
4.6.2 Rivers and Drainage

As pointed out earlier, the general slope of the land is from east to west. The drainage tends to follow the slope and thus flows from east to west. The County is traversed by permanent rivers and streams which flow westwards and drain into Lake Victoria. River Gucha which rises from Kiabonyoru Hills in Nyamira County is the main river and has adequate water for the development of a mini hydro-electric station. Other streams are Mogonga, Mogusii, Riana and Iyabe (Kisii County, 2012). There are also numerous springs and boreholes which are sources of clean water for both human and livestock. It is important to note that sources of water in the County are varied ranging from, springs, streams and roof catchments. It is estimated that the average distance to the nearest water point is about 2 kilometer (Kisii County, 2012). Bogeche sub location is traversed by a few rivers and several streams as illustrated in ***Map 4.6.2*** below. Availability of water for human and animal consumption enhances food and livelihood security because it allows people to keep livestock and prepare food for consumption.

4.6.3 Sanitation

Kisii County does not have appropriate drainage systems and most towns in the County have poor drainage. Waste is not properly managed as there are no designated sites for waste disposal. Most households have pit latrines but there is need to connect households to the sewer lines especially in major towns and establish dumping sites (Kisii County, 2012). Sanitation conditions reflect the level of hygiene in food preparation and consumption. Therefore, sanitation is a component of food security and wellbeing in general.

Map 4.6.2: Rivers and Streams in Bogeche Sub location



Source: Author, 2018

4.7 Climatic Conditions of the Study Area

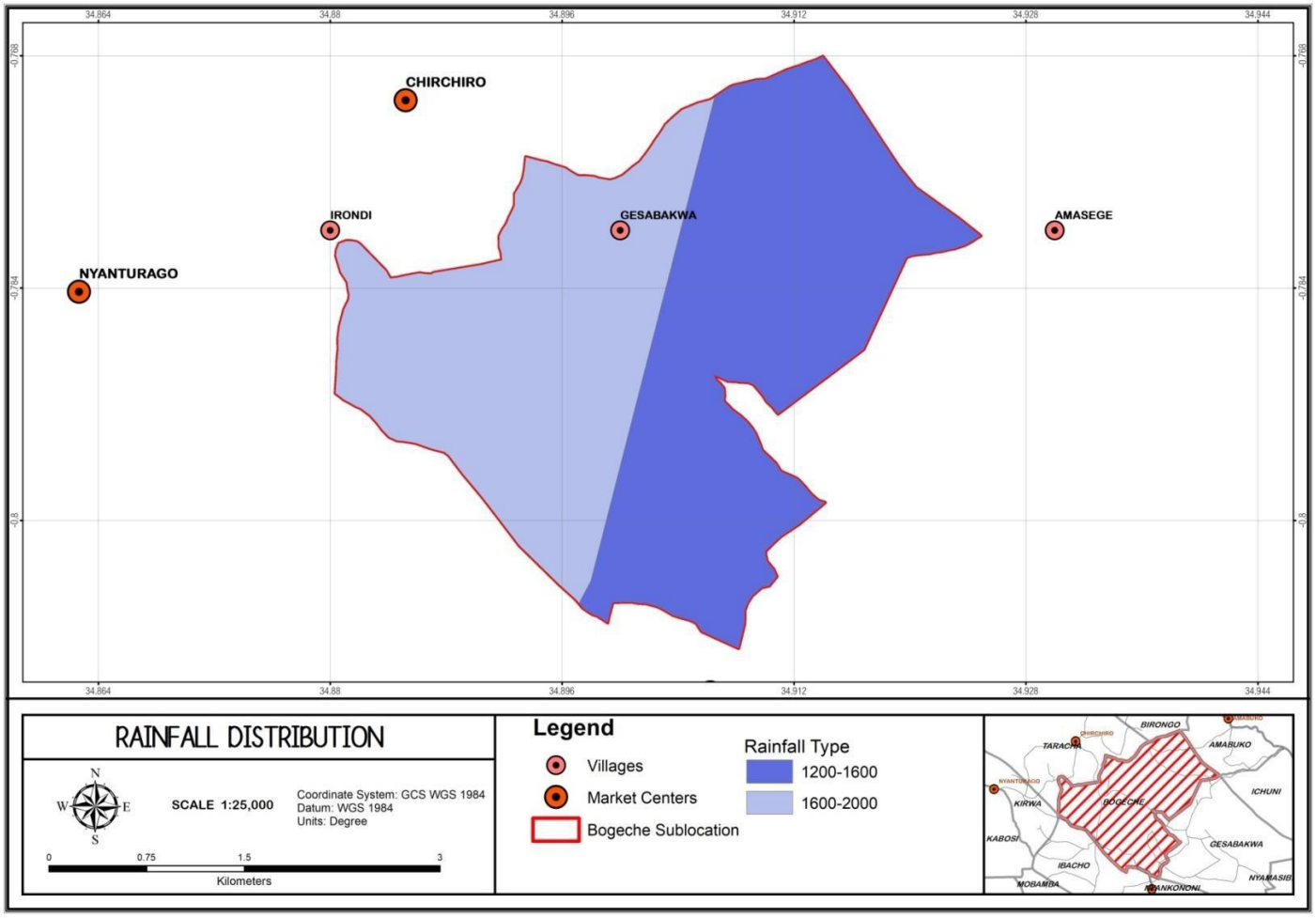
4.7.1 Rainfall

Kisii County has a highland equatorial climate resulting into a bimodal rainfall pattern with an average annual of 1,500 mm. The long rains are between March and June while the short rains are received from September to November; with the months of January and July being relatively dry. The high and reliable rainfall supports crops such as tea, coffee, maize, beans, finger millet, potatoes, and dairy farming. The rainfall pattern of Bogeche sub-location is similar to that of the entire Kisii County. Notably, the western part of the sub location receives a higher average annual rainfall (1600mm-2000mm) than the Eastern part (1200mm- 1600mm) as illustrated in ***Map 4.7.1*** below.

4.7.2 Temperature

The maximum and minimum temperatures in the County range between 21°C to 30°C, and 15°C to 20° C, respectively. The high and reliable rainfall coupled with moderate temperatures are suitable for growing crops like tea, coffee, pyrethrum, maize, beans, and bananas. They are also suitable for dairy farming. The temperatures in Bogeche sub location are similar to those of the wider region of Kisii County.

Map 4.7.1: Rainfall Distribution in Bogeche Sub location



Source: Author, 2018

4.8 Land and Land Use

4.8.1 Mean Holding Size

The household land sizes for smallholder farmers in Kisii County range from 0.2 to 2.1 ha (Kisii County, 2012). The total number of smallholder farmers in the county is estimated to be over 135,000 (Kisii County, 2012). The small sizes of landholdings are considered to be uneconomic for agricultural productivity. This study investigated the implications of these small land holdings on household food and livelihood security, particularly in the mixed farming system of Bogeche sub location.

4.8.2 Percentage of Land with Title Deeds

The percentage of land parcels with title deeds in the county is considerably low (40%). The remaining 60 percent of households reside on ancestral land without formal rights (Kisii County, 2012). This low percentage of people with title deeds may be attributed to the high cost of processing title deeds that is unaffordable to a majority of the population (Kisii County, 2012). Notably, cases of landlessness in the county are few to strong family and community ties that regulate land-use rights (Kisii County, 2012). This study investigated the implication of the prevalent informal land tenure system on household food and livelihood security.

4.8.3 Crop and Livestock Production

4.8.3.1 Main Crops

The main crops produced in Kisii County are maize, bananas, beans, potatoes, tea, sugarcane, coffee, and horticultural crops. However, due to small land holdings, the production is mainly for subsistence purposes. The predominant crops in Bogeche sub location are maize and tea.

4.8.3.2 Acreage under Food Crops and Cash Crops

The acreage under cash crops in Kisii County is approximately 17,800 ha, whereas the food crops cover an area of about 72,500ha. Majority of the farmers still use traditional methods of farming because the smallholdings cannot sustain modern technology (Kisii County, 2012). This study compared how cash crops versus food crops influence food and livelihood security of the rural households in Bogeche sub location.

4.8.3.3 Livestock

The main livestock in Kisii County are dairy cattle (both of local zebu and European stock), goats, sheep, donkeys, and poultry. This study investigated how livestock ownership, particularly dairy cattle, influences household food and livelihood security.

4.8.4 Forestry and Agro-Forestry

Kisii County does not have any gazzetted forests. However, it has many ungazetted ones which include Nyangweta, Ritumbeand Ndonyo forests in Gucha South Sub-County, Keboye Hills in Kisii South, Sameta Hills in Sameta Sub-County, Nyacheki Hills in Nyamache Sub-County,

Igorera and Ibencho Hills in Kenyenya, Taracha Hill in Kisii Central, Intamocha Hill in Gucha sub -County, and Emborogo forest in Masaba South. The total forest cover is approximated at 228.4ha (Kisii County, 2012).

Notably, some of the forests on hilltops have been poorly managed by uncontrolled grazing and cultivation leading to massive soil erosion especially in Nyangweta and Ibencho hills. Cultivation along riverbanks has led to reduction of soil fertility especially during the rainy seasons. Gucha River is the most affected in relation to soil erosion (Kisii County, 2012). This study investigated the correlation between forest or tree cover and food security.

4.9 Infrastructure

4.9.1 Road Network and Airstrip

The County has a network of 1,133 km classified roads and 435km rural access roads. About 171 km of the roads are tarmac. The tarmac roads pass through major town centres like Kisii, Ogembo, Keroka, Nyamache, Gesusu, and Suneka. The total length of graveled road is 293km while 669km are earth roads (Kisii County, 2012). These roads serve high agricultural potential areas. Though the roads are well distributed, poor maintenance and hilly terrain of the County make them inaccessible during the rainy season. The County has one airstrip at Suneka in Kisii South sub-County. However, it cannot allow the landing of commercial aircrafts to facilitate connectivity and trade. Physical access to food through connectivity is one of the four dimensions of food security. As such, poor connectivity can lead to food insecurity even when the food is available in the market. This study investigated whether the food security situation in the Bogeche sub location is related to the conditions of the road networks.

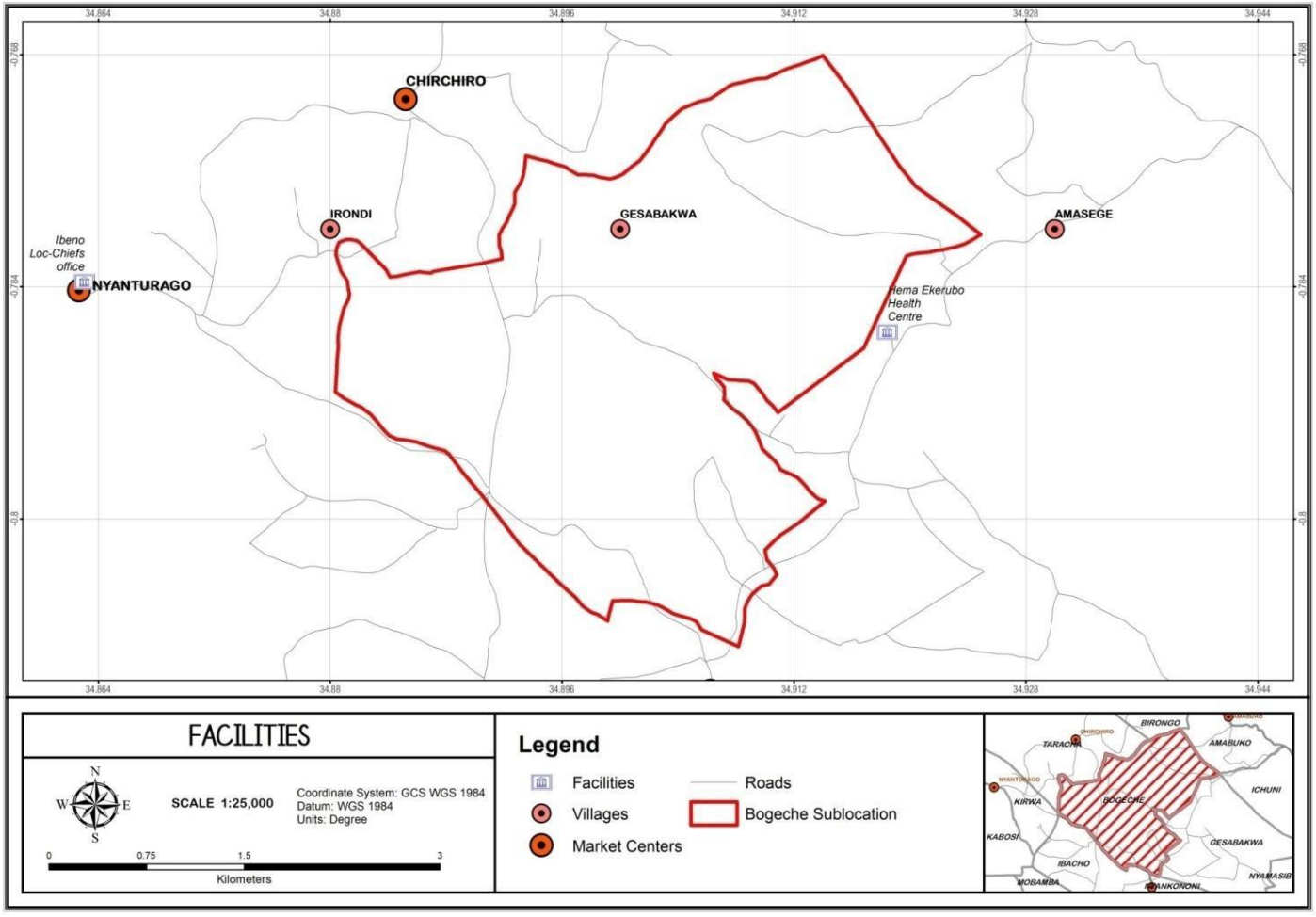
4.9.2 Education Institutions

The County has 793 primary schools and 334 secondary schools of which two are national schools namely; Kisii Boys and Nyabururu Girls High Schools. There is no national polytechnic in the County. The County has 7 colleges, one training institute, 1 public university and 8 university campuses (Kisii County, 2012). These institutions are not adequate to cater for the rising number of youths in pursuit of higher education. High literacy levels are an indicator of food and livelihood security because educated people tend to have higher incomes than less literate or illiterate ones.

4.9.3 Health Facilities

Kisii Town has a government hospital and several private clinics, as well as private practitioners. There are also a number of clinics and health-care stations throughout Kisii County. Map **4.9.3** below shows health and other facilities in the neighborhood of Bogeche sub location.

4.9.3 Facilities in Bogeche Sub Location



Source: Author, 2018

4.9.4 Energy Access

The main sources of energy in the County are firewood, paraffin, electricity, charcoal, and biogas. The electricity coverage in the County is low (45 percent) due to high costs of installation (Kisii CIDP, 2012). There is need to encourage the use of renewable energy sources such as biogas, wind, and solar energy. This move will spare the county from further deforestation. High costs of acquiring energy increase vulnerability to food insecurity because a considerable amount of income is used on other expenditures besides food. Furthermore, energy is required for cooking. As such, low access to energy can contribute to food insecurity. This study assessed the relationship between forest cover and food and livelihood security. It also assessed whether accessibility to energy is a contributor to food security.

4. 10 Markets and Town Centres

The main towns of the County are fourteen namely: Kisii, Keroka, Ogembo, Suneka, Kenyenya, Nyamache, Marani, Nyamarambe, Masimba, Tabaka, Nyacheki, Mosocho, Keroka and Keumbu. There are also several market centers spread in the nine constituencies. It is estimated that about 40 percent of the County's population resides in town (Kisii CIDP, 2012). However, these towns lack infrastructure such as sewer system, piped water and all weather roads making them less attractive for investment (Kisii CIDP, 2012). Towns and market centres serve as trading sites for agricultural produce. Their accessibility is thus of interest to this study.

4.11 Housing Types

The main housing types in the County are mud/wood houses comprising 189,596 households; brick/block houses comprising 51,676 households; mud/cement houses occupied by 21,297 households; stone houses comprising 2,456 households; and timber and other houses comprising 5,637 households (Kisii CIDP, 2012). Due to its high population, Kisii Town has an acute shortage of dwelling units. It is worth noting that there are no slums in the town centres of the county (Kisii CIDP, 2012). Housing type is an indicator of wellbeing. This study sought to find out whether there is a correlation between house types and food/livelihood security in the study area.

4.12 Environmental Issues

The major contributor to environmental degradation in the County is population pressure. Unsustainable farming practices have resulted in destruction of water catchment areas like Nyansembe Forest in Gucha South Sub-County. The depletion of vegetation, together with the hilly terrain also contributes to soil erosion in the County. The application of farm chemicals has caused pollution on both surface and under surface water sources. The coffee and tea processing factories contribute to water pollution through discharging the effluent into the rivers. Mining of soap stone has also led to land degradation.

The main effects of environmental degradation are destruction of water catchment areas, increased spread of diseases like malaria due to uncovered quarry sites which provide breeding grounds for mosquitoes as well as landslides. The weather pattern has also significantly changed resulting in unpredictable planting seasons in the County. Environmental degradation is a threat to sustainable development especially in relation to food and livelihood security. This study seeks to foster sustainable utilization of land resources such that the wellbeing of future generations is not compromised.

4.13 The Role of Agriculture in the Economy of the Study Area

The agricultural sector is considered as a key sector in the socio-economic development for Kisii County. The sector is important in ensuring food security, creating employment and income, and enhancing development of agro-based industries through provision of raw materials in the county. It also contributes towards conserving the environment through appropriate agricultural practices such as agro-forestry.

4.13.1 Crops

The main crops produced in Kisii County are maize, bananas, beans, potatoes, tea, sugarcane, coffee, and horticultural crops. The annual production of maize in 2012 was estimated at 1.68 million bags (90 kg) valued at KES 5,080 million. Production statistics for other crops are indicated in ***Table 4.13.1***.

The main storage facilities in Kisii County include: National Cereals & Produce Board, granaries, stores and sacks at the household level. However, only 30 percent of the produce is stored in the storage facilities due to low level of production as almost all the produce is consumed at household level.

Table 4.13.1: Food Crop Production in the County

Crop	Production Unit	Price/Unit (Kshs)	Total Production	Total Value (Ksh)
Dry Maize	90 kg bag	3020	1,682,174	5,080,165,480
Beans	90 kg bag	5,543	397,415	2,202,871,345
Sorghum	90 kg bag	3,686	1,52	5,602,720
Millet	90 kg bag	5,720	72,9	417,502,800
Green grams	90 kg bag	7,644	240	1,834,560
Sweet potatoes	98 kg bag	3,049	12,1	37,045,350
Cassava	98 (kg bag)	2046	1,45	2,966,700
Tomatoes	M.Tons	40,046	6,28	324,500,000
Cabbages	M.Tons	14,583	4,80	92,700,000
Bananas	M.Tons	14,999	66,8	1,484,900,000
Mangoes	M.Tons	25,007	6,67	167,000,000

Source: Economic Review of Agriculture, 2013

From ***table 4.13.1*** above, maize is the leading food crop in both quantity and value of the produce.

4.13.2 Livestock

The main livestock reared in Kisii County are cattle, goats, sheep, donkeys, and poultry. Due to land scarcity in the county, livestock production and crop farming often compete for space. Milk production in 2012 amounted to 134.5 MT valued at KES 2,683 million (***Table 4.13.2)***. There is a high business potential for animal feed production due to increase in zero grazing activities. This study takes special interest on how livestock keeping for dairy purposes influences household food and livelihood security.

Table 4.13.2: Quantity and Value of Livestock and Livestock products

Product	Quantity	Value (Kshs. Million)
Milk (litres)	134,150,000	2,68
Beef (MT)	2,184	4,769.
Mutton Production (MT)	125.16	20,25
Poultry Meat (MT)	268.5	53.7
Poultry Eggs (No.)	652,153	4.53
Honey (MT)	15.73	4.72
Pork (MT)	16.5	3.3
Fish (MT)	78.2	17.9

Source: Kisii County Development Profile, 2013

4.14 History and Culture of the Abagusii

4.14.1 Origin and Occupational Orientation

The Abagusii are a bantu-speaking people. Historical accounts suggest that the Gusii moved and settled in the fertile South Western slopes of the Mau Escarpment, overlooking Lake Victoria to the West about two centuries ago (Omosa, 1998). They are reported to have originated in a place called *Misiri,* an area whose location seems to have been just North of Mt. Elgon, near Kenya-Uganda border (1998). The Kisii people were predominantly farmers and thus preferred to occupy the agriculturally high potential highlands. The establishment of the British colonial administration in 1907 did not alter the occupational orientation of the Abagusii. Since Kenyan independence in 1963, various developments in the form of schools, road, electricity, piped water, and telephones have taken place in the County. By the 1970s, a shortage of land had begun to make farming unprofitable, and the education of children for off-farm employment became more important (Omosa, 1998). This study investigated how the agrarian community is coping with scarcity of agricultural land in the endeavor to achieve sustainable food and livelihood security.

4.14.2 Kinship Ties

Among the Gusii, a lineage is conceptualized as *egesaku* (common descent) or *enyomba* (family). In the past, membership in a lineage entitled one to rights over land, defense and other forms of

support, including meeting food needs. Migrations among the Gusii, however, show that whereas spatial distribution of lineages is an old practice, and although the people have tried to maintain these linkages to date, particularly by disapproving of inter-marriages, most of the relations have become rather loose in areas that require tangible support. What then seems to matter is a combination of both physical and kinship ties. *Enyomba,* therefore, has come to signify both residential and kin relations with several of these making a clan. A homestead then refers to several households within the same compound but which run as independent units, even if to a limited degree. These units often consist of married sons who still live in the same compound as their parents and other adult brothers. The Gusii lineage system can therefore be analysed in terms of existing bonds and its physical properties. This study takes interest in the Gusii's social organization because it has an influence on the acquisition and distribution of primary resources, mainly land and labor.

4.14.3 Domestic Units and Settlement Patterns

Although this is changing rapidly, settlement patterns in much or rural Gusii are tied to clan and lineage and each Gusii person (*omogusii*) traces descent to Mogusii, through one of the seven clans (Omosa, 1998). Descent is traced along the male line and residence is patrilineal. Social relations within the lineage are particularly important because, as a source of solidarity and support, they remain a basis for new forms of networking and support regardless of the changes taking place.

The traditional Kisii society was predominantly polygamous. Before the colonial period, the extended polygamous family was spatially divided into two components: the homestead (*omochie),* where the married men and women and their unmarried daughters and uncircumcised sons lived, and the cattle camps (*ebisarate),* located in the grazing areas, where most of the cattle were protected by resident male warriors (Omosa, 1998). The British abolished the cattle camps in 1913. In the late nineteenth century most Gusii were settled in dispersed farmsteads, although the North Mugirango built fortified villages for protection against Kipsigis raids. Each wife maintains her own household and there is little cooperation between co-wives. The compound had several elevated granaries for finger millet. The traditional Gusii house (*enyomba*) was a round, windowless structure with a framework of thin branches, walls of dried mull, and a conical, thatched roof (Omosa, 1998). Today the Gusii continue to live in homesteads sited in the middle of the farm holdings. Modern houses are rectangular, with thatched or corrugated-iron roofs, and cooking has been moved from the house to a separate kitchen structure. With the decline in polygamy, a domestic unit typically has come to consist of a wife, a husband, and their unmarried children. It may also include the husband's mother and, for shorter periods, younger siblings of the wife. Until the birth of the first or second child, a wife and her mother-in-law may cook together and cooperate in farming. Married sons and their wives and children usually maintain their own households and resources (Omosa, 1998).

A typical Gusii farm consists of a long strip of land running from the top of a ridge to a valley bottom and it includes the homestead (Omosa, 1998). This study investigated how the culture and settlement patterns of the Gusii influence agricultural land size and use, and by extension, food

and livelihood security. This study used the household (herein defined by the domestic of each wife in case of a polygamous setting) as the main unit of analysis**.**

4.14.4 Inheritance and Land Tenure

Until the 1940s, land was held corporately by lineages and clans. Grazing was communal, and arable land was divided into plots with strict use rights that pertained to each household of the polygamous family. Local populations also included people that did not belong to the clan (*abamenyi),* who had limited tenure. According to customary law, which is still the effective rule for a majority, only men can inherit property. Sons inherit only the cattle, land, and other assets that belong to their mother's house (*enyomba*). All the resources that are owned by the father, such as personal cattle or business establishments, are divided equally among the sons of all houses, irrespective of the number of heirs in each. Although national law recognizes the equal inheritance rights of daughters, customary law has seldom been challenged. Through inheritance, men have ultimate rights to the management and use of land. Women still have no birthright to their parents' land. The vast majority of women can obtain access to land only through marriage; however, a few employed women are able to buy land in other districts. A man usually transfers land to his wife and sons when the eldest son marries. Ideally, land is divided equally between wives, under the supervision of and witnessed by local male elders. After division, the husband often retains a small plot (*emonga*) for personal use. The crop's harvest from *emonga* often served as security in case of a food shortage. This study assessed how the inequitable access to land in relation to gender affects household food and livelihood security in Kisii County.

4.14.5 Socialization

Mothers have the ultimate responsibility for the care and socialization of their children and fathers take very little part in child rearing. Gusii infants are raised to understand how to behave according to the codes of shame and respect that apply to their relationships to persons in adjacent generations. The grandparents play a supportive role and are supposed to inform grandchildren about proper behavior and sexual matters. Children, especially boys cease sleeping in their mother's house when they are still very young. After the age of 8, boys gradually start to sleep in a special house for unmarried sons. After initiation, at the age of 10 or 11, a son cannot sleep in his mother's house at all. This culture compels the Gusii to build have many houses since mature boys that have gone through the initiation rites into manhood cannot sleep on the same roof as their parents. This study takes interest in the settlements of the Gusii people and how the land use affects food and livelihood security.

4.14.6 Division of Labor

In the late nineteenth century women were primarily responsible for food cultivation and processing, cooking, brewing, fetching water and fuel, and cleaning house, whereas men were concerned with waging war, building houses and fences, clearing new fields, and herding. Although women performed most of the cultivation, men participated to a much higher degree than is the case today. Herding was undertaken by boys and young unmarried men in the cattle villages; initiated unmarried daughters assisted in cultivation. Since the early colonial period, the

division of labor has gradually changed, to the disadvantage of women: men have withdrawn from cultivation, but women are obliged to perform most of the same tasks that they undertook during precolonial era, in addition to cultivating the men's cash crops. This research investigated how gender equity or lack thereof affects the food and livelihood security of rural households.

4.14.7 Political Organization

Pre-colonial political power and authority were vested in local male elders' councils and in the big-men who dominated their neighborhoods (Omosa, 1998). In the absence of crosscutting forms of social organization, political life was factionalized into descent-based groups of varying ramifications. Only the Kitutu clan cluster developed a rudimentary political office of chief, *omogambi* ("giver of verdicts"). Women were alienated, and geographically separated, from their natal clans and were thus in a position of little influence and power during the first years of marriage; however, older women, who had gained power by dint of the number of their sons and daughters-in-law, were often in charge of negotiations between fighting parties (Omosa, 2012). Men continue to dominate political life, and leadership is nowadays based on elected office in local government bodies and in administration as chiefs and assistant chiefs.

During the pre-colonial period, disputes over cattle and land, crimes, and other misdeeds were handled by local male elders' councils (Omosa, 2012). Today local disputes are handled by a meeting of local male elders and the assistant chief (*baraza).* Crimes and disputes can also be taken to the court system (Kisii County, 2012). This study takes interest in dispute resolution structures because the scarcity of land in the study area often leads to conflicts related to land ownership and use. A good conflict-resolution structure is expected to ensure that equity and justice prevail.

4.14.8 Religion and Expressive Culture

Before Christianity was introduced to the Gusii, they believed in one supreme god who created the world but did not interfere directly in human affairs. Instead, interference was caused by ancestor spirits *(ebirecha),* witches, and impersonal forces. The Gusii believed that displeased ancestor spirits were responsible for disease, the death of people and livestock, and the destruction of crops. Today, most Gusii claim to be followers of some form of Christianity. A Roman Catholic mission was first established in 1911 and a Seventh Day Adventist mission in 1913. There are four major denominations in Gusii land: Roman Catholic, Seventh - day Adventist, Swedish Lutheran, and the Pentecostal Assemblies of God.

Although churches are very active, some non-Christian beliefs continue to influence the lives of most Gusii. If afflicted by misfortune, many Gusii visit a diviner *(abaragori)* who may point to displeased spirits of the dead and prescribe sacrifice. In addition to abaragori, who are usually women, various healers also exist. *Abanyamoriogi* (herbalists) use a variety of plant mixtures for medicines. Indigenous surgeons *(ababari)* set fractures and treat backaches and headaches through trepanation (needles). Professional sorcerers *(abanyamosira)* protect against witchcraft and retaliate against witches. *Omoriori,* the witch smeller, finds witchcraft articles hidden in a house.

Witches *(omorogi)* can be men or women, but are usually women. They are believed to dig up recently buried corpses to eat the inner organs and use body parts for magic. Among the Gusii, witchcraft is believed to be a learned art handed down from parent to child. This study takes interest in the religious beliefs of the people because the evil spirits are considered to affect crop and livestock yields thus influence food and livelihood security.

4.14.9 Death and Funerals

Funerals take place at the deceased's homestead; a large gathering is a sign of prestige. Women are buried beyond the yard, on the left side of the house, whereas men are buried beyond the cattle pen, on the right side of the house. If the deceased man was married but had not built a house, he cannot be buried without first building a house for him. Notably, the Gusii believe that each grown son must have a house structure in his homeland. Accordingly, people who stay in urban areas have to build houses at their homeland; which are only used occasionally when they pay a visit to their parents. This practice has led to mushrooming of settlements. This study investigated how settlements compare to agricultural land use in the area and the implication on food and livelihood security.

4.14.10 Folklore

Gusii oral tradition contains a number of prominent figures linked with historical events, especially migrations into the current homeland and the arrival of the British. These prominent folk figures are usually men, although a few are women. An example of such a figure is prophet Sakawa (born in the 1840s and died around 1902), who was reported to have predicted the arrival of the British in 1907 and the building of the district capital, Kisii Town. Unlike the situation in other highland areas of Kenya, the Gusii were not moved from their lands. The seven subdivisions of Gusiiland were converted into administrative units under government-appointed chiefs (Omosa, 1998).

The Gusii oral history also presents the people's beliefs concerning harvest and food shortages. While hunger or inadequate food (*enchara*) was seen as avoidable through such coping mechanisms as giving food aid to those affected (ogosuma), famine, locally referred to as *egeku*(deadly disaster), was considered unavoidable and no mechanisms would salvage the situation. Famines were attributed to some supernatural catastrophe that went beyond the people's control and had devastating consequences on the lives of the people (Omosa, 1998). The following is a renowned song from Gusii oral tradition lamenting a locust invasion that led to famine as adopted from Omosa (1998):

Obori bw' baba keande,
e'keande obori bwa' baba, obori bw' baba keande
e' keande baba omotegera nyangweso
e' nyangweso yacha yabori
e' yaboria, enyangweso yacha
enyangweso yacha ya bori

e' yaboria, baba omotegera nyangweso
ndi ndi ndi ndi ndi!

(A Gusii song lamenting a locust invasion that consumed all the finger millet from the farm)

4.14.11 Food

Before British colonization, the main crop grown in Gusii land was finger millet, which the Gusii considered very nourishing (they also believed it strengthened a person's physical and mental power and increased a man's sexual prowess). Sorghum, beans, and sweet potatoes were also cultivated. These foods were complemented by meat and milk from livestock as well as wild vegetables.

The staple food presently is maize, which is ground into flour. Corn flour is mixed into boiling water to form a thick dough-like paste *(obokima)* that is eaten at all meals. A meal usually includes fried cabbage, tomatoes, and some potatoes. Depending on how well-off the family is, chicken or goat may be served. Other popular foods are sour milk, goat intestines, and millet porridge. This study takes interest in the nutritional value of the food consumed in the study area because food security is not simply a matter of quantity but also quality of the food.

4.14.12 Social Problems

Alcoholism and violence toward women are the most severe social problems. Traditionally, only older people were allowed to drink large amounts of locally brewed beer *(amarua).* Today, social control over drinking has broken down, and traditional beer and home-distilled spirits are served in huts all over the County. Probably close to 50 percent of young and middle-aged Gusii are regular drinkers, with a larger proportion of men than women. This heavy drinking leads to violence, neglect of children, and poverty. The Gusii also have high murder rates compared to the rest of Kenya. Although violence toward women (such as rape and beatings) has been part of Gusii culture since earlier in this century, alcohol is probably a factor in its increase. This study investigated whether social problems such as alcoholism have a link with food and livelihood insecurity.

4.14.13 Subsistence and Commercial Activities

The pre-colonial staple crop was finger millet, which was grown together with sorghum, beans, and sweet potatoes (Omosa, 1998). Cultivated-plant food was complemented by meat and milk from livestock and wild vegetables. At the end of the nineteenth century, the cultivation period was two years, with a fallow of three to six years. By the 1920s, maize had overtaken finger millet as both a staple-food crop and a cash crop (Omosa, 1998). Maize is widely cultivated, mainly twice a year. Mixed farming and multi-cropping is also widely practiced in the County. Other important contemporary crops include cassava, pigeon peas, green grams, onions, bananas, potatoes, and tomatoes. Coffee was already being grown on a limited basis in the 1930s, and, by the 1950s, Gusii land had become established as a producer of coffee and tea. Livestock including

cattle (both of local zebu and of European stock), goats, sheep, and poultry were also kept are still reared presently. Subsistence farming is widely practiced in the County. In addition to farming, many Gusii people engage in employment or business, either locally or in the large urban centers. This study assessed how farm and non-farm activities influence household food and livelihood security in the study area.

5. PRESENTATION AND ANALYSIS OF THE RESEARCH FINDINGS

5.0 Chapter Overview

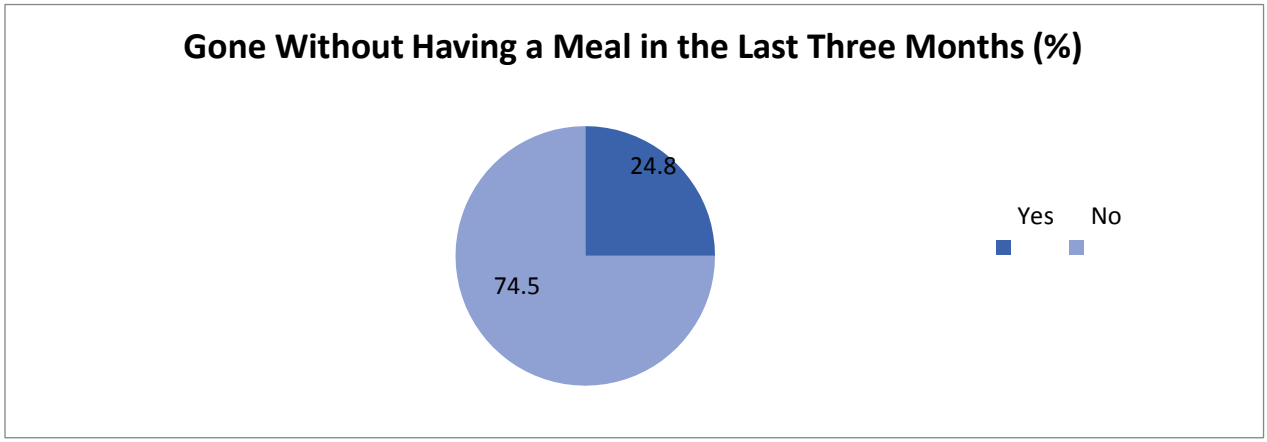
This chapter presents the results, interpretation, and discussion of the central findings of this study. First, the food security status of households in the study area is discussed and then followed by the findings for each of the four research objectives in their respective order.

5.1 Household Food Security Status

This study used an experience-based approach to measure food security. As already discussed, food security has four dimensions including availability, access, stability, and utilization. Accordingly, this study used various indicators related to the dimensions of food security to assess the prevailing situation.

Respondents were asked to describe their household's food security status, whether secure- that they have food- or insecure- that they struggle to secure three meals a day all for the last three months. Three months were used to assess the situation because they reflect the existing food security situation. A considerable percentage (24.8%) indicated that they were food insecure and had skipped some meals for the last three months three due to food scarcity, whereas 73.5% were food secure as shown in **chart 5.1**

Chart 5.1: Household Food Security Status



Source: Field Survey, 2018

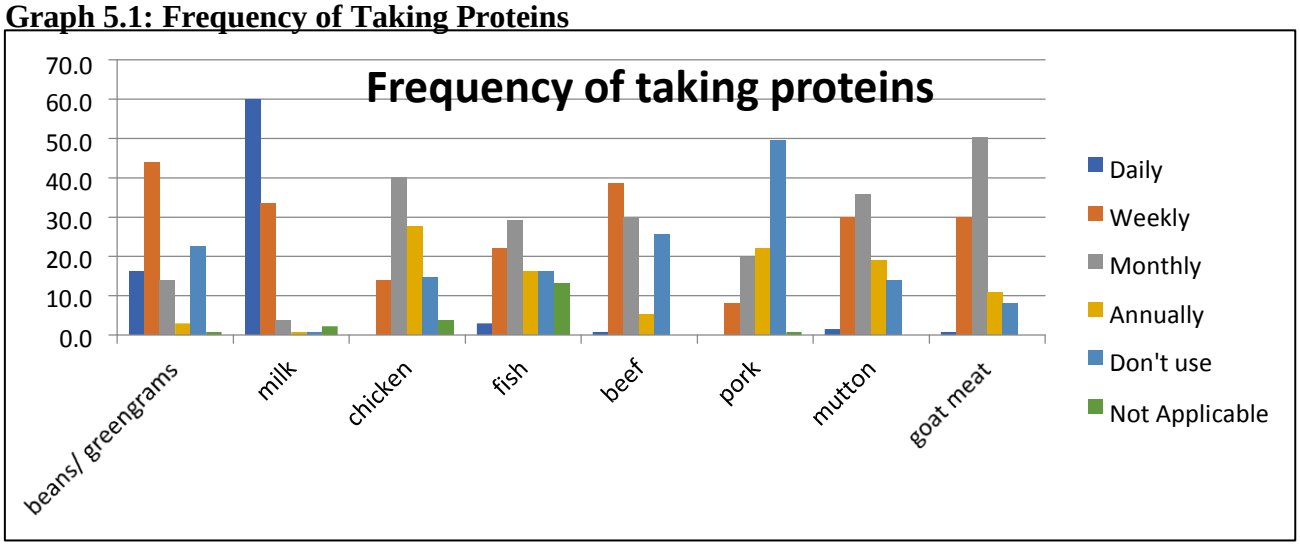
This percentage of food insecure population is alarming given the Kisii is a high potential agricultural land that is expected to produce surplus to feed other regions.

Main Food and Consumption Patterns

The study also assessed the food consumption patterns in the study area with the aim of capturing the utilization dimension of food security.

Results show that milk is consumed daily. Beans, beef, and goat meat are consumed weekly, whereas chicken and fish are consumed monthly basis. Most of the respondents do not use pork and beef as illustrated in **graph 5.1** and **table 5.1.**

Graph 5.1: Frequency of Taking Proteins



Source: Field Survey, 2018

Table 5.1 Frequency of Taking Proteins

Duration	beans/green grams	milk	chicken	fish	beef	pork	mutton	goat meat
Daily	16.1	59.9	0.0	2.9	.7	0.0	1.5	.7
Weekly	43.8	33.6	13.9	21.9	38.7	8.0	29.9	29.9
Monthly	13.9	3.6	40.1	29.2	29.9	19.7	35.8	50.4
Annually	2.9	.7	27.7	16.1	5.1	21.9	19.0	10.9
Don't use	22.6	0.7	14.6	16.1	25.5	49.6	13.9	8.0
Not Applicable	.7	2.2	3.6	13.1	0.0	0.7	0.0	0.0

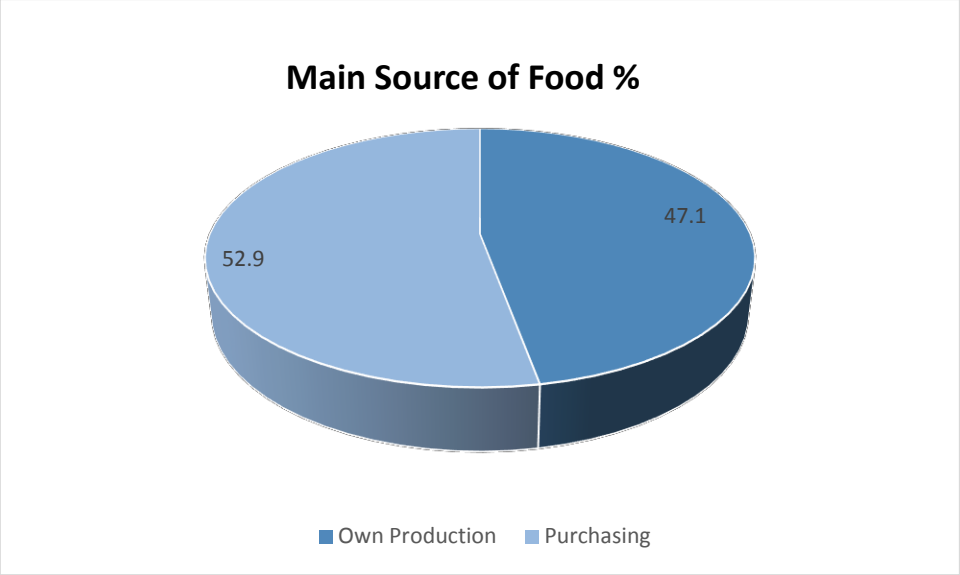
Source: Field Survey, 2018

The study focused on proteins because the area is known for overreliance on ugali and vegetables.

Main Source of Food

The study established that 47.1 per cent of food consumed by residents of Kisii County is from own production while 52.9 per cent is purchased from food markets as shown in **chart 5.1.**

Chart 5.1: Main Source of Food



Source: Field Survey, 2018

The result indicates that the households are deficit producers of food crops and hence rely on purchasing food from other areas despite being a high potential agricultural land.

5.2 Current Household Land Size and Use and How They Influence Household Food and Livelihood Security

5.2.1 Current Household Land Size

Land size (herein measured in acres) captures the size of the land available to the household, whether it is owned or rented as discussed below.

Owned Household Land Size

The people of Bogeche own different sizes of land ranging from less than 0.5 acres to around 4 acres. A majority (59%) own less than an acre, with a significant proportion out of these (32.8%) owning less than 0.50 acres as shown in **table 5.2.1.**

Table 5.2.1 (a): Owned Land Size

Owned Land Size in acre		Percent
Valid	<0.50	32.8
	0.51-0.99	21.2
	1.00-1.49	16.8
	1.50-1.99	2.2
	2.00-2.49	2.2
	2.50-2.99	4.4
	3.0-3.49	2.2
	3.5-3.99	5.1
	Total	100.0

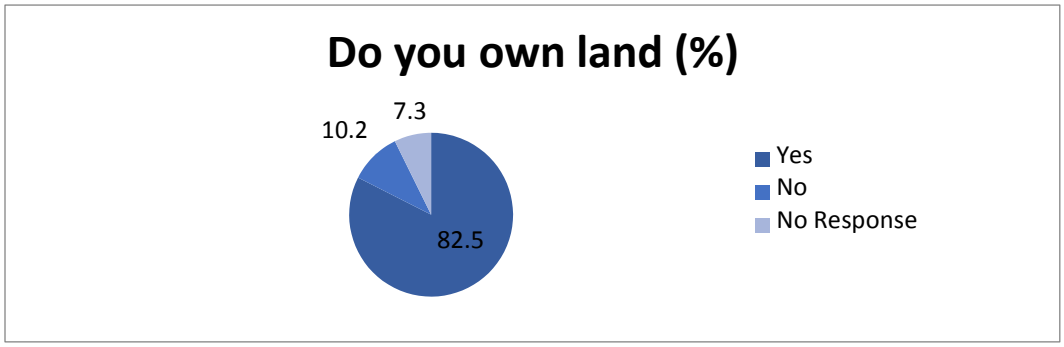
Source: Field Survey, 2018

The average owned household land size is half an acre (0.5 acre). The land sizes are relatively small considering that the area is one of the high agricultural potential zone in Kenya.

Proportion Owning Land

Most household heads (82.5%) own land in the study area as shown in **chart 5.2.1**.

Chart 5.2.1 (a) Land Ownership



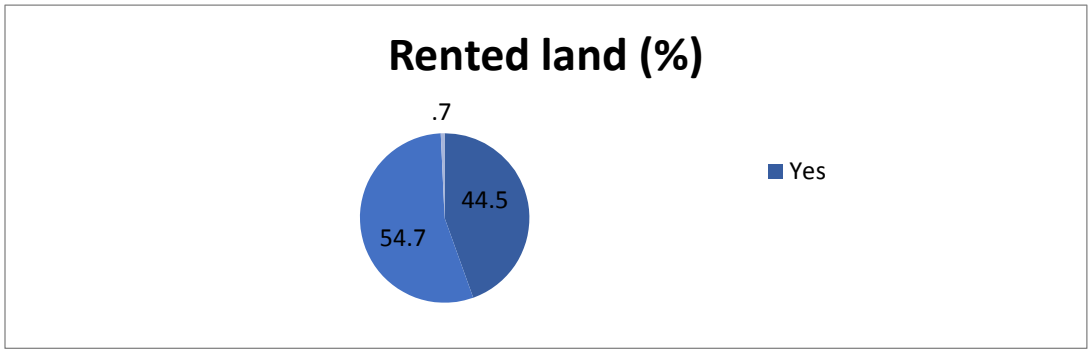
Source: Field Survey, 2018

Therefore, most of the households can determine how to use land because it belongs to them.

Rented Land

Nearly half of the people in the study area (44.5%) have sought access to land through renting as shown in **chart 5.2.1**.

Chart 5.2.1 (b): Rented Land



Source: Field Survey, 2018

Therefore, a considerable number of people are renting farmlands as a coping strategy for the diminishing ownership of agricultural land.

Size of Rented Land

A significant proportion (21.2%) have rented between 0.50 and 0.99 acres of land, with an average parcel size of 0.75 acres. Only a small proportion (4.3%) have rented above 2 acres of land as shown in **table 5.2.1 (b**).

Table 5.2.1 (b): Size of Rented Land

		Frequency	Percent
Valid	<0.50 acres	10	7.3
	0.51-0.99	29	21.2
	1.00-1.49	7	5.1
	1.50-1.99	11	8.0
	2.00-2.49	5	3.6
	2.50-2.99	1	.7
	Not Applicable	73	53.3
	No Response	1	.7
	Total	137	100.0

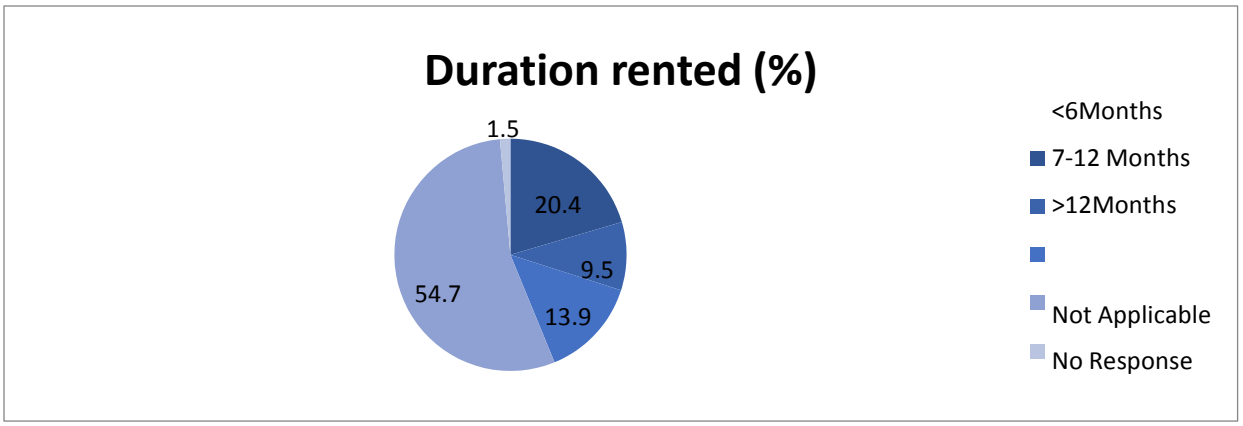
Source: Field Survey, 2018

The reason why most people have rented less than an acre is that there are no large tracks of land available for renting.

Duration of Rented Land

A significant proportion of the people in the study area (29.9%) have rented land for a duration ranging from less than six months to a year, whereas only 13.9 percent have acquired land through renting for more than a year as shown in **chart 5.2.1 (c).**

Chart 5.2.1 (c) Duration of Rented Land



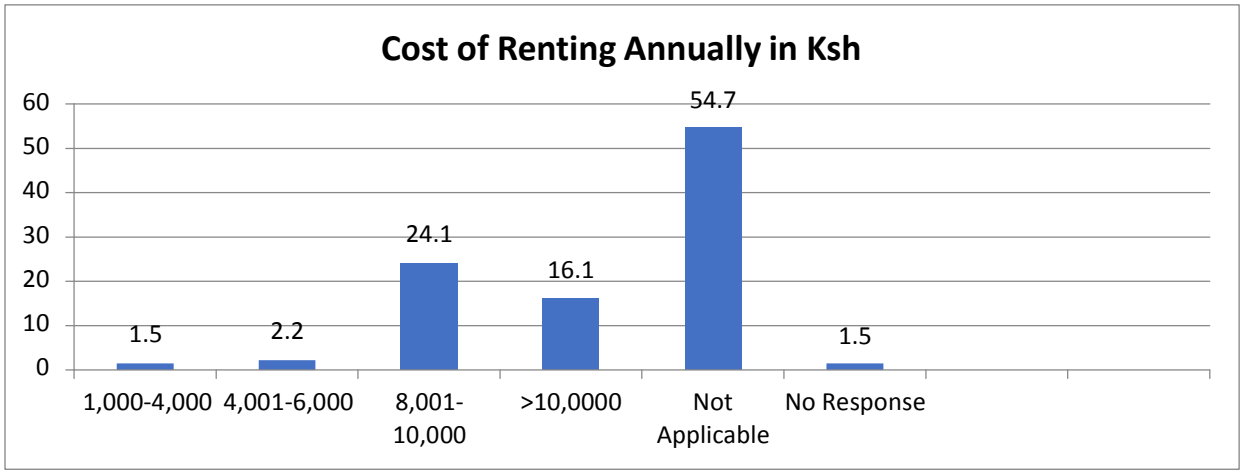
Source: Field Survey, 2018

Therefore, rented land is only temporarily available depending on one's ability to pay for it.

The Cost of Rented Land

The cost of renting land varies from Ksh. 1,000 to Ksh. 10,000 per acre annually. Most of the parcels (24.1%) range between Ksh. 8, 0000-10,000, and only 16.1% cost over Ksh. 10,000 as shown in **graph 5.21.**

Graph 5.2.1: Annual Cost of Renting Land



Source: Field Survey, 2018

Only a small proportion (3.7%) have rented an acre of land for less than Ksh. 6000 per annum, mostly because the land owner and the tenant have kinship ties. The cost of renting land is likely to increase with time as land scarcity becomes more severe. Therefore, whereas renting can temporarily alleviate the problem of land scarcity, it presents a myriad of challenges including, uncertainty of future availability and fluctuating costs.

5.2.2 How Land Size Relates to Food and Livelihood Security

Descriptive data indicated that households with above 2.5 acres were the most food secure with an average food security status of 60 percent, followed by those that owned between 1.0 and 2.49 acres (an average food security status of 56%), and then those with 0.5 to 0.99 acres (a food security status of 39%). The least food secure households (with the food security status of 32%) had farm sizes of below half an acre as shown in **Table 5.2.2.**

Table 5.2.2 (a) How Farm Sizes Influence Food and Livelihood Security

Land Size in Acres	Percentage	Food Secure Percent	Food Insecure Percent
<0.5	32.8	32	68
0.5-0.99	21.2	39	61
1.0-1.49	16.8	55	45
1.5-1.99	2.2	57	43
2.0-2.49	2.2	56	46

2.5-2.99	4.4	60	40
3.0-3.49	2.2	63	36
3.5-3.99	5.1	58	48
Total	100		

Source: Field Survey, 2018

Therefore, household food security was higher among households with large land parcels than those with smaller ones.

Hypotheses-Testing Results

Farm size was hypothesized as a determinant of household food security. The findings on the hypotheses testing were established by carrying out a 2 tailed Pearson's (r) correlation test.

The following guide was used to interpret values:

Pearson's (r) correlation coefficients **range *from -1 to 1***

-1 = Perfect Negative relationship 0 = No relationship 1 = Perfect Positive relationship

As a guide, ± (0.1 – 0.3) = Weak, ± (0.4 – 0.7) = Moderate, ± (0.7+) = Strong

The P-value is the probability that one would have the same result if the correlation coefficient were in fact zero (null hypothesis). If this probability is lower than the conventional 5% ($p<0.05$), the correlation coefficient is considered statistically significant.

The results are displayed on **Table 5.2.2 (b)**

Table 5.2.2 (b): The Relationship between land size and household food Security

Variables	**Pearson Correlation (r)**	**P value**
Farm Size	0.471	0.000**

*Statistically not significant (P>0.05) Source: Field survey, 2018

**means statistically significant (P<0.05)

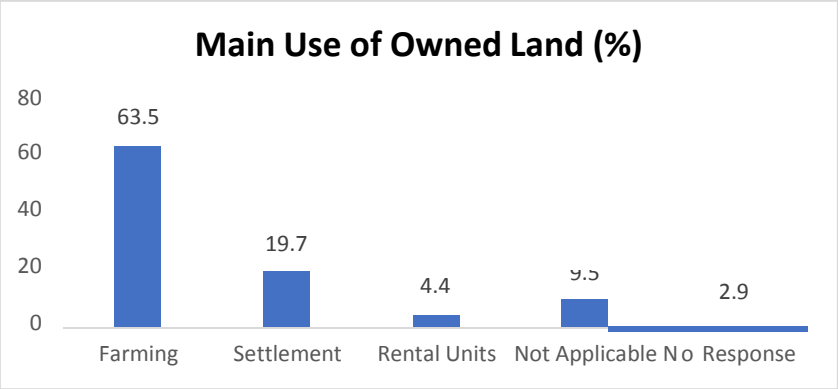
The findings from this study showed a moderate positive correlation between land size and household food security in the study area (r = 0.471) at 5% probability level. The possible explanation for this finding is that households with large farm sizes had the flexibility of diversifying crops and keeping livestock. Some could also lease the land to neighbors who then gave them extra income to support their families. In addition, households with large farms can have better chances of accessing credit for buying farm inputs because or investing elsewhere because the land can be used as a collateral. The finding also implies that households with inadequate land holding in the study area were unable to significantly improve their livelihood

through alternative sources such as selling labour, engaging in meaningful, or intensifying the productivity of the small parcels they owned. This finding concurs with a study by Kumba et al. (2015) in Kisii Central Sub-County which found that a fairly large proportion of respondents were food insecure due to small farm sizes. It also corresponds with earlier studies by Alem, (2007) in Amhara Region of Ethiopia and Kirimi et al. (2013) in Kenya who found out that agricultural yields increased with an increase in land size, which in turn translates to food security. The finding is anchored on the premise that land productivity cannot supersede the carrying capacity of particular environment and as such, smaller farm lands have limited capacity to provide enough yields needed to curb food insecurity (Stewards, 1955). This result establishes the key role that land holdings play in household food and livelihood security. Therefore, the null hypothesis that land size does not have a significant relationship with food security was rejected and the alternative adopted. The alternative hypothesis states that farm size is positively correlated with food and livelihood security.

5.2.3 Land Use

The two major land uses in the study area entail agriculture and settlement**.** Being an agricultural zone, majority (63.5%) of the land owners use if for farming and a significant proportion (19.7%) use the parcels primarily for settlement as shown in **Graph 5.2.3 (a)**.

Graph 5.2.3 (a): Main Use of Owned Land



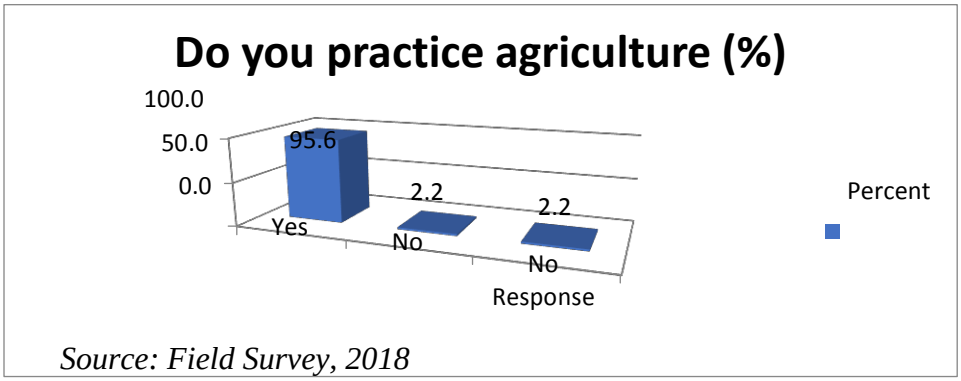
Source: Field Survey, 2018

Other uses include tree-harvesting and soil mining. The various land uses are discussed in their respective sections below.

Agricultural Land Use in the Study Area

Agriculture is the leading land use in the study are that is practiced almost in all households. In particular, 95.6% of the households engage in agricultural activities as shown in graph **5.2.2**.

Graph 5.2.3 (b) Engagement in Agricultural Activity



Source: Field Survey, 2018

Given the large proportion of people involved in agriculture, any improvement in the access and use of land will reduce, to a large extent, the level of food insecurity.

Categories of Agricultural Land Use in the Study Area

The two major categories of agricultural land use in the area include crop farming and livestock keeping. Notably, due to the prevalence of small sizes of land, households have adopted mixed cultivation whereby a variety of crops and/or livestock are grown on one piece of land on these parcels so as to maximize space as illustrated on ***Image 5.2.3 (c)***.

Image 5.2.3 (c): Mixed Farming Involving Banana and Napier Grass

Field Survey, 2018

Crop Farming

This category is divided into three sections including food, cash, and fodder crop farming. The major food, cash, and fodder crop in the sub location include maize, tea, and napier grass, respectively.

Food Crop

Food crops in the study area include maize, beans, bananas, and vegetables among others. The specific details for each crop are discussed below.

Maize

Maize is a widely grown crop in the area. **Image 5.2.3 (d)** illustrates maize farming in the study area.

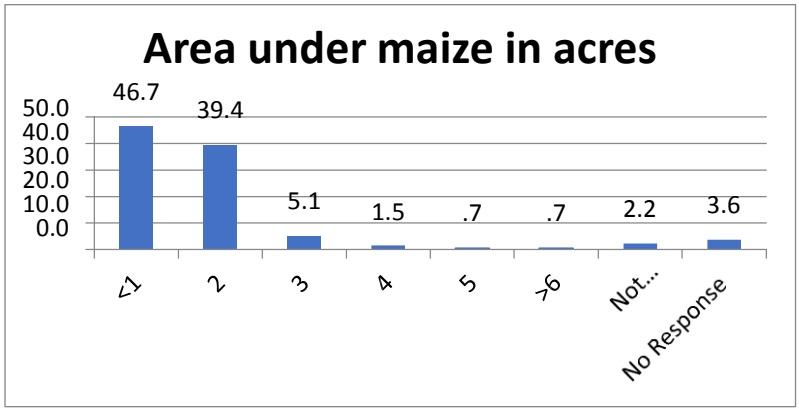
Image 5.2.3 (d): Maize Farming in the Study Area

Source: Field Survey, 2018

Area under Maize in Acres

Graph 5.2.3 (d) illustrates the area under maize in the study area.

Graph 5.2.3 (d): Area under Maize in Acres



Source: Field Survey, 2018

Notably, 92.84 percent of the people grow it. A large percentage (46.7%) grow maize in less than 1 acre of land, a significant proportion (39.4%) produce it in 2 acres, and a small proportion (5.1%) cultivate it in 3 acre as shown in **graph 5.2.3 (d)** above. Therefore, maize farming in the area is mostly small scale.

Yields of Maize

Since most of the farmers are small scale, the yields per season are also low as shown in **table 5.2.3 (a)**

Table 5.2.3 (a): Yields of Maize

Yield per season in Kg	Percentage Producing the Yield	Maize consumed in Kg	Percentage	Maize sold in Kg	Percentage
<50 kgs	7.3	<20kgs	9.5	<20kgs	24.1
51-100kgs	13.9	21-50kgs	26.3	21-50kgs	5.1
101-150kgs	10.2	51-80kgs	5.1	51-80kgs	17.5
151-200kgs	22.6	81-110kgs	18.2	81-110kgs	16.8
201-250kgs	17.5	111-140kgs	13.1	111-140kgs	13.1
251-300kgs	4.4	141-170kgs	7.3	141-170kgs	3.6
301-350kgs	5.8	171-200kgs	5.8	171-200kgs	4.4
351-400kgs	5.1	201-230	5.1	201-230	4.4
>400	5.8	231-260kgs	2.9	231-260kgs	2.9
					2.2
Not Applicable	2.2	Not Applicable	2.2	Not Applicable	2.2
No Response	3.6	No Response	3.6	No Response	3.6
Total	100.0	Total	100.0	Total	100.0

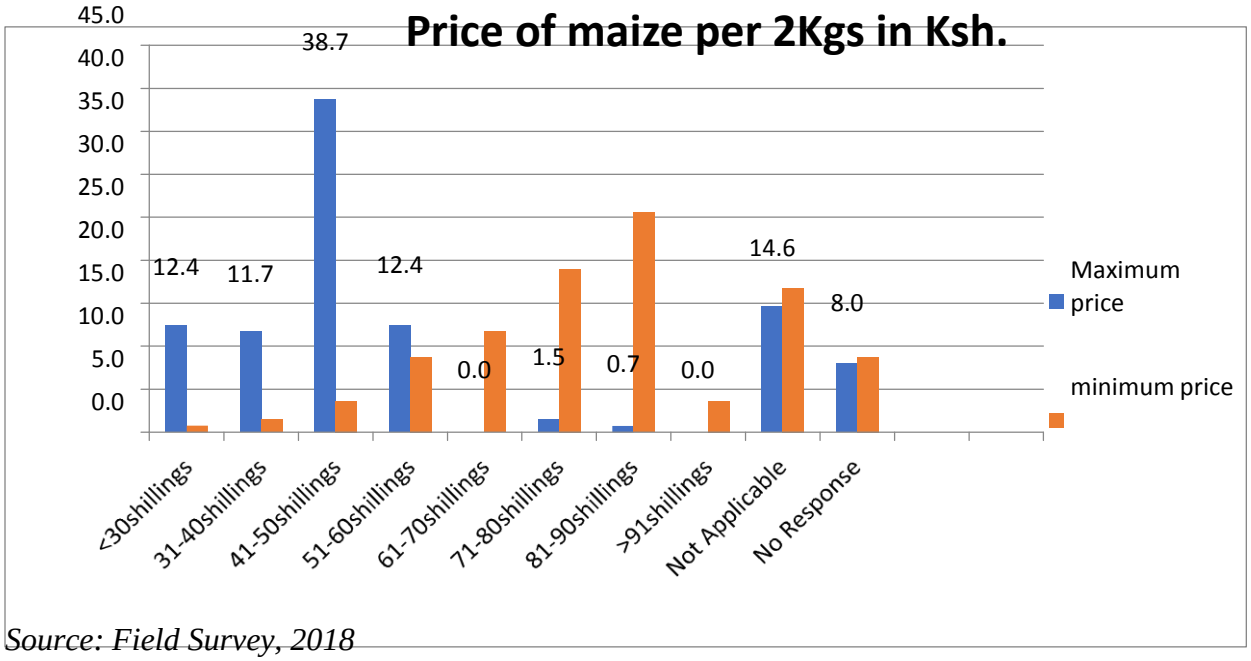
Source: Field Survey, 2018

Therefore, maize production in the study area is primarily for subsistence purposes.

Price of Maize

The maximum price of maize was 41-50 shillings per 2kgs bag as shown in **graph 5.2.3 (e)**.

Graph 5.2.3 (e): Price of Maize



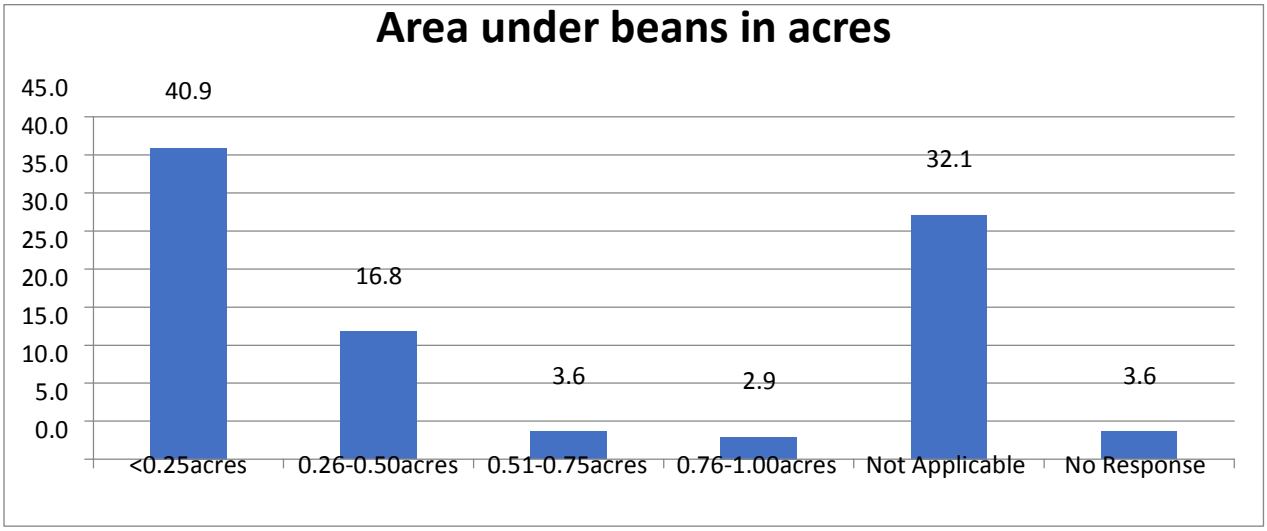
Source: Field Survey, 2018

The price is quite affordable for the people in the area of Bogeche.

Beans Farming

A majority (40.9 percent) of the respondents have beans on their farms in a quarter of an acre, whereas a considerable percentage (32.1%) do not grow beans as shown in ***graph 5.2.3 (f)***.

Graph 5.2.3 (f): Beans Farming



Source: Field Survey, 2018

Therefore, beans are majorly grown in small scale. Notably, the scale of growing beans is much smaller than maize. In particular, a significant percentage (39.1%) grow maize in 2 acres, whereas beans are cultivated only up to 0.75acres.

Image 5.2.3 (a) illustrates beans cultivated alongside bananas, a typical example of mixed farming.

Image 5.2.3 (a): Beans in a Mixed Farming System

Source: Field Survey, 2018

About half of the households (49.6%) are only able to produce up to 220kgs of beans per season. Therefore, the yield of beans per season is less compared to that of maize. A large percentage

consumes only up to 110kgs (48%), whereas a significant proportion (38.6%) sells only up to 110 kg per season. The consumption and selling rate is also relatively lower than that of maize and the distribution is as shown in **5.2.3 (b).**

Table 5.2.3 (b): Yield of beans per season

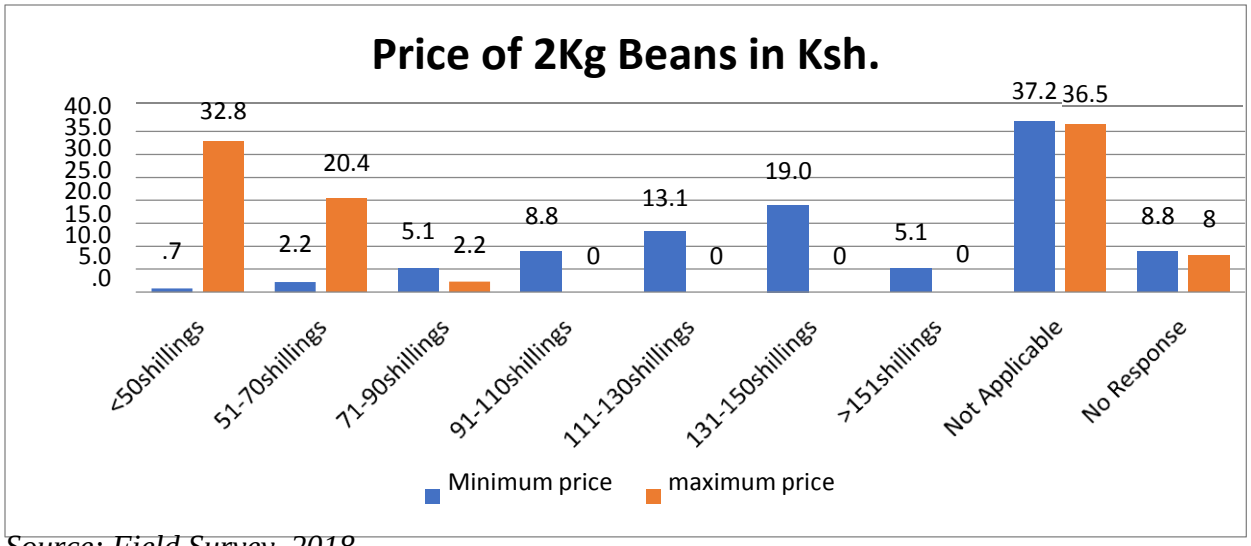
Yield of beans in Kgs.	Percentage	Beans consumed	Percentage	Beans sold	Percentage
21-60kgs	8.8	<20kgs	5.1	<20kgs	13.1
61-100kgs	9.5	21-50kgs	13.9	21-50kgs	8.0
101-140kgs	8.0	51-80kgs	14.6	51-80kgs	3.6
141-180kgs	12.4	81-110kgs	14.6	81-110kgs	13.9
181-220kgs	10.9	111-140kgs	4.4	111-140kgs	5.1
221-260kgs	3.6	171-200kgs	.7	141-170kgs	5.1
>261kgs	5.8	Not Applicable	40.1	171-200kgs	2.2
Not Applicable	35.0	No Response	6.6	201-230	5.8
No Response	5.8	Total	100.0	Not Applicable	36.5
Total	100.0			No Response	6.6

Source: Field Survey, 2018

Price of Beans

The minimum price of 2kgs bag of beans is 50 shillings and the maximum price is 150 shillings as shown in ***Graph 5.2.3 (g)*.**

Graph 5.2.3 (g): Price of Beans



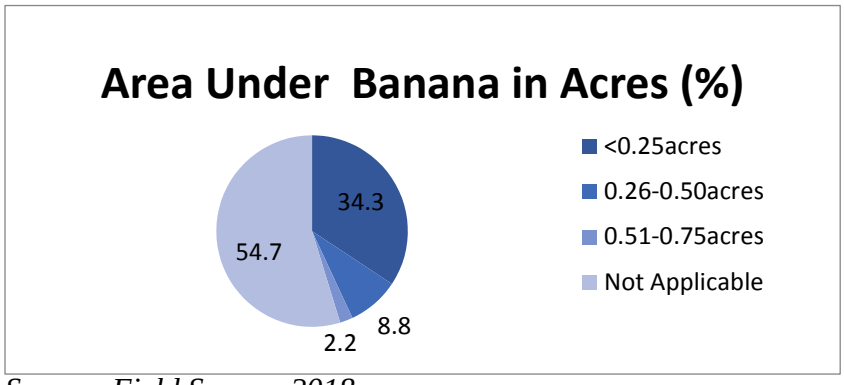
Source: Field Survey, 2018

Therefore, beans are more expensive than maize, and being a short-term crop, more people would benefit from cultivating it on a larger scale.

Banana Farming

Over half of the population (54.7%) does not grow bananas, whereas a significant proportion (34.3%) have less than a quarter of their farms under bananas as shown in **chart 5.2.3 (a)**.

***Chart 5.2.3 (a)*: Banana Farming**



Source: Field Survey, 2018

The consumption and selling distribution of bananas is as indicated by the **table 5.2.3 (c).**

The price per kilogram varies from Kshs, 100 to Kshs. 500 as shown below.

Table 5.2.3 (c): Yield of Bananas

Banana consumed at home	Percentage	Banana sold	Percentage	Price per unit Kg.	Percentage
51-100kgs	3.6	51-100kgs	4.4	101-200shillings	19.7
101-150kgs	12.4	101-150kgs	2.2	201-300shillings	16.8
151-200kgs	13.9	151-200kgs	5.8	301-400shillings	4.4
201-250kgs	7.3	201-250kgs	8.0	401-500shillings	1.5
251-300kgs	5.1	251-300kgs	7.3	Not Applicable	56.9
301-350kgs	1.5	301-350kgs	6.6	No Response	.7
Not Applicable	56.2	351-400kgs	3.6	Total	100.0
Total	100.0	>400	3.6		
		Not Applicable	58.4		

Source: Field Survey, 2018

The photo below shows banana farming in the study area.

Image 5.2.3: Banana Farming in the Study Area

Source: Field Survey, 2018

Area under Vegetables in Acres

The people of Bogeche grow vegetables on a small scale. Most of them (54.7%), have grown vegetables on less than 0.25 acres of land and a small percentage (5.8%), grow it in three-quarter of an acre. Out of the total yield, 42.4% of the respondents consume up to 50Kgs of vegetable and sell the rest. More than half of the residents of Bogeche sell from 50Kgs to 230kgs of vegetable as shown in **table *5.2.3***

Table 5.2.3: Area under Vegetables in Acres

Area under vegetable in acres	Percentage	Vegetable consumed	Percentage	Vegetable sold	Percentage
<0.25acres	54.7	<20kgs	4.4	<20kgs	.7
0.26-0.50acres	18.2	21-50kgs	38.0	21-50kgs	6.6
0.51-0.75acres	5.8	51-80kgs	31.4	51-80kgs	3.6
Not Applicable	20.4	81-110kgs	5.8	81-110kgs	11.7
No Response	.7	111-140kgs	1.5	111-140kgs	12.4
Total	100.0	Not Applicable	18.2	141-170kgs	10.9
		No Response	.7	171-200kgs	9.5
		Total	100.0	201-230	8.0
				231-260kgs	4.4
				>261kgs	4.4
				Not Applicable	26.3
				No Response	1.5

Source: Field Survey, 2018

The photo below illustrates vegetable farming in the study area.

Image 5.2.3: Vegetable Farming in the Study Area

Source: Field Survey, 2018

Cash Crop Farming

The two major cash crops in the area include tea and sugarcane.

Tea

The area under tea varies from less than one acre to four acres of land. Notably, about half of the people (51.1 %) do not grow tea, 20.4% grow it on less than 1 acre, 16.8% grow it on one acre, and only 11% have more than 2 acres of the crop as shown in **Table *5.2.3***. The lowest yields of tea are 50Kg whereas the highest go beyond 301Kg. Majority of the yields are between 101 and 250 Kgs as shown in **table *5.2.3* below**.

Table 5.2.3: Area under Tea in Acres

Area under tea in acres	Percentage	Yield from tea plantation	Percentage
<1acre	20.4	51-100kgs	2.2
1acre	16.8	101-150kgs	11.7
2acres	5.1	151-200kgs	15.3
3acres	4.4	201-250kgs	10.2
4acres	1.5	251-300kgs	2.9
Not Applicable	51.1	>301kgs	5.8
No Response	.7	Not Applicable	51.8
Total	100.0	Total	100.0

Source: Field Survey, 2018

The photo below shows tea farming in the study area.

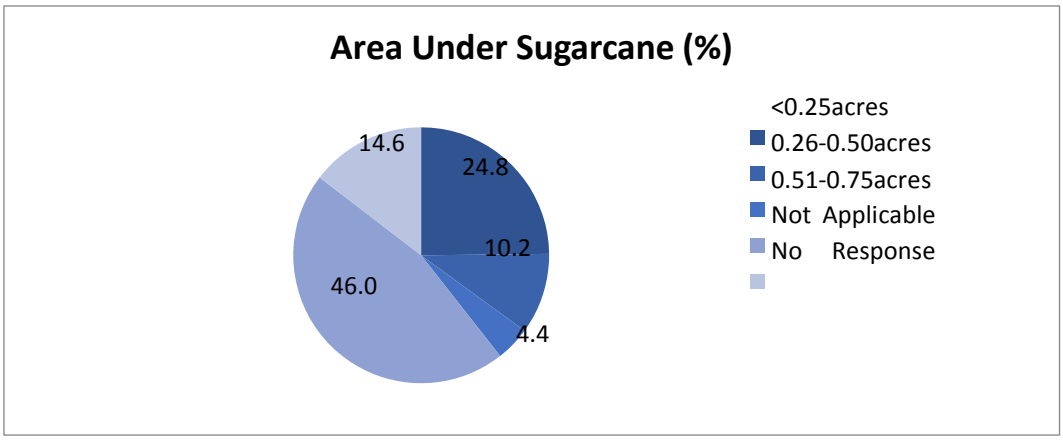
Image 5.2.3: Tea Farming in the Study Area

Field Survey, 2018

Sugarcane

Majority of the people (46%) do not grow sugarcane. However, a significant population (24.8%) grow it on less than a quarter an acre, the maximum area under sugarcane per household being 0.75 acres as shown in **chart *5.2.3*** Therefore, sugarcane is grown in small scale in the study area.

Graph 5.2.3: Area under Sugarcane



Field Survey, 2018

The photo below shows sugarcane farming in the study area.

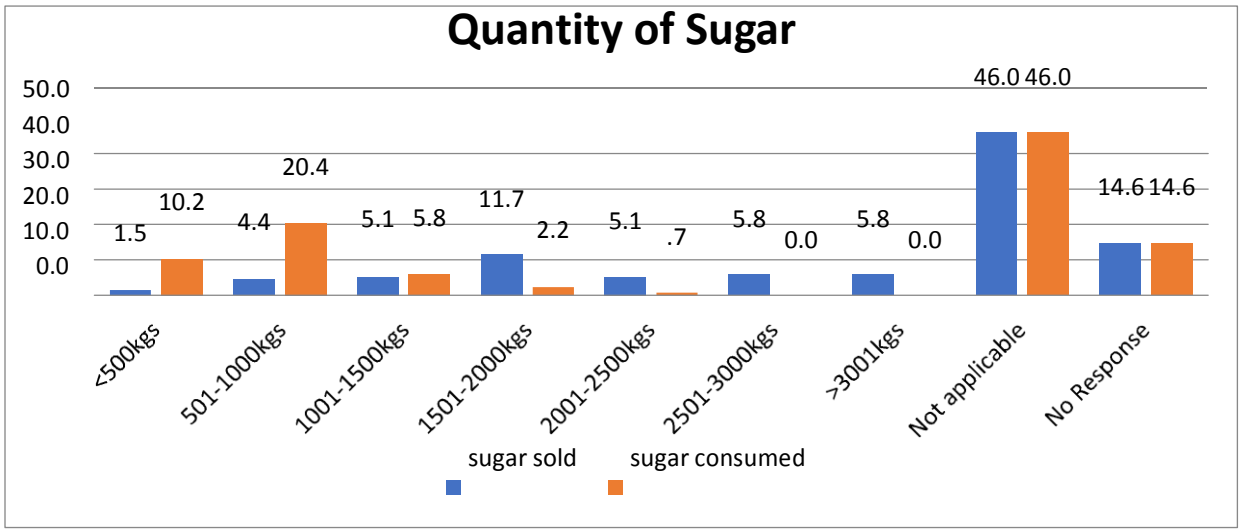
Image *5.2.3*: *Sugarcane Farming in the Study Area*

Source: Field Survey, 2018

Yield of Sugar

The maximum quantity of sugar consumed was 500-1000kgs and the maximum quantity of sugar sold was 1501-2000kgs as shown in **graph *5.2.3***.

Graph *5.2.3*: Yield of Sugar



Source: Field Survey, 2018

Area under Napier Grass in Acres

Approximately half of the people in the study area are livestock keepers and need napier grass to sustain their cattle. A considerable proportion of the people (32.8%) have planted napier grass on 0.125 acres of land, followed by 10% that grow it on 0.25acres as shown in **Table *5.2.3***.

Table 5.2.3: Area under Napier Grass in Acres

Area under Napier Grass		Frequency	Percent
Valid	0.125 acres	45	32.8
	0.250	15	10.9
	0.750	5	3.6
	1.000	2	1.5
	Not Applicable	60	43.8
	No Response	10	7.3
	Total	137	100.0

The photo below shows napier grass farming in the study area.

Image 5.2.3: Napier Grass Farming in the Study Area

Source: Field Survey, 2018

Notably, majority of the livestock farmers use napier grass as the main cattle feed, although a few have devoted land for natural pasture as shown in **photo *5.2.3* below**.

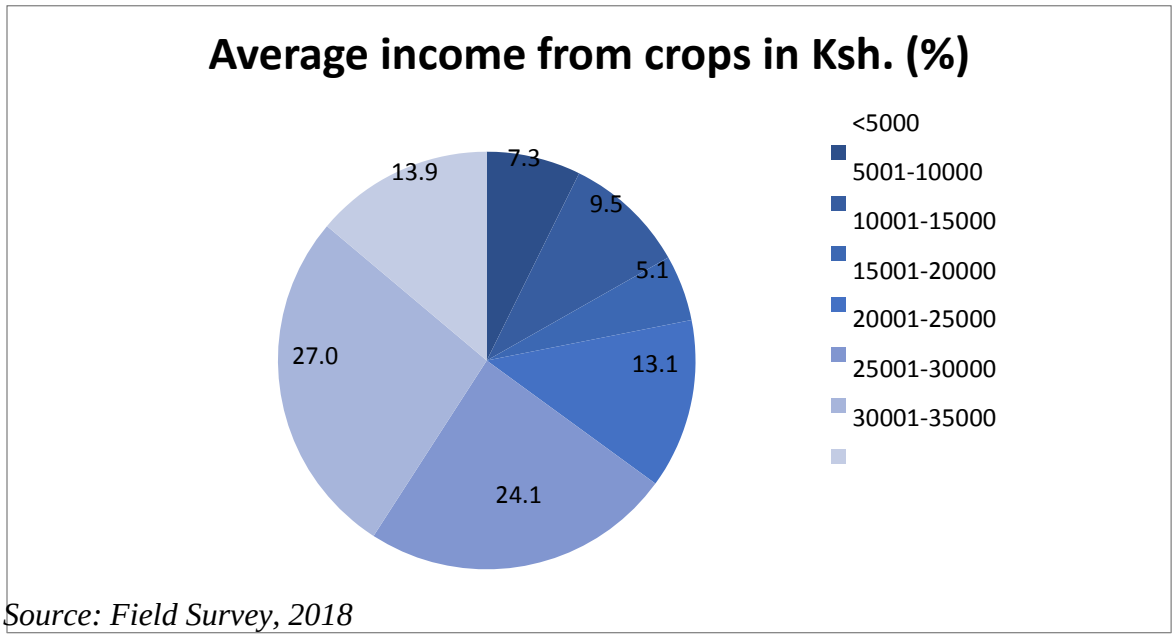
Image: Natural Pasture in the Study Area

Source: Field Survey, 2018

Income from Crop Farming

A majority (51.4 percent) of the respondents earned an average income of ksh 25,000 to 35,000 from growing crops as shown in **chart *5.2.3*.**

Chart *5.2.3*: Average Income from Crops



Source: Field Survey, 2018

This finding indicates that agriculture is a major employer in the area.

Livestock Keeping

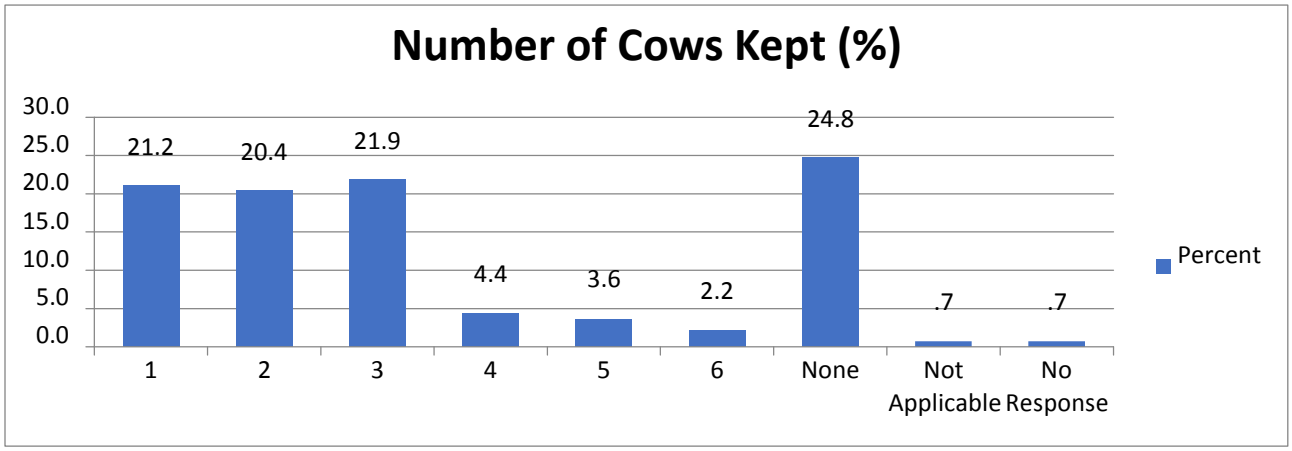
Households' Livestock Wealth

Respondents were asked about their livestock possessions in order to estimate if they had any fallback positions in case their crops failed. The households reported to keep livestock as an investment (they sell to pay school fees, buy foods. Livestock can also provide manure for their farms. The two major livestock kept in the area include cattle and goast as discussed below.

Cattle Keeping

Cattle keeping is done by a majority of the people (75.1%) in the study area. The average number of cows kept by a majority (63. 5%) of the people is 1-3 cows as shown in **graph *5.2.3***

Graph *5.2.3*: Number of Cows Kept



Source: Field Survey, 2018

The photo below illustrates cattle farming in Bogeche sublocation.

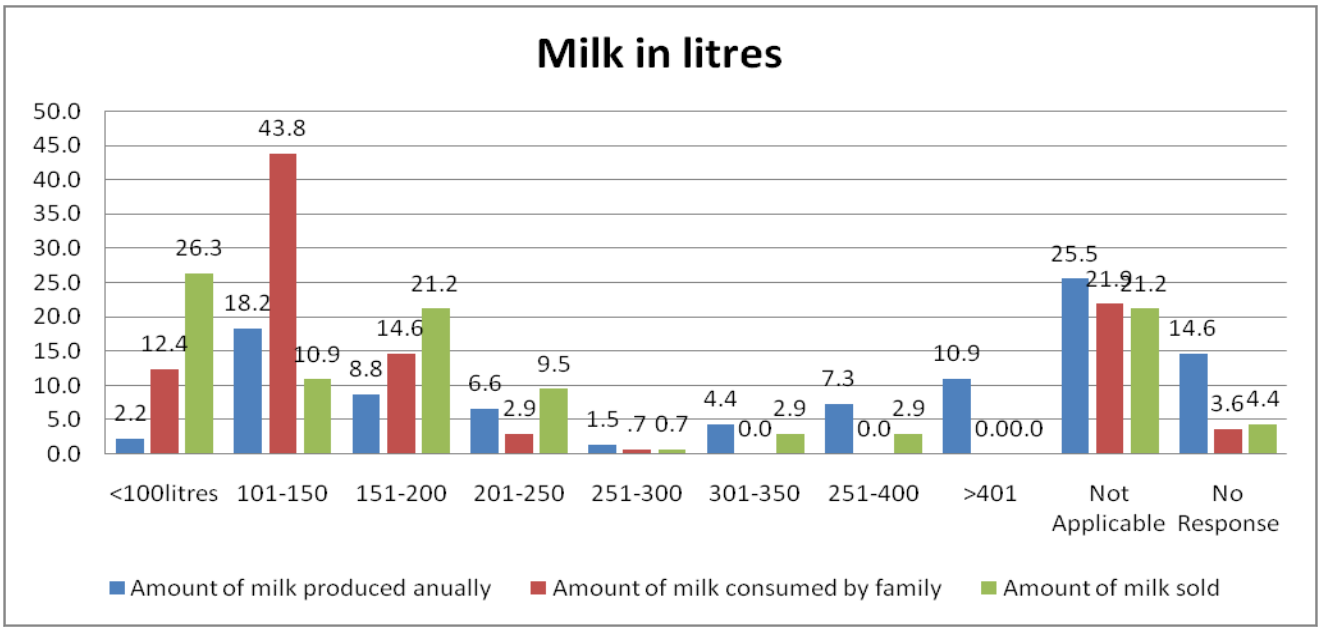
Figure: Livestock keeping in Bogeche Sub Location

Source: Field Survey, 2018

Milk Production

The highest amount of milk produced annually is 150 litres. The maximum amount of milk consumed annually by family is 150 litres, whereas the highest amount of milk sold annually is less than 100 litres as illustrated in **graph *5.2.3*.**

Graph *5.2.3*: Milk Production



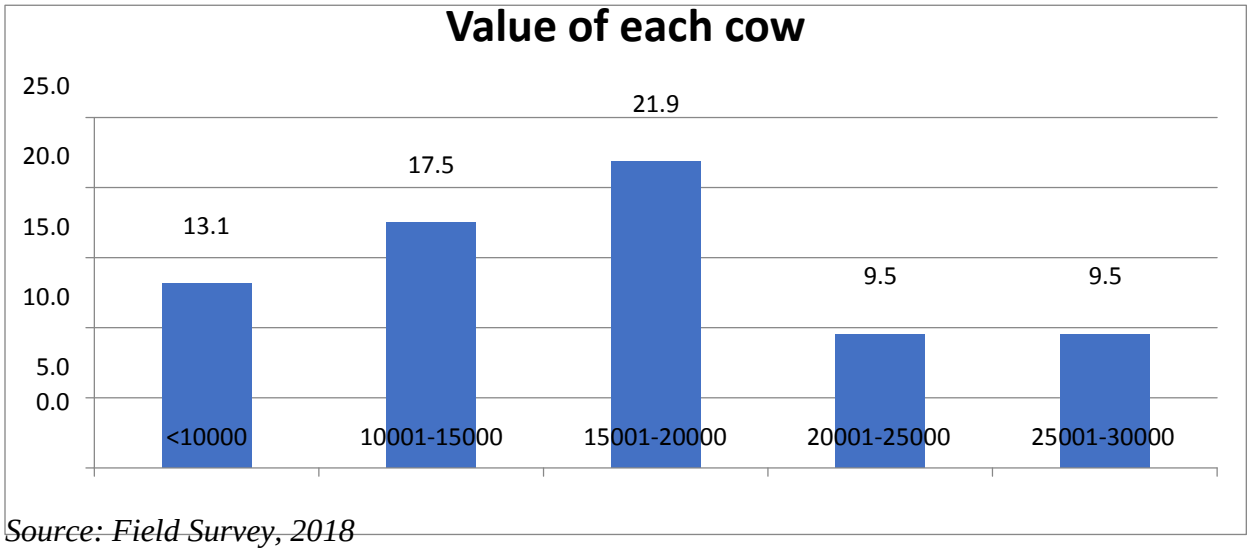
Source: Field Survey, 2018

This finding indicates that people consume a larger proportion of the milk they produce.

Value of a Cow

Other than selling milk, cows can be sold when need arises. A majority of the respondents (21.9%) value their cows between ksh. 15000-20000 followed by ksh 10000- 15000 as shown in **Graph *5.2.3***

Value of a Cow



Source: Field Survey, 2018

Goat Keeping

A great proportion (62.6 percent) of the respondents do not keep goats. However, a significant proportion (27.7%) keep between 1 to 2 goats, 6.6% keep 2-3 goats and 3.1% keep 4-5 goats as shown in **table *5.2.3*.**

Goat Keeping

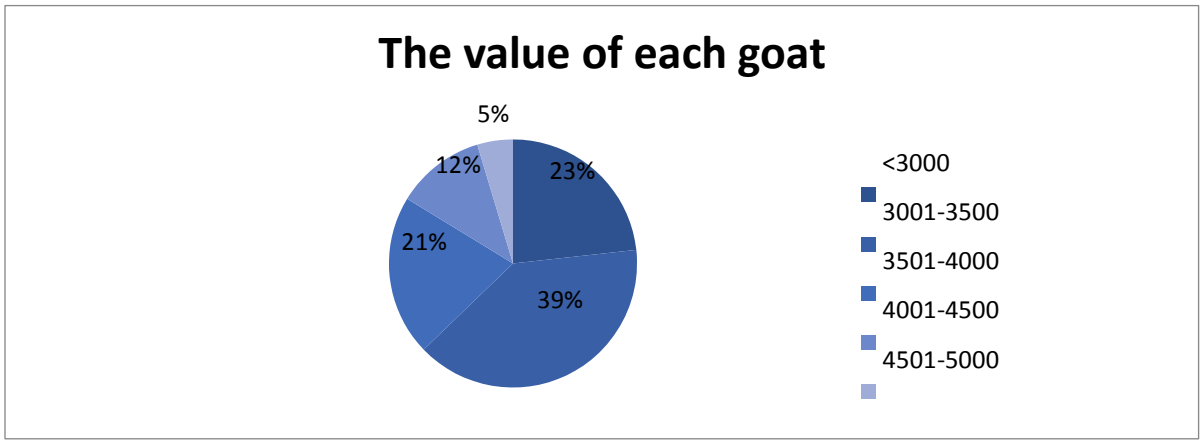
Number of Goats	Percentage
1-2	27.7
2-3	6.6
4-5	3.1
None	62.6

Source: Field Survey, 2018

Value of a Goat

The majority of the people (60%) value their goats between 3500 and 4000. A significant proportion of the respondents (23%) estimated the value of their goats at ksh. 3000-3500 as shown in chart ***5.2.3.***

Value of a Goat

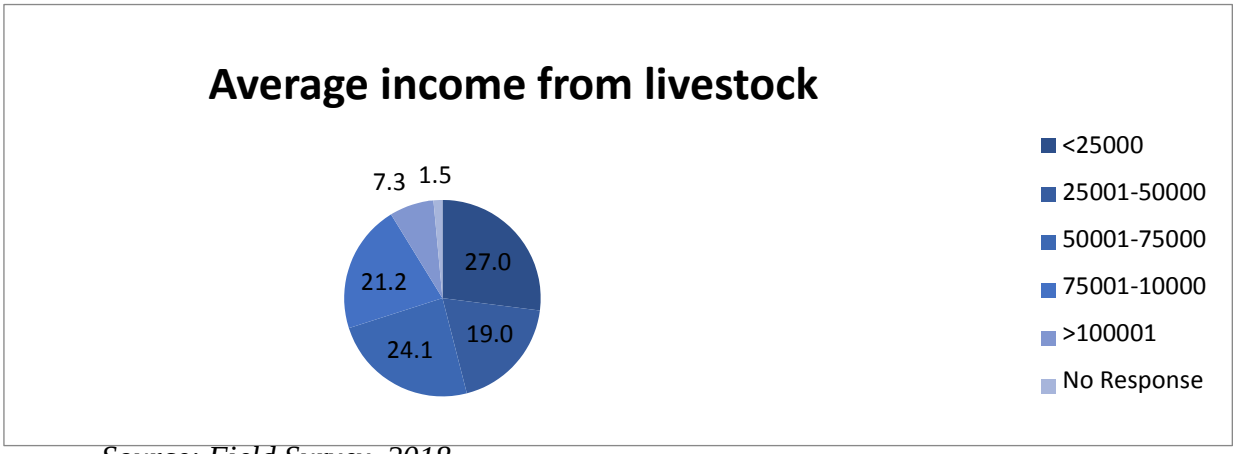


Source: Field Survey, 2018

Average Income from Livestock

A significant proportion of the people (27 percent) earned less than 25000 from livestock kept.

Average Income from Livestock



Source: Field Survey, 2018

This is an indication that livestock is not the major employer.

Summary of Agricultural Land Use

Allocation of agricultural land to different land uses was varied. Maize, Tea, and napier grass were the most widely grown crops in the study area. Due to reduced agricultural land, households have adopted mixed cultivation on small pieces of land so as to maximize space. Food crop production was conducted on field sizes ranging from 0.01-4 acres. Maize was the most popular food crop grown by 92.8% of the households. Household food production is a significant contributor to food

security especially among small scale farmers. Maize is a primary stable food in the study area and nationally it is estimated to account for 20% of the agricultural production and contributes 68% of daily per capita cereal consumption apart from providing 25% of agricultural employment (Shroeder et al., 2013). Tea was the most prevalent cash crop grown up to 4 acres of land followed by sugarcane that was majorly grown on a much smaller scale than tea (up to 0.75 acres per household). Vegetables were cultivated by most households (79.9%) although on small field sizes, mostly 0.25 acres. Napier grass was a popular crop grown by a half of the households (50%) on field sizes ranging from 0.125 to 1 acre. A large proportion (63.5%) of the sample households keep livestock, especially cattle. The agricultural land uses discussed above are important sources of livelihoods and determine, to a large extent, the food security state of a household.

5.3.3 Settlements

This study assessed the area covered by the homestead as well as buildings or structures and the construction material so as to determine whether these variables had any relationship with food and livelihood security.

Area Covered by Homesteads

Most of the homestead compounds in Bogeche sub location (59.8%) take up an area of up to 800 feet with only a few homesteads having more than 3000 feet area. The area occupied by the main houses in the sub location range between 21 and 100 feet. Majority of the main houses have 1 to 3 rooms depending on the household needs.

Area Covered by Homesteads

Total area of homestead in feet	Percentage	Main house area in feet	Percentage	Number of rooms in the main house	Percentage
<3000 feet	8.0	<500	2.9	1	34.3
3000-3500	8.8	500-1000	32.1	2	43.1
3501-4000	18.5	1001-1500	26.3	3	19.0
4001-4500	17.5	1501-2000	23.4	4	2.2
4501-5000	41.6	2001-2500	10.2	5	.7
5001-6000	4.1	2501-3000	3.6	6	.7
>6000	1.5	>3000	1.5	Total	100.0
Total	100.0				

Source: Field Survey, 2018

From the findings shown on **table *5.2.3*** above, the area covered by the main house and the number of rooms tends to be proportional to the homestead area. Most of the households (49.7%) have main house area of between 500 to 2000 feet. Moreover, a majority (43.1%) have two rooms.

Furthermore, majority (41.5%) have a homestead area of between 4500 to 5000 feet, which implies that most homesteads occupy close to an eighth of an acre (0.125acres). Considering that the average household land size is 0.5 acres, the 0.125 occupying homestead translates to a quarter of the total and available to the household. Therefore, if policies aiming to rearrange settlements such as the clustered model can be implemented in the study area, a nearly a quarter an acre can be freed so as to be used for agricultural use for each household.

Number of Other Houses

Most homesteads in Bogeche have one other house apart from the main house followed by those homesteads with 2 other houses. The total area of the other houses range from 100-550 feet and as shown in **table *5.2.3*.**

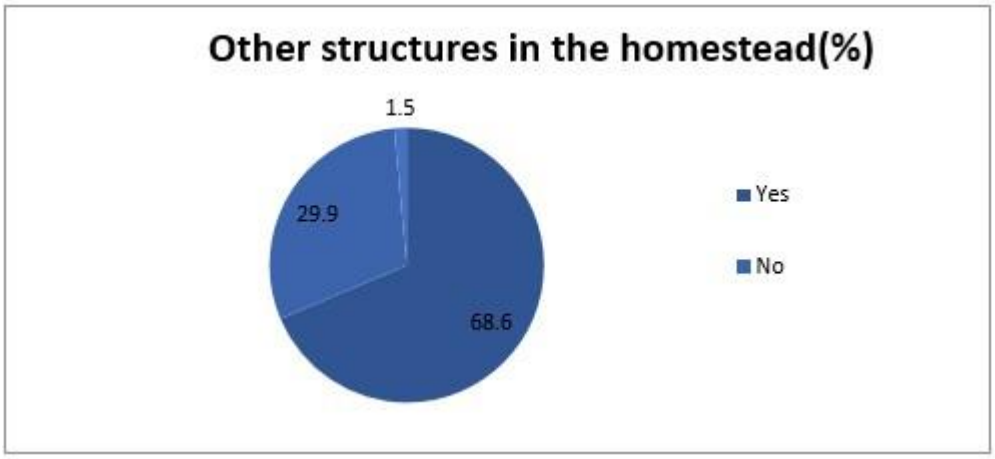
Number of Other Houses

number of other houses in the compound	Percentage	total area of other houses in feet	Percentage
None	1.5	100-250	35.0
1	37.2	250-300	42.3
2	35.8	350-400	10.2
3	17.5	400-500	2.2
4	5.1	501-550	1.5
No Responds	2.9	>559	.7
Total	100.0	Not applicable	8.0
		Total	100.0

Source: Field Survey, 2018

A majority (69 percent) of the households have other structures built in their homesteads.

Other Structures in the Homestead



Source: Field Survey, 2018

The photo below illustrates other structures in the homestead.

Other Structures in the Homestead

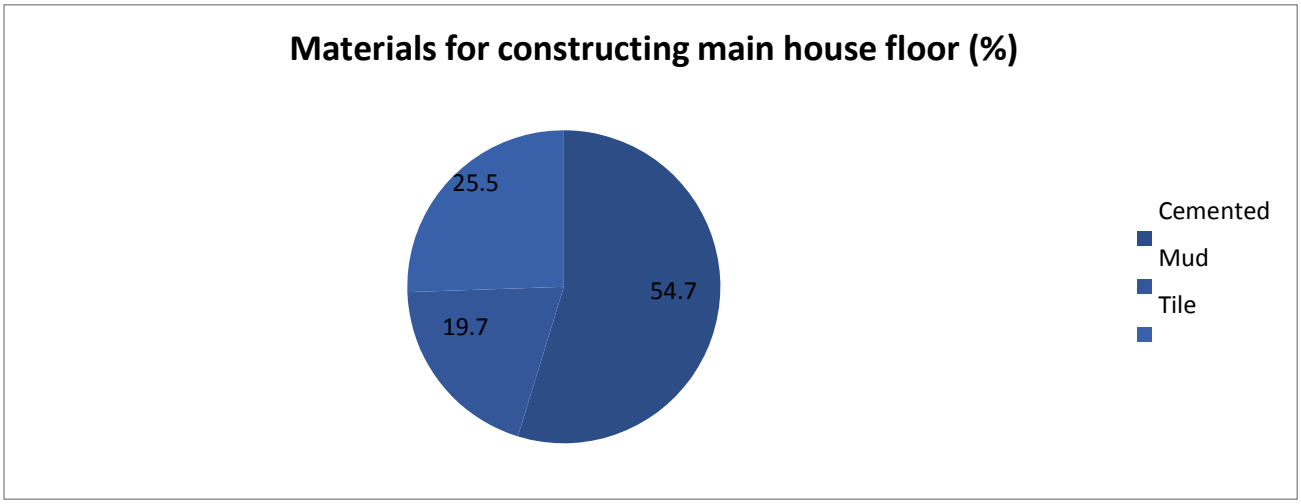
Source: Field Survey, 2018

On average, the built-up area occupies three quarters of the homestead.

Construction Materials for the Floor of Main House

Majority (54.7%) of the residents have cemented floors, 19.7% have mud floor, while 25.5% have tiled floors as shown in **chart *5.2.3***.

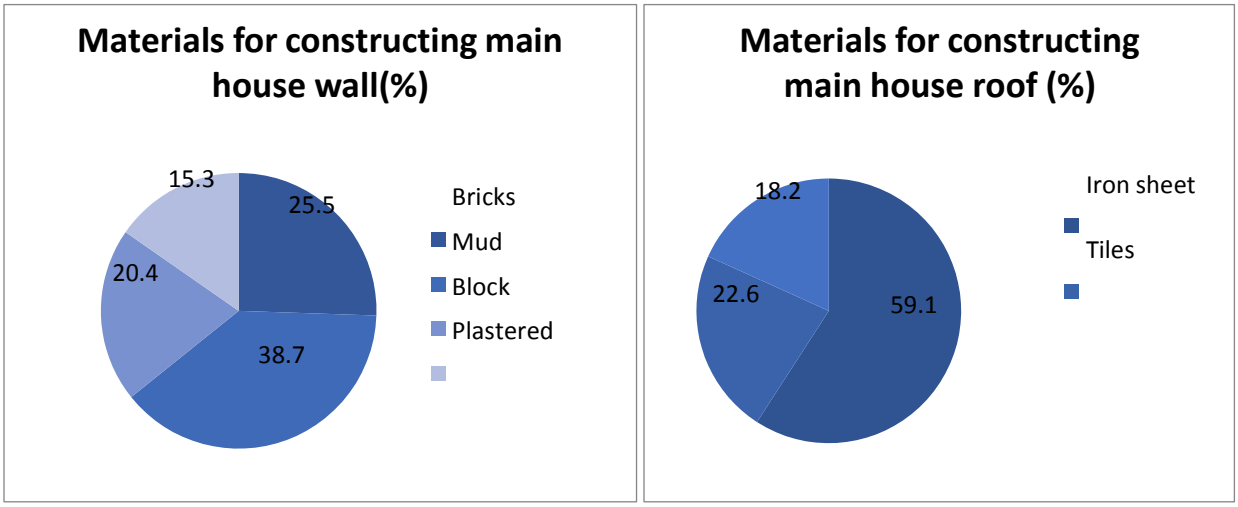
Construction Materials for the Main House Floor



Source: Field Survey, 2018

The main material used in construction walls is mud (38.7%), followed by bricks, blocks and plaster at 25.5%, 20.4% and 15.3% respectively. Majority (59.15%) of the houses have iron sheet roofs and 22.8% have tiled roofs as shown below.

Construction Materials for the Main House Wall and Roof



Source: Field Survey, 2018

The photos below illustrate the most common housing typologies in the study area.

Plate *5.2.3*: Common Housing Typology

Source: Field Survey, 2018

Therefore, majority of the households are not permanent, which implies that policies that require a re-arrangement of the settlement patterns in the area are viable and practicable

Settlement pattern

This study established that the most predominant settlement pattern is dispersed or scattered, as shown in **photo *5.2.3***. This settlement pattern leads to land fragmentation and causes inefficiencies in the utilization of agricultural land.

Photo ***5.2.3 below*** illustrates settlement patterns in the area

Scattered Settlement Pattern in the Study Area

Source: Field Survey, 2018

Ration of Homestead Area to Total Land Area

To determine the proportion settlements occupy in comparison to the total available land, the homestead area was compared to total household and the percentages are as shown in **table *5.2.3*** below.

Ration of Homestead Area to Total Land Area

Homestead to Total Land Area Ratio	Percentage
<1:4	14
1:4	45
1:2	20
1:3	16
>1:3	5

Source: Field Survey, 2018

A majority (45%) have homestead area that occupies a quarter (1:4) of the land, whereas 20 percent occupy homestead area equivalent to a half (1:2) of the total land. This finding implies that homestead area occupies a large space that can be freed for agricultural use.

Other Land Uses

Other land uses in the study area include soil mining (brick-making) and tree harvesting as illustrated in images below.

Image: Soil Mining

Source: Field Survey, 2018

Tree Harvesting

Source: Field Survey, 2018

5.2.4 Hypotheses Testing for Correlation between Various Land Uses and Food Security

Land use was hypothesized as a determinant of household food security. The findings on the hypotheses testing were established by carrying out a 2 tailed Pearson's (r) correlation test.

The results are displayed on Table ***5.2.3***:

Association between Household Food security Status and Various Agricultural Land Uses

Variables	Pearson Correlation (r)	P value
Food Crop	0.302	0.000 **
Cash Crop	0.650	0.000 **
Fodder Crop	0.570	0.000 **
Settlement	-0.433	0.000 **

*Statistically not significant (P>0.05) Source: Field survey, 2018

**means statistically significant (P<0.05)

Notably, this study found out that cash crop production had a strong positive coefficient (0.650) that was significant with household food security status at p value of 0.000. According to Schneider and Gugerty (2010), cash crops are important sources of household income that could be used to buy food for households or farm inputs that would boost food production and general agricultural productivity. Achterbosch et al. (2014) also suggests that cash crop production can increase food security by increasing food availability either through household production or increasing the income available to purchase food. Therefore, in theory, farmers might be better off if they could produce only cash crops and use the earned income to purchase food. Similarly, Kumba et al. (2015) established that households that cultivated cash crops were better off than those that largely produced food crops.

The study also found out that food crop production had a low but positive coefficient (0.302) that was significant at 5% with household food security status. The implication was that the higher the amount of food from production the higher the likelihood of food security. Households prefer to produce food crops even when the returns are higher from market oriented production due to uncertainty about food availability in the market, fluctuating food prices, or unknown technology associated with production of commercial crops (Schneider and Gugerty, 2010). This study concurs with Babatunde et al. (2007) who found that food production had a low positive correlation with food security status of rural farming households in North Central Nigeria.

In relation to fodder crop production, this study established that napier grass had a strong positive coefficient (0.570) that was significant at 5% with household food security status. The presence of natural pasture and napier grass is an indication of livestock ownership in a household and this increases a households probability of being food secure. In particular, those who own livestock have better chance to earn more income from it especially through milk production. This in turn enables them to purchase food on cash when faced with food deficit, and invest in purchase of farm inputs that increase food production thus ensuring food security at household level. These findings are consistent with those of Khan and Gill (2009) who found that food availability in the rural areas of Pakistan was significantly associated with increased production of crops and livestock products. Kidane et al. (2005) also found that livestock ownership was significantly

related to household food security in Ethiopia and that this relationship was positive because crop and livestock complement each other in ensuring household food security.

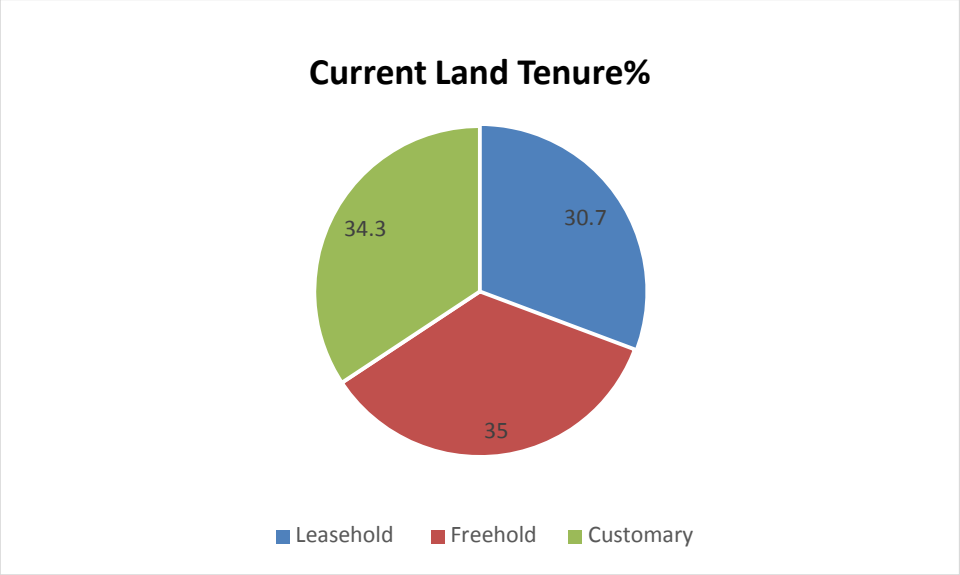
In relation to settlements, the study found out that settlements had a moderate negative coefficient (-0.433) that was significant at 5% with household food security status. The possible explanation for the finding is that settlements diminish arable land thereby increasing food insecurity.

5. 3 Effects of Inter-Generational Transmission of Land Rights on Food/Livelihood Security

5.3.1 Current Land Rights/Tenure

This research established that the most prevalent land tenure in the study area is freehold (35%), followed closely by customary (34.3%) and then leasehold (30.4%) as shown in **Chart *5.3***.

Current Land Tenure



Source: Field Survey, 2018

Given the strong cultural norms of the people in the study area, customary land tenure is quite secure. However, in some cases, it is insecure especially where family conflicts over boundaries are involved. The key informant interviews revealed that conflicts surrounding land are quite common in the study area. One key informant, when asked about the security of the customary land tenure, stated as follows:

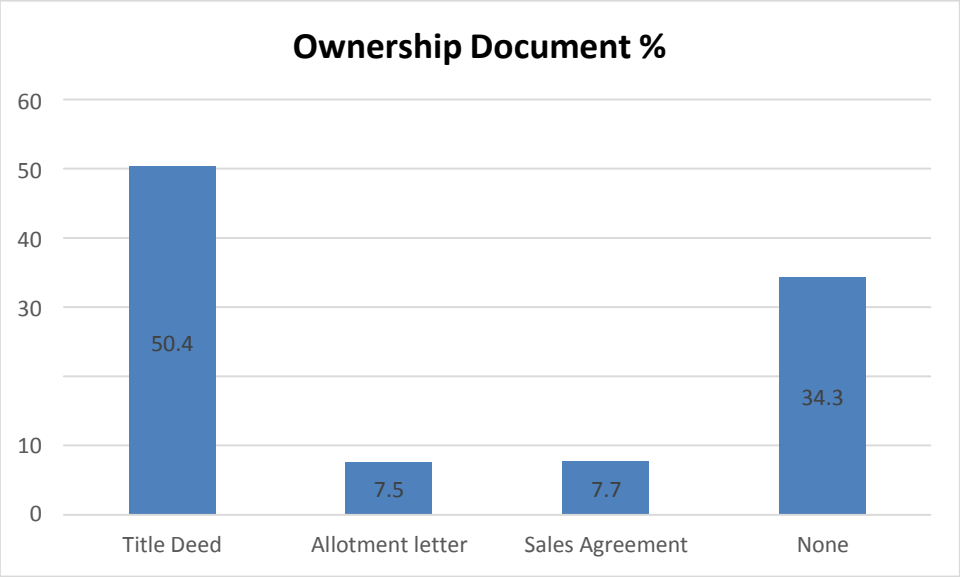
> "Customary land is generally secure because our people understand and respect our culture of sharing land equally among heirs. However, there are some people who constantly try to manipulate land boundaries so as to get a bigger share than their brothers. Such people will always be there." Nonetheless, the community has venues for resolving such conflicts including through village elders and assistant chief.

Therefore, it can be concluded that the households in Bogeche sub location have secure land tenure systems. Secure land tenure is a good indicator of fighting food security.

Ownership Document

A large proportion of the households (50.4%) own title deeds, whereas a small proportion of 7.5 percent and 7.1 percent have allotment letter and a sales agreement documents, respectively as shown in the graph below**.**

Ownership Document



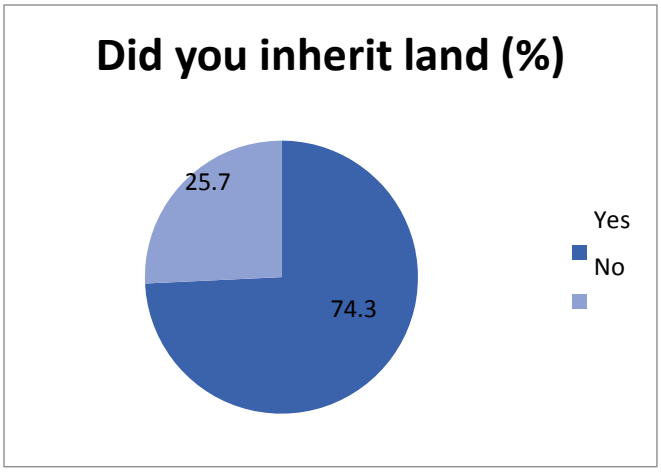
Source: Field Survey, 2018

Notably, a significant proportion (34.3%) does not have any ownership document. This percentage corresponds to that of households with customary land tenure discussed above. Those with customary land tenure do not have individual ownership document but rather the ownership title is still under the overall household head of the extended family. Nonetheless, as already noted, security of tenure is not a severe challenge in the study area.

5.3.2 Means of acquisition

This study established that the leading mode of land acquisition in the study area was inheritance. In particular, 74.7 percent have acquired land through this means as shown in the chart below.

5.3.2 Means of acquisition



Source: Field Survey, 2018

Many studies have also shown that inheritance is the main mode of land acquisition in developing countries as discussed in the literature.

Cultural Practices Related to Land Inheritance

The cultural practices that are related to land inheritance are mainly that daughters do not inherit land, and that every son (heir) gets an equal share of land as illustrated in table below.

Main Cultural Practice Related to Land Inheritance

		Frequency	Percent	Valid Percent
Valid	Girls do not inherit the land	68	49.6	49.6
	All sons get equal share of land	52	52	38.0
	Not aware	11	8.0	8.0
	No Response	6	4.4	4.4
	Total	137	100.0	100.0

Source: Field Survey, 2018

Therefore, the general practice is that women are expected to acquire land through male connections and exercise only secondary or inferior rights which are susceptible to breakdown in relationships, divorce, or disconnection.

Another cultural practice that was flagged in focus group discussions is that every son has to build a house or two whether he lives in the homestead or not because it gives a sense of belonging. This study established that the custom led to wastage of arable lands by absentee land owners. Image

The image below illustrates a four-bedroomed house that is rarely occupied because the owner lives elsewhere but has built the space-consuming house in observation of this custom.

Image: Unoccupied House Built in Observation of Custom

Source: Field Survey, 2018

Size of Inherited Land

To find out how inter-generational transmission of land rights affects the size of farmlands, respondents were asked to state how much land they had inherited. Majority of the current household heads inherited only up to 2 acres of land, with nearly half of the population (46%) inheriting less than 1acre from their parents before as shown in the table below.

Size of Inherited Land

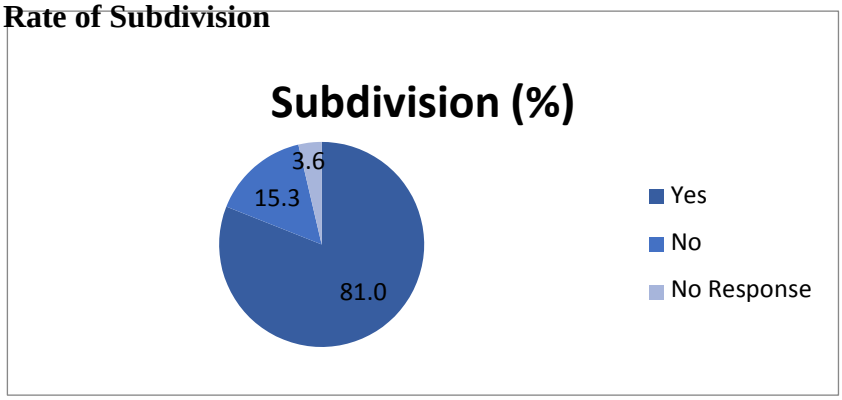
		Frequency	Percent
Valid	0.125 acres	17	12.4
	0.250	34	24.8
	0.750	21	15.3
	1.000	4	2.9
	1.500	3	2.2
	1.750	7	5.1
	>2.000	17	12.4
	No response	8	5.8
	Not applicable	26	19.0
	Total	137	100.0

Source: Field Survey, 2018

Rate of Subdivision

This study established that majority (81%) of the people in the study area have subdivided land as shown in chart below.

Rate of Subdivision

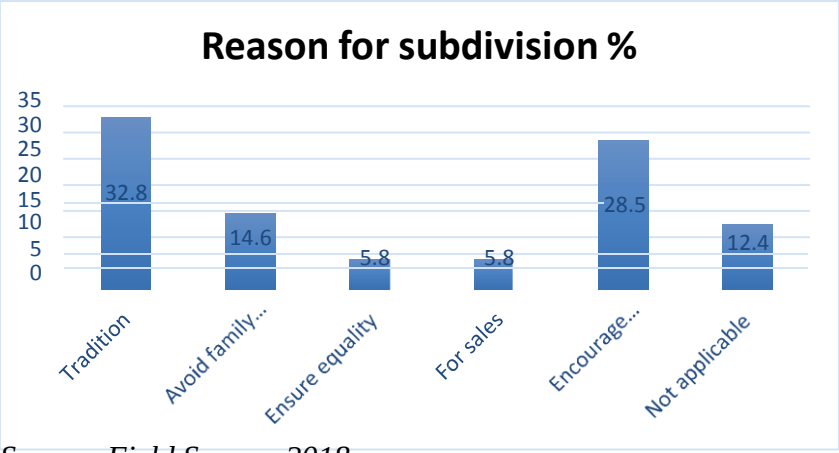


Source: Field Survey, 2018

Reason for Subdivision

The major reasons for subdividing land include to observe the tradition which bounds every parent to subdivide land to his son (32.8%), encourage independence (28.5%), avoid family conflicts (14.6%), ensure equality (5.8), and to enable selling (5.8) in that order as shown in the graph below.

Reason for Subdivision



Source: Field Survey, 2018

Size of land before Subdivision

Notably, 70% had less than 3 acres of land before sub dividing it to a number of heirs ranging from 1 to 7, with the majority being 1 and 4 heirs as shown in the table below.

Size of land before Subdivision

Size of land before subdivision	**%**	**Number of heirs**	**%**
>1acre	18.2	1	18.2
2	34.3	2	26.3
3	17.5	3	19.0
4	9.5	4	13.1
5	5.8	5	7.3
>6	2.2	6	2.2
Not Applicable	.7	7	1.5
No Response	11.7	No Response	12.4
Total	100.0	Total	100.0

Source: Field Survey, 2018

One participant in the men focus group discussion narrated as follows:

> "I come from a family of five sons and each one of us is married with children. Our father had 4 acres of land, which he divided into 6 portions; one for self and the rest for each of the five sons. The result is that each of us inherited less than an acre and we have not managed to buy more. Although all of us intensively cultivate our respective parcels, it is only my eldest brother who gets enough food for his household from own production and it is because he leases two acres."

This scenario whereby the younger generation inherits a quarter or less of the original farm sizes was reiterated by many others in the study area. This trend implies that the future generations will have no land to cultivate. In addition, it is evident from the verbatim narrative that small land sizes impair food and livelihood security.

Land Sizes of the Older Generation

To understand how land sizes have changed due to inter-generational transmission, this study interviewed old people aged 80 years and over. The older generation reported to have inherited considerably large shares from their parents, ranging from 5 to 10 acres. Their parents had even larger land parcels, ranging from 20 to 28 acres. One of the elderly respondents noted that some of the farms were so vast that one could not see to the other end of his land when standing at the edge. The figures of land sizes mentioned above reveal a pattern whereby land reduces by nearly a quarter of the original size whenever it subdivided to the next generation. Notably, virtually all elderly people reported to have come from polygamous families of about 2 to 4 wives. Therefore, this drastic decrease in land sizes has resulted from rapid population increase overtime.

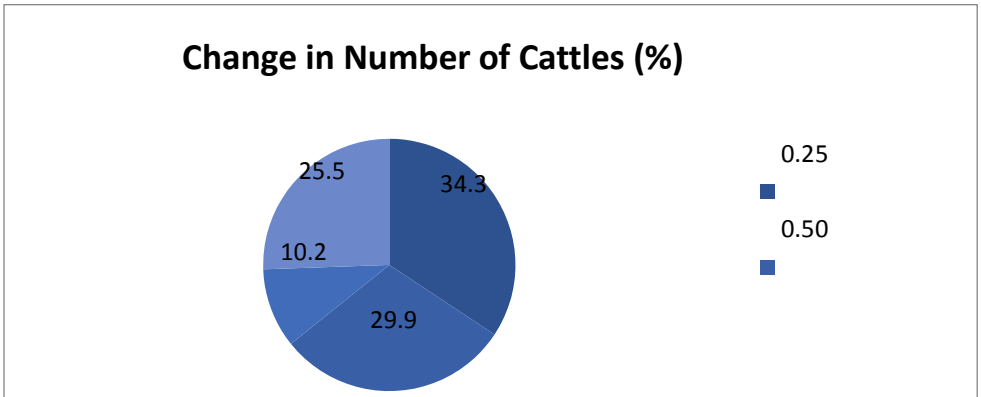
How Land Subdivision Affects Land Use

Transfer of land rights to the next generation through subdivision affects land use primarily by reducing the yields as discussed below.

Change in Cattle Yield

Majority of the respondents (34.3%) stated that the number of cattle kept reduced by a quarter of the original herd after land subdivision, whereas a significant proportion of 29.9 percent, and 25.5 percent indicated that the herd size had reduced by a half and a third, respectively as shown in the chart below .

Chart: Change in Cattle Yield



Source: Field Survey, 2018

Change in Crop Yield

Notably a majority of the respondents (69.1%) attest that the yield after subdivision is lower than before subdivision as shown in table below**.** Notably, a majority (47.5%) estimate that the yield reduced by a quarter, whereas, an equally large proportion (42.3%) approximate that it has dropped by a half of the original before land subdivision.

Change in Crop Yield

yield comparison before and after subdivision	Percentage	Reduction in yield	Percentage	how long the yield lasts the family members	Percentage
Yields are the same	9.5	A Quarter	47.5	3	2.2
Yields are more	4.6	Half	42.3	6	19.0
Currently yields are lower	69.1	Three Quarters	5.8	9	19.7
I'm not sure	16.1	Not sure	3.6	4	.7
Not Applicable	.7	Not Applicable	.7	12	51.1
				No Response	7.3
Total	100.0	Total	100.0	Total	100.0

Source: Field Survey, 2018

Perceived Changes in Crop Yields among the Elderly People

Livestock Yields

When asked to describe how livestock yields have changed overtime, older people stated that cattle size has reduced greatly (to less than a quarter of the original size). One narrated as follows:

> "Cattle were enumerable, some would get lost without the owner discovering. Sometimes, there were surprise conception and birth of young ones. The unsuspecting owner would be surprised to see his cattle birthing a calf out in the grazing field. Besides, we had large herds that would graze unrestricted on vast grazing fields, but now even letting chicken move freely is a threat to the neighbor's produce"

They also noted that indigenous breeds have largely been replaced by exotic ones and the practice of free ranch grazing is no more. Instead, people are currently relying on zero grazing. Moreover, indigenous cattle did not require medication often as the current exotic cattle breeds. Their medicine was largely the grass and shrubs.

Change in Crop Yields

All elderly people agreed that the current yields are much lower less than a quarter of the original. Back then, food was in plenty. One elderly person, in describing yields in the past stated that one ear of maize would be as big as the size of her hand (from the elbow to the toes), and sorghum grew so high, it reached to her shoulders. Other elderly people noted that they had plenty to preserve until the next season and their granaries were almost always full. They also had certain traditional bags called *emenyoncho* for keeping dry grains such as finger millet. Some of the plentiful harvest used to be kept on kitchen ceilings called *rirongo* and in most cases the next harvest season would find plenty of food still left. Nobody has food stores anymore as was the case for nearly every household in the past. These trends are in great contrast to the current situation wherein there are no granaries because the harvest is too small to require a separate house for storage. For example, it was established through the women focus group discussion that currently the finger millet harvest rarely lasts a month into the harvest. In fact, the people cannot depend on own production to meet their food needs and must complement it largely through purchasing as already discussed above under the food security status section.

Change in Biodiversity

This study established that there was a decline in agro-biodiversity in the study area. The number of food crop variety was declining thereby leading to loss of food and nutrient diversity. Much of the food crops mentioned by the elderly people that were cultivated widely in the 1960's including Soghurm and finger millet have reduced greatly and so were many of the food preparation methods. There was over reliance of households on maize as the staple food, which encouraged mono cropping.

Changes in Settlement

When asked to describe the changes in settlement, all the elderly people interviewed said that buildings have increased rapidly. Some described the change as mushrooming of settlements. The change was associated with food insecurity because it takes up land for cultivating.

Changes in Tree Cover

Concerning forest cover, the elderly were of the opinion that it has increased moderately. They noted that back then trees were not planted but grew naturally by themselves. There was a variety of indigenous trees with native names such as *emesorich, mesobisobi*, *emesabakwa, omosoricho, emeyaboga, and omosocho*. The trees were used for firewood, shade, herbal medicine, fencing, and building houses. Currently, the tree cover has increased by half of the original. The reason for this increase as noted by the elderly people is that the colonizers introduced exotic trees such as cyprus and blue gam and encouraged people to plant trees. The elderly people could not relate the emergence of more trees with food security claiming that the distinct contribution is hard to notice given that land sizes, infertility, and erratic rainfall have contributed to current reduction in yields.

Expected Rate of Sub division if the Trend continues

From the discussion above, the average land sizes are 0.5 acres and the average number of sons per household is 4. Therefore, if the current practice continues, each son of the next generation will inherit land is expected to obtain an eighth of an acre. If the trend continues, the heirs of the next generation will inherit 1/32 (0.03 acres) of land. Such land sizes cannot support agriculture in the area and that means that the highly potential area would become urbanized. These changes would not only escalate food insecurity in the study area but also nationally.

5.3 Factors Influencing the Size and Use of Household Land and Their Impact on Food and Livelihood Security

This study established that farm size and use are affected by many factors including demographic characteristics, c**ultural practices relating to land inheritance, technology, policy and laws, climatic factors, personal preferences, and institutional aspects as discussed below.**

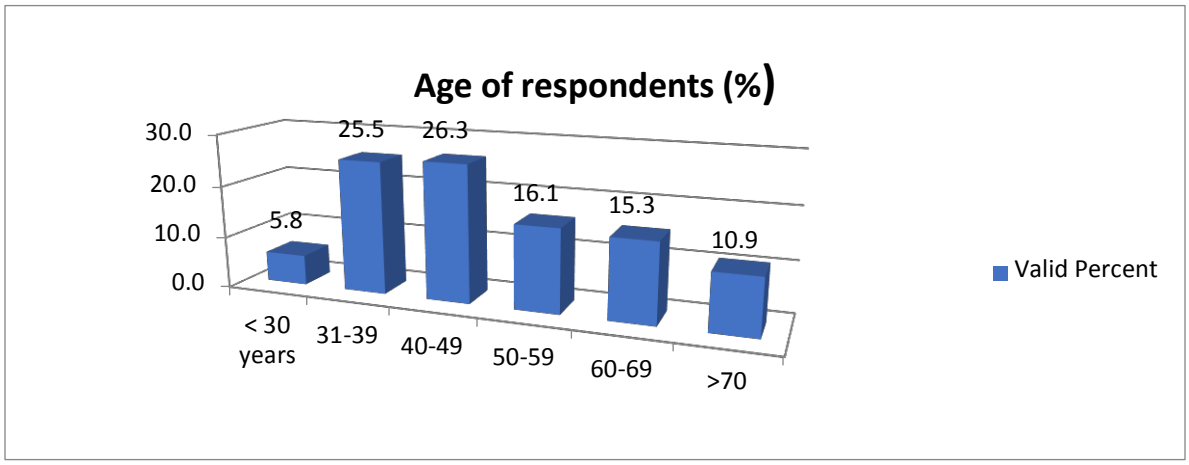
5.3.1 Socio-demographic Factors

The socio-demographic data sought from the respondents entailed age, gender, current marital status, level of education, occupation, and household size. The aim was to determine whether the listed variables have any relation to household land size and use as well as food and livelihood security. The results are discussed below.

5.3.1 Age

This study established that most of the household heads (26.3%) were aged between 40 and 49 years, followed by those within the age bracket of 31 and 39 (25.5%), implying that over half (51.8%) of the household heads are between 31 and 49 years. The large proportion of household heads in the middle age suggests that most of the household heads are actively engaged in production activities. Other household heads fall in the age brackets of 50-59 (16.1%), 60-69 (15.3%), above 70 years (10.9%), and below 30 years (5.8%) as shown in graph **5.3.1** below.

Graph 5.3.1: Age or respondents



Source: Field Survey, 2018

The best possible explanation as to why the least proportion of household heads falls below 30 years could be that majority of the people have not married by this age and are, therefore, still headed by their parents.

Notably, the age of household heads ranged between 22 and 85 years, with the mean age of 45.57 years, falling between the modal ranges of 41-50 years, and a standard deviation of 13.09 as shown in **Table 5.3.1**.

Table 5.3.1

Variable	N	Minimum	Maximum	Mean	Std. Deviation
Age	137	22	85	45.57	13.07

Source: Field Survey, 2018

Therefore, the average age of the respondents was within the active labor force of 15-65 years. The inference for this finding is that most household heads were within the productive age and able to be actively involved in the acquisition and production of agricultural goods. In particular, it implies that most of them were active young adults who could apply maximum physical labour

and skills needed for obtaining a livelihood in farming as well as off-farm activities. According to Yinusa (1999), this age bracket contained the innovative and adoptable individuals.

5.3.2 Relationship between Age and Household Food Security

The study established that food and livelihood security is highest from the age of 31 to 60, beyond which it declines as shown in Table **5.3.2**.

Table 5.3.2 Relationship between Age and Household Food Security

Age	**Percent**	**Food Secure Percent**	**Food Insecure Percent**
<30	5.8	46	68
31-40	25.5	62	33
41-50	26.3	67	36
51-60	16.1	63	49
61-70	15.3	38	65
>70	10.9	41	63
Total	**100**		

Source: Field Survey, 2018

The findings of the descriptive statistics shown in the table above indicated that respondents within the age bracket of 31 to 60 were the most food secure (average food security status of 64 percent), whereas, their counterparts of 30 years or younger and those above 60 years were the least food secure (average food security status of 42 percent).

In relation to land size, the possible explanation for this trend is that household heads with age 31 to 60 years are more likely to own larger pieces of land than younger ones and, therefore, can produce more food and cash crops. In relation to land use, age tends to improve production efficiency because household heads with a fairly advanced age (31-60 years) are likely to have better farming skills and experience as well as capital to adopt new farming technology (Bogale & Shimelis, 2009). They also have strengh to engage in off-farm activities and supplement own production.

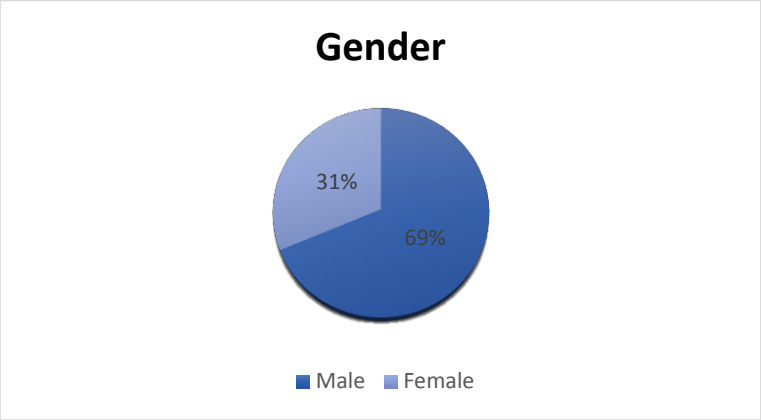
However, an increase of age of the household head beyond 60 years has an inverse relationship with food security as shown in table **5.3 2** above. The possible explanation in relation to land size is that as the household head becomes much older (over 60 years), access to land decreases to

about the same quantity as at age of 30 as a result of distributing it to the heirs through inheritance (Jayne *et al*., 2003).With regards to land use, the much older household heads are less likely to adopt the technologies that boost farm production (Babatunde, 2007). They may also be less educated, thus unable to synthesize relevant information that would improve farm production. In addition, the vulnerability to food insecurity among the household heads of age 60 is not surprising because most of them have limited incomes with many depending on pension benefits given that majority of them are retired and probably not working. In addition to lacking money to purchase food, older people also face unique barriers that are unlikely to be experienced by those in younger age groups in accessing food. These barriers include functional impairments, health problems, difficulty in mobility, and loss of appetite or inability to use food because of health problems (Lee & Frongillo, 2001). Furthermore, the positive correlation between age and land use drops beyond the age of 60 because family labor decreases as children leave home and start their own life.

Gender

Male headed households in the study area constituted 69 percent, whereas the proportion of female heads was about 31 percent as shown in the **chart**.

Chart: Gender



Source: Field Survey, 2018

This finding implies that majority of the households in the area are headed by males. Consequently, males are the ones who make majority of the farming decisions.

Relationship between Gender and Food Security

The gender of the household head was found to affect household food security positively if the head is a male but negatively if female. In particular, the food security status was 69 percent among male headed households and 40 percent among female headed households as shown in the **table.**

Table: Relationship between Gender and Food Security

Gender	**Percent**	**Food Secure Percent**	**Food Insecure Percent**
Male	69	67	32
Female	31	40	60
Total	**100**		

Source: Field Survey, 2018

With regards to land size, this finding could be attributed to the fact that most women in the study area do not own farm lands due to tradition. Notably, in the Kisii culture parents bequeath part of the land to their sons whereas this is uncommon for daughters. Most female household heads were found to be widowed or abandoned by their husbands and owned lesser household assets. Muche et al. (2014) also observes that the cultural restrictions on land ownership imposed on women are likely to limit their ability to produce enough food for the household. As such, male headed households are likely to have more access to land than their female counterparts.

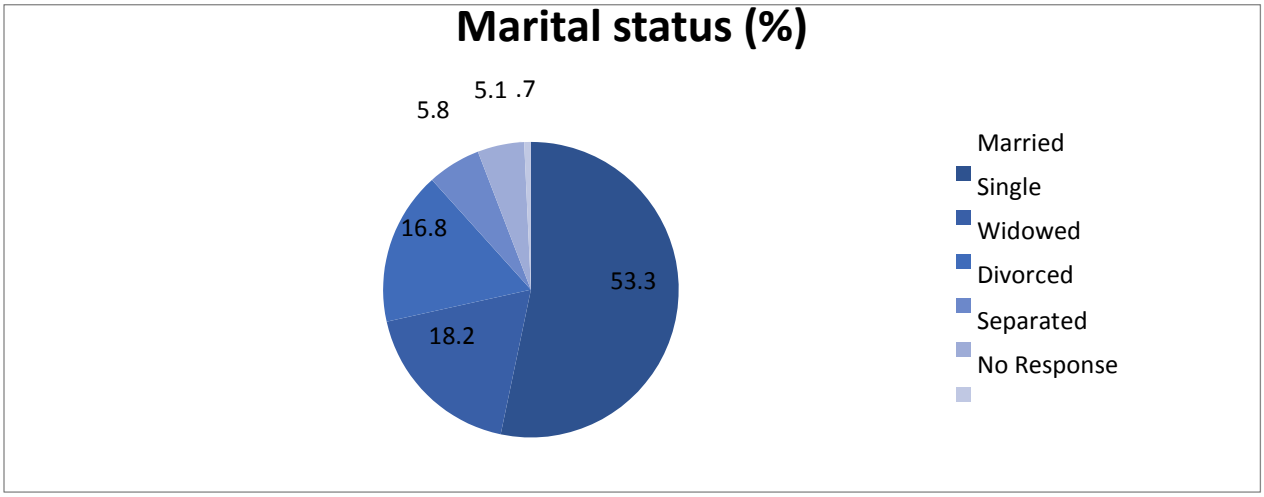
In relation to land use, women tend to have lesser capital for investing in farm production. Ncube and Kang'the (2015) observes that African women are the most susceptible to food insecurity because they are mostly denied equal opportunity in various spheres of life including the job market and education.

The findings of this study concurs with the one carried out by Kumba, Wegulo, & Otieno (2015) in Kisii, which found that majority of the male headed households were food secure as compared to their female counterparts. Amaza *et al.* (2006) also found out that male headed households have higher probability of being food secure. Consequently, there is the need to empower women by guaranteeing equal constitutional rights to land and property and creating g them employment opportunities for them.

Marriage

This study inquired about the respondents' marital status with the aim of determining whether the variable had any association with food and livelihood security. Majority of the respondents (53.3%) were married, followed by singles (18.2%), then widowed (16.8%), divorced (5.8%), and lastly, separated (5.1%) as illustrated in the **chart**. An insignificant percentage (0.7%) did not state their marital status.

Chart: Marital Status



Source: Field Survey, 2018

Ideally, the large proportion of married people is good sign of fighting food insecurity since spouses can complement each other when it came to accessing land, farm inputs and labor.

Therefore, majority of the household heads were in a family relationship, implying that they had support in terms of labour and general interdependence of family members (spouse). Ideally, this was a good sign of fighting food insecurity since spouses were likely to complement each other when it came to accessing farm inputs such as fertilizers as well as labour.

Relationship between Food Security and Marital Status

This study established that food security status was highest among the singles (72%), and the married (64%), but least among the divorced (57%), widowed (53%) and separated (52%) as illustrated in the **table.**

Relationship between Food Security and Marital Status

Marital Status	**Percent**	**Food Secure Percent**	**Food Insecure Percent**
Single	18.2	72	28
Married	53.3	64	36
Widowed	16.8	53	47
Divorced	5.8	57	43
Separated	5.1	52	48
Total	**100**		

Source: Field Survey, 2018

The possible explanation for this finding as it relates to land size is that married people enjoy support in terms of labor, income, and general interdependence of family members (especially a spouse), which facilitates capital accumulation necessary to buy more land. Besides, married people have more family responsibilities that motivates them to acquire more land. Similarly, the married are likely to use land more efficiently because they have interdependence in terms of the labor and capital needed to cultivate land and buy farm inputs, respectively. However, focus group discussions revealed that people in polygamous marriages had low food security status because they had larger household size than their monogamous counterparts and therefore, too many needs. The probable reason why the singles also had a high food security status is because they had few or no dependents. On the contrary, the divorced, widowed, and separated had low food security status for lacking the financial, social, and labor support available to the married.

Household Size

The house hold size (number of household members) in the sub location ranged from 1 to 10 with 78.8% of the respondents having 3 to 6 household members as demonstrated in the **table**. Only 1.5% of the respondents have more than 10 members. The mean household size was 4.6, which translates to 5 members per household.

No. of household members	**Percentage**
<2	5.8
3-4	40.1
5-6	38.7
7-8	13.1
9-10	7
>10	1.5

Field Survey, 2018

The average household size corresponds to the Kisii County (2013) estimates of 5 members per household.

Relationship between Household Size and Food Security

Household size was hypothesized as a determinant of household food security. The findings on the hypotheses testing were established by carrying out a 2 tailed Pearson's (r) correlation test and the results are displayed in the **table** below.

Table 5.2.2: The Relationship between land size and household food Security

Variables	Pearson Correlation (r)	P value
Farm Size	0.471	0.000**

*Statistically not significant (P>0.05) Source: Field survey, 2018

**means statistically significant (P<0.05)

This variable was significant at 5% probability level and negatively related with food security status of rural households. In particular, household size revealed a negative correlation of (r= -0.476) at a p value of 0.000. The negative relationship indicates that the odds ratio in favor of the probability of being food secure decreases as family size increases. Omotesho et al. (2010), Mitiku et al. (2012) and Mensah et al. (2013) also found a negative correlation between household size and food/livelihood security. The possible explanation is that as the household size increases, there is larger number of people that depend on the limited productive resources, especially land. According to Haile et al.(2007), an increased household size increases food consumption more than its contribution to farm production especially in less developed countries where there is inadequate capital resources. A higher food demand than suppy is experienced especially in situations where the dependency ratio is increased (Muche et al., 2014). The proportion of household members who are aged below 15 years and above 65 years is referred to as dependency ratio or burden (Todaro and Smith, 2012). These age groups are considered to be economically unproductive and are thus dependents. Therefore, increased household size tends to reduce the resources available per capita including land size and income. Considering that the average hosuehold size and land size in the study area is 5 members and 5 acres, respectively, it follows that the average per capita access to land is approximately 0.1 acres. This statistic implies that there is excessive subdivision of land into uneconomic agricultural units in the study area. Other than reducing the per capita land sizes, a large household size does not improve land use to match the food demand. Accordingly, the null hypothesis that household size has no significant association with food security was rejected. The alternative, which states that household size is negatively correlated with food security was adopted.

Gender Proportion of Household Members

Most of the households have three to four sons and three to four daughters with a percentage of 51.1% and 44.5%, respectively as shown in the table below.

Table: Proportion of Sons to Daughters in the Household

No. of sons	**Percentage**	**No. of daughters**	**Percentage**
<2	21.2	<2	32.1
3-4	51.1	3-4	44.5
5-6	16.1	5-6	8.8
7-8	7	7-8	14
9-10	0	9-10	9.4
>10	0	>10	0

Field Survey, 2018

As already discussed above, land subdivision is a culturally largely a culturally derived practice. In particular, the number of sons determines the land sizes because the custom recognizes them as the heirs. Accordingly, a large household size with more daughters than sons is likely to have fewer subdivisions than one with more sons in comparison to daughters.

Technology and Innovation

This study established that technology affects yields. In particular, fertilizers, certified seeds, irrigation, green houses, zero grazing, pesticide control, modern storage facilities, and labor mechanization are some of the ways in which technology can influence land use. Focus group discussions and key informant interviews acknowledged that use of poor seed and inadequacy of extension services is negatively affecting food security in the study area.

Market Forces

This study found out that market forces determine what crops farmers grow. In particular, farmers in the study area are shifting form conventional crops grown in the area to the ones with market demand. For example, some farmers have chosen to plant high value and short term crops such as carrots because they offer high returns. The image below shows the farming of carrots in the area.

Image: Carrot Farming due to Market Demand

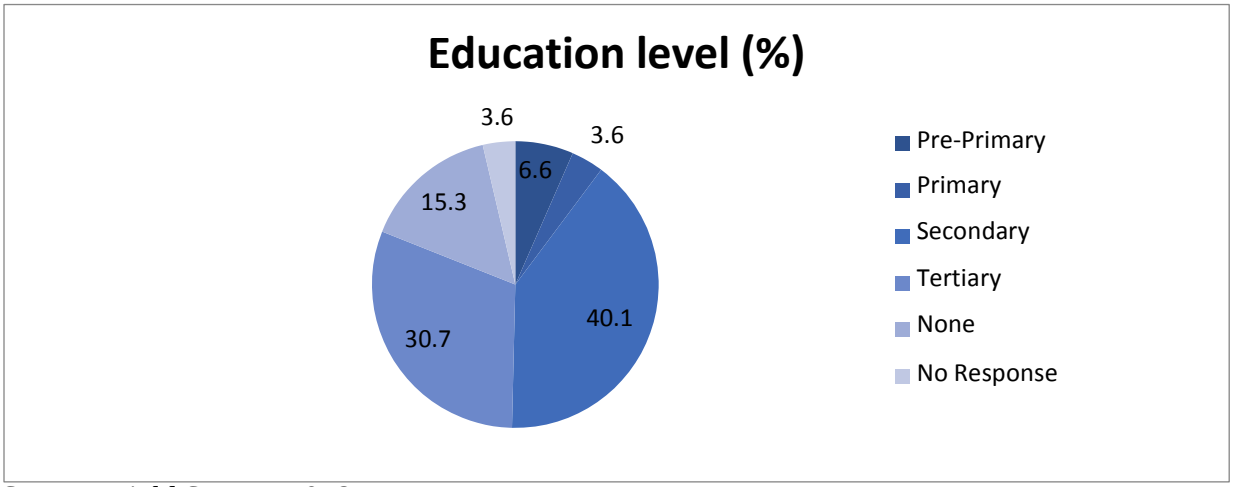
Source: Field Survey, 2018

Similarly, a study on the sweet potato potential in Kenya found that the root crop was neglected in spite of its being highly ecologically adaptive because it lacked market demand (Omosa, 1994).

Moreover, the study established that market forces such as fluctuation in food prices made farmers to plant maize irrespective of its productivity because the alternative strategy of specializing in cash crops was considered too risky given the fluctuating prices of food in the market as already discussed above.

Education

The majority of household heads (40.1%) have access to secondary education, followed by those with tertiary education (30.7%), whereas a significant proportion (15.3%) did not have any access to formal education. Other categories include those with pre-primary and primary education at 6.6 percent and 3.6 percent, respectively as shown in the chart.



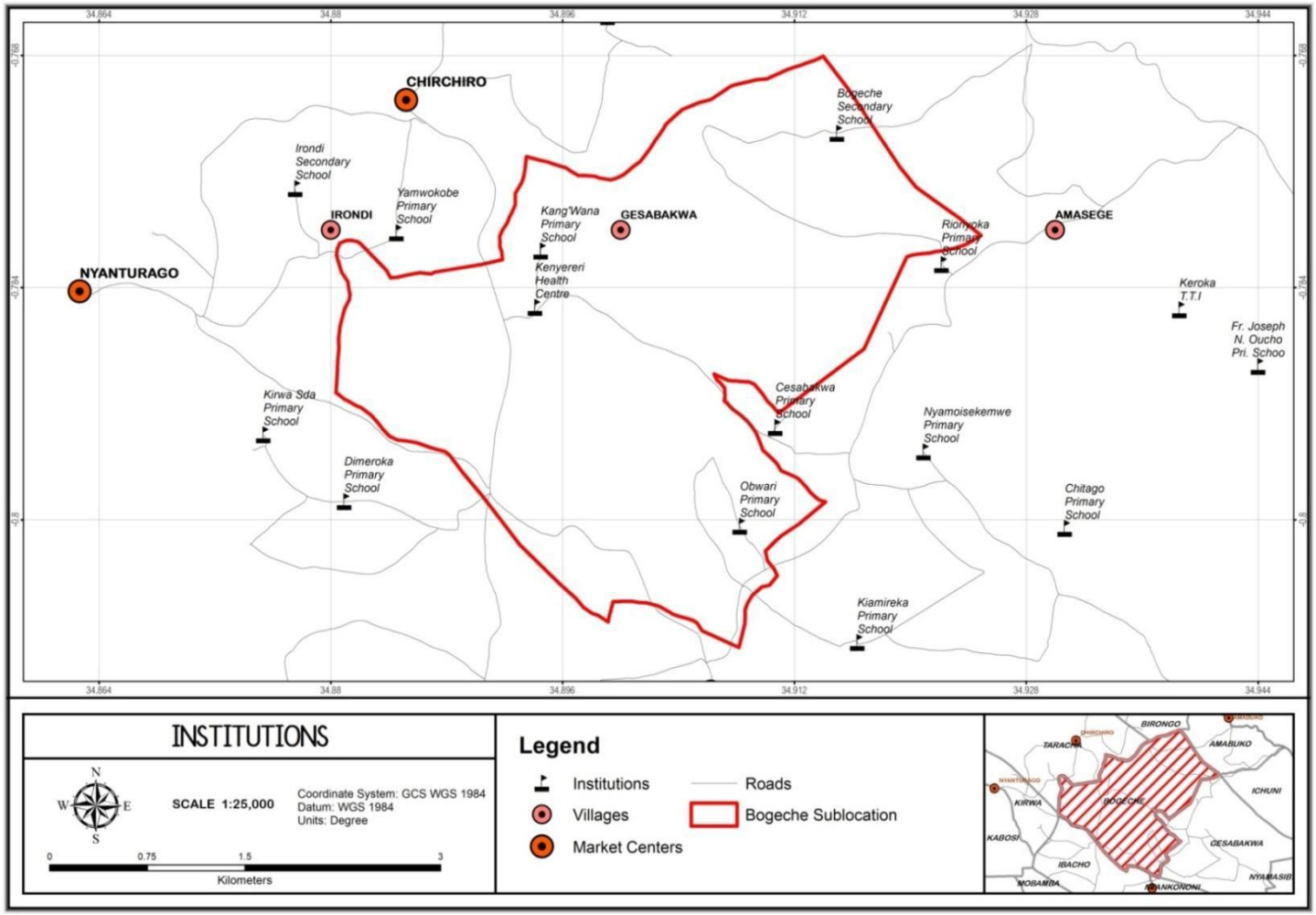
Source: Field Survey, 2018

A conclusion can therefore be drawn that the people of Bogeche sub location have fairly high literacy levels of 70.8 percent when combining the proportion with secondary and tertiary education.

Adequacy of Education Facilities in the Study Area

There are a few primary and secondary schools in Bogeche sub location and its neighborhood and one training institute as illustrated in ***Map 4.9.2***.

4.9.2 Education Facilities in Bogeche Sub Location



Source: Author, 2018

The images below are showing Bogeche primary and secondary education, respectively.

Image: Bogeche Primary School

Source: Field Survey, 2018

Image: Bogeche Secondary School

Source: Field Survey, 2018

Relationship between Education and Household Food Security

This study established, on one hand, that the food security status was 33 percent, 31 percent, and 44 percent among those with no formal education, pre-primary, and primary levels, respectively. On the other hand, the food security status of those with seondar and tertiary education was 73 percent and 88%, respectively shown in the table.

Table: Relationship between Education and Household Food Security

Education Level	**Percent**	**Food Secure Percent**	**Food Insecure Percent**
None	15.3	33	74
Pre-primary	3.6	31	69
Primary	6.6	44	56
Secondary	40.1	73	47
Tertiary	30.7	88	22
Total	**100**		

Source: Field Survey, 2018

Therefore, food security was positively related to the level of education. This finding is consistent with that of Chowa, Garforth, & Cardey (2013) in Malawi which revealed that an increase in the number of years in educational attainment will increase the probability of households being food secure. Haile et al. (2005) and Kaloi et al. (2005) also found out that the household head's level of formal education had a positive effect on household food security. The possible explanation is that it enhances the head household head's capacity to increase production through better management of farm resources and adoption of modern technologies thus enhancing agricultural productivity (Kaloi et al., 2005). Moreover, attainment of education increases the chances of securing off-farm employment, thus improving the household income (Kuwornu et al., 2013). The income may be used to acquire more land, farm inputs or food from the market, thereby enhancing food security.

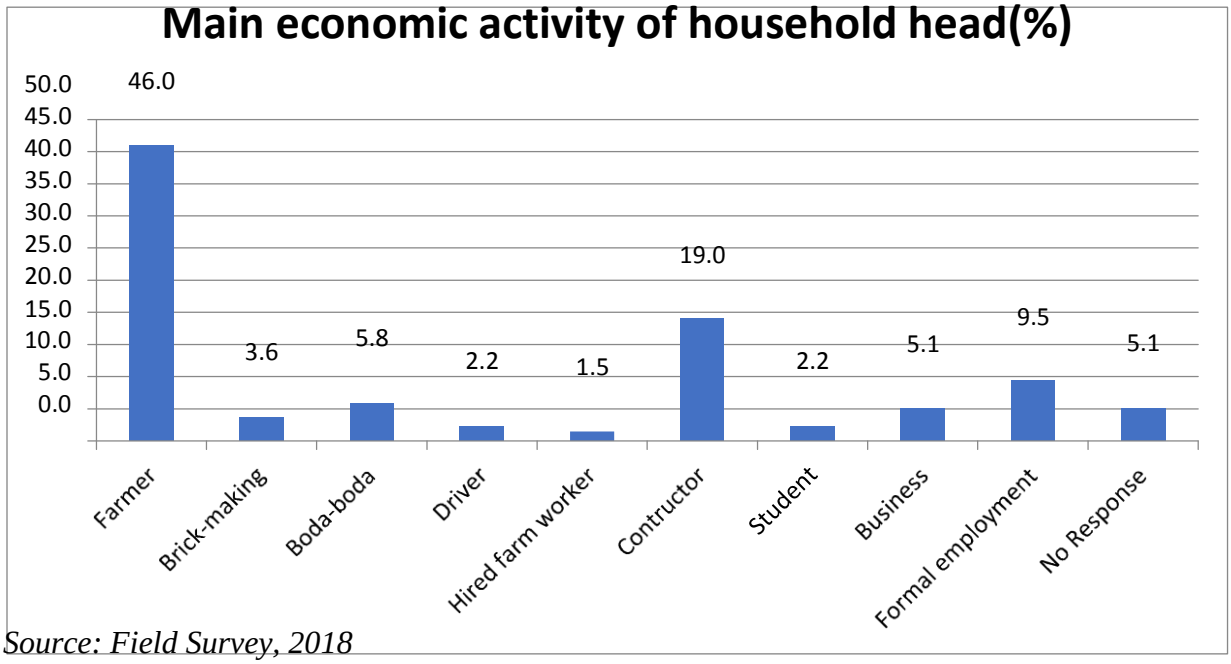
On the other hand, low literacy level has adverse effect on food security because it impedes access to and utilization of agricultural information for household food security by farmers. They also have little understanding important aspects of food security such as water and sanitation as well as nutrition (Republic of Kenya, 2008). Consequently, the education sector needs to be improved because it enhances people's ability people to diversify resources and activities, increase output and income, promote resilience and competitiveness, and enhance health and sanitation among others.

Main Economic Activity of Household Head

Majority (46%) of household heads carry out farming as their main economic activity. The rest engage in construction works (19%) and formal employment (9.5%), whereas a few others are

students or undertake economic activities such as brick-making, boda-boda, driving, hired farmers, and business people as shown in the **graph below.**

Graph: Main Economic Activity of the Household Head



Source: Field Survey, 2018

Given that the majority are farmers, any improvement on farming will have a positive impact on food and livelihood security since a majority depend on it.

Relationship between the Main Livelihood Activity and Food Security

This study found out that the sources of household incomes in the study area were many but majority (46 percent) derived their livelihoods primarily from farming. Despite a majority of the respondents obtaining their income from farming, the study found out that those that were formally employed were more food secure with an average household food security status of 93 percent in comparison to farmers (64% food secure) as shown in the table below.

Graph: Relationship between the Main Livelihood Activity and Food Security

Main Economic Activity	**Percent**	**Food Secure Percent**	**Food Insecure Percent**
Farmer	18.2	64	36
Formal Employment	9.5	93	7
Brick-making	53.3	55	45
Boda-boda	16.8	52	48
Driver	5.8	60	40

Hired farm worker	5.1	53	47
Constructor	19.0	54	56
Student	2.2	59	41
Business	5.1	60	40
Total	**100**		

Source: Field Survey, 2018

This finding can be attributed to the subsistence nature of farming that is predominant in the area, which is carried out on small farms and is characterized by low yields. The findings collaborates with Kuwornu et al. (2012), who found out that in Central Ghana, majority were small scale farmers and food insecure. The finding underscores the importance of reliable off-farm employment. A household's access to more productive and diversified income opportunies increases the likelihood of a household being food secure. Engagement in off-farm activities is part of food security coping mechanisms that provide additional incomes to households. Off-farm occupation increases household income and the working capital required for farm production thus increasing household food availability (Dhehibi et al., 2014). However, the farmer's engagement in off-farm occupation, according to Geta et al. (2013), may reduce the time and resources devoted to the farm and hence reduce food production. Therefore, if farmers spend more of their time on off-farm activities at the expense of working in their farm and particularly if the wage they earn does not commensurate with the foregone farm income, their food security situation could be worsened.

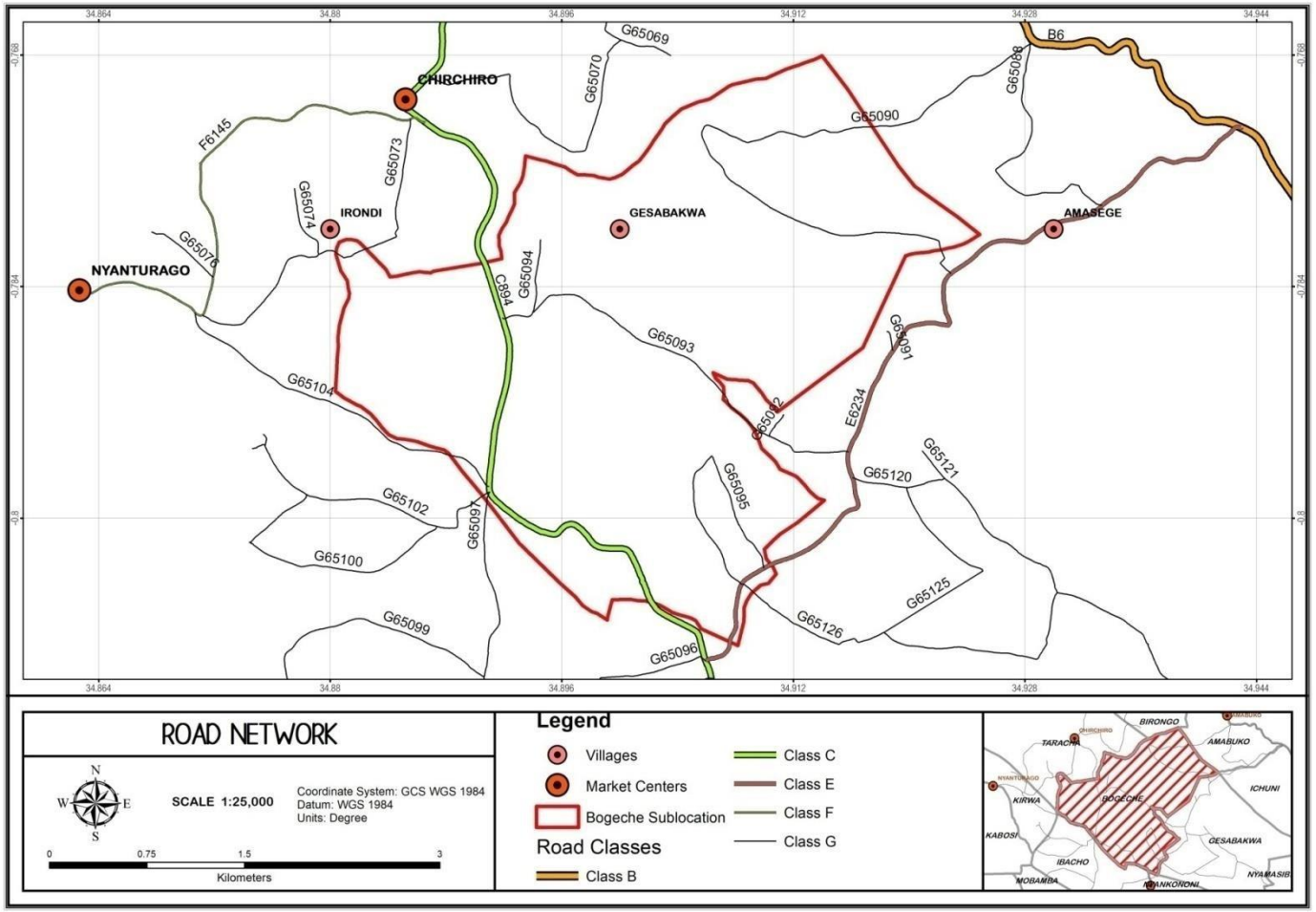
Physical Infrastructure

This research established that all roads, including the main one in the study area are impassable for vehicles during the rainy season. The **image (5.1.1)** below shows the main road in the study area. Notably, the road is seasonal and impassable for vehicles especially when it is rainy.

Image: Major Road (Seasonal) in the Study Area

Source: Field Survey, 2018

5.3 Road Network in Bogeche Sub Location



Source: Author, 2018

Notably, the road network in the study area shows fair connectivity to other parts as shown in ***Map* 5.3** above. The main challenge, therefore, is that the available ones are not all weather roads.

The underdeveloped infrastructure in the study area, and generally, most parts of Kisii County affects distribution and marketing of farm inputs as well as agricultural produce, which contributes to food insecurity. Therefore, this study proposes upgrading the roads to facilitate sale of farm produce and access to food markets.

Availability and Access to Markets

This study established that there are only a few processing industries for value addition in Kisii county and none is located in the study area. For example, there are a few tea processing factories that offer markets to the tea farmers. The image below illustrates tea farmers in the study area loading there produce to a vehicle that transports the product to the tea factories.

Image: Market Access to Farm Produce

Source: Field Survey, 2018

Whereas such efforts should be commended, there is need to stablish small scale processing factories and plants to add value and provide markets for the rest of farm produce in the study area such as milk. Besides, upgrading the roads in the study area as already suggested in the discussion above would enhance market accessibility.

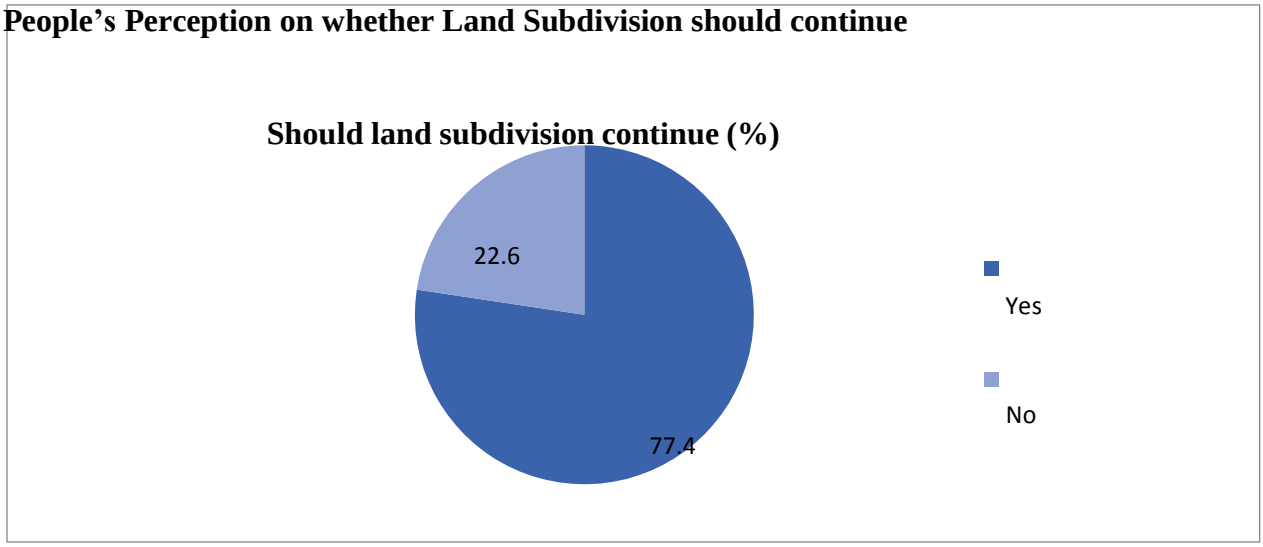
5.4 Appropriate Policy Interventions on Land Holding Size and Use

To identify appropriate policy interventions, this study sought to understand the people's perceptions concerning small farm holdings and how they would like their food security challenges

to be solved. The perception survey was deemed necessary because it informed the receptivity of the people towards various policy interventions. The participants' proposals are later used together with the best practices identified in the literature to propose recommendations for improving the food security status in the study area.

People's Perception on whether Land Subdivision should continue

A majority of the people (77.4%) were of the opinion that land subdivision should be stopped, whereas 22.6 percent wanted it to continue as illustrated in the **chart.**



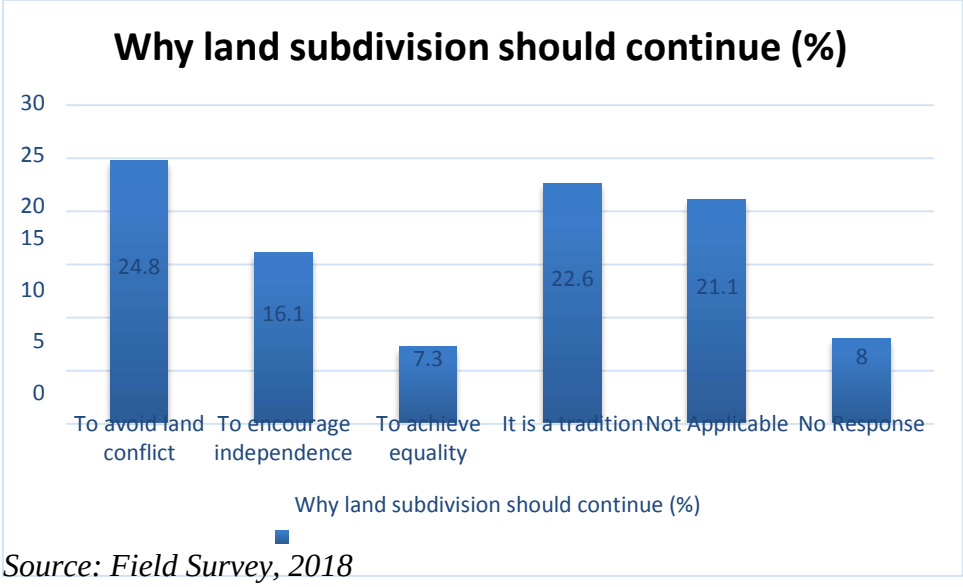
Source: Field Survey, 2018

Reasons for Supporting or Opposing Land Subdivision

Those in support of the practice gave various reasons including to improve crop yields, increase livestock yield, and finally prevent land conflicts from land subdivision.

A significant percentage (22.6%) supported the land subdivision practice for various reasons including to avoid land conflict, encourage independence, fulfill a tradition and achieve equality in the community as illustrated in the **graph** below.

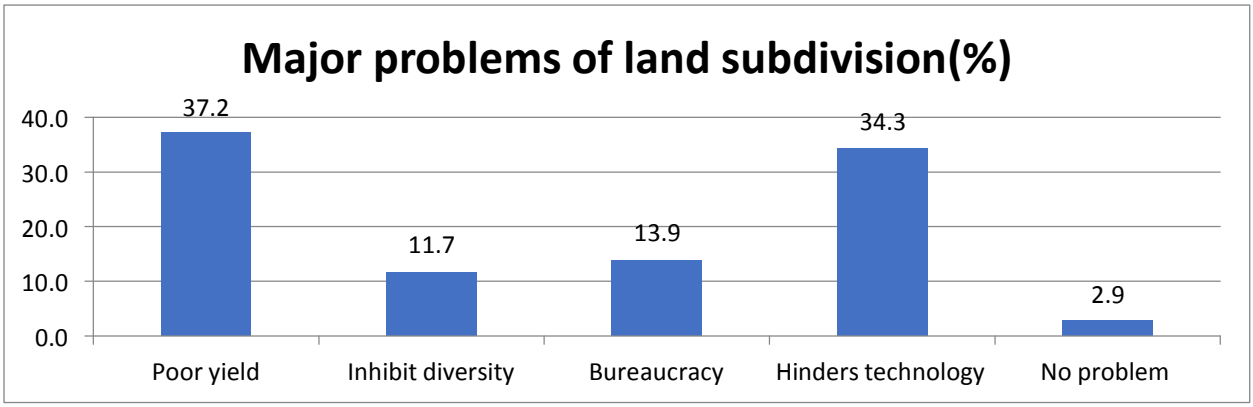
Reasons for Supporting Land Subdivision



Source: Field Survey, 2018

On the other hand, the majority that were opposed to the practice gave various reasons including that it leads to poor yields (37.2%), hinders mechanization/technology (34.3%), and inhibits diversity (11.7%) as illustrated in the **Graph** below.

Reasons for Opposing Land Subdivision

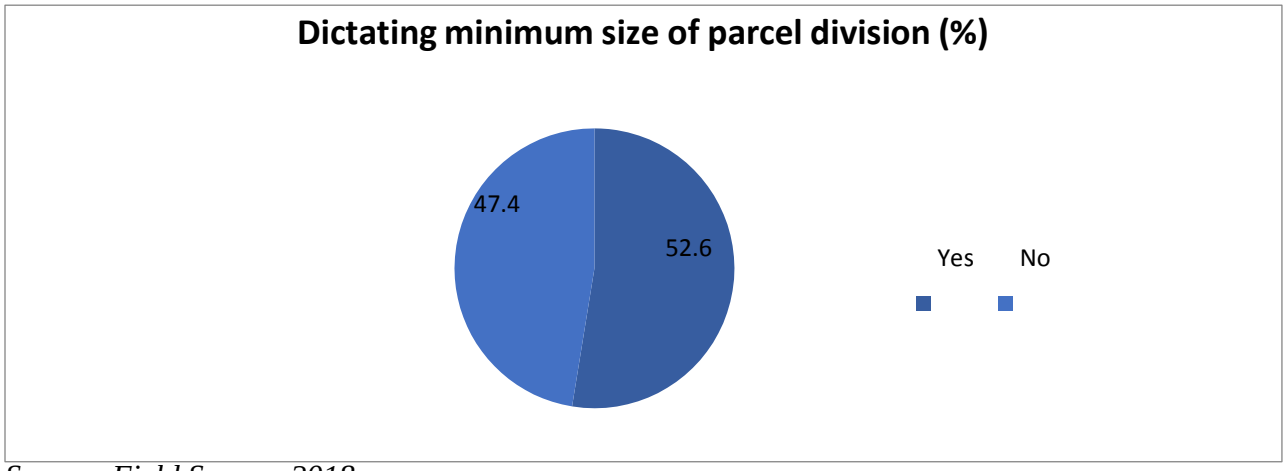


Source: Field Survey, 2018

Perception about Dictating Minimum Land Sizes

Dictating the minimum size of parcel division to help reduce subdivisions received almost the same level of criticism and support from the people with 52.6 percent supporting and 47.4 percent opposing as shown in the chart below.

Perception about Dictating Minimum Land Sizes

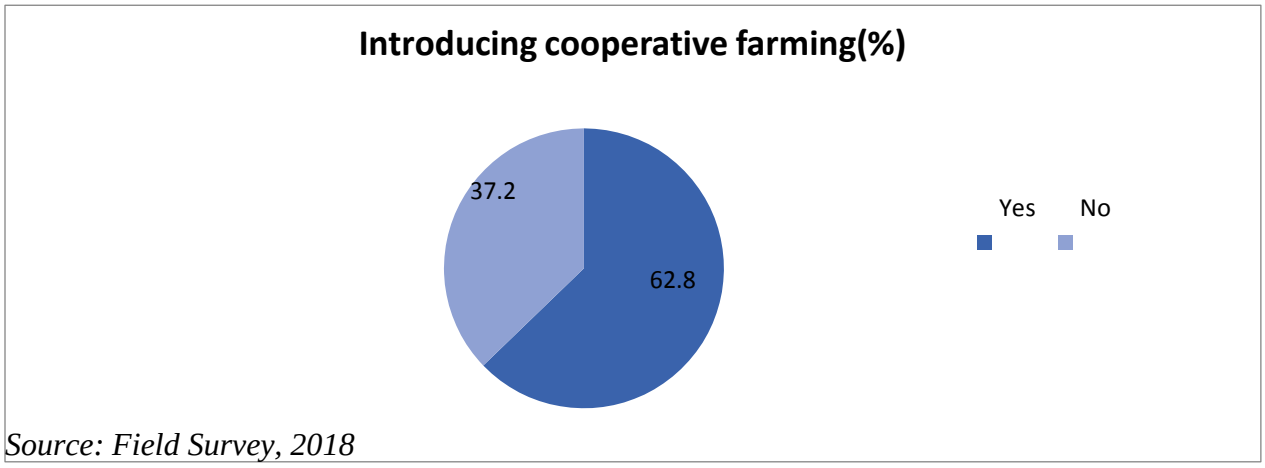


Source: Field Survey, 2018

Cooperative Farming

Introduction of cooperative farming received considerable support with 62.8 percent of the people supporting the idea and 37.2 percent opposing it as shown in the **chart.**

Perception on Cooperative Farming



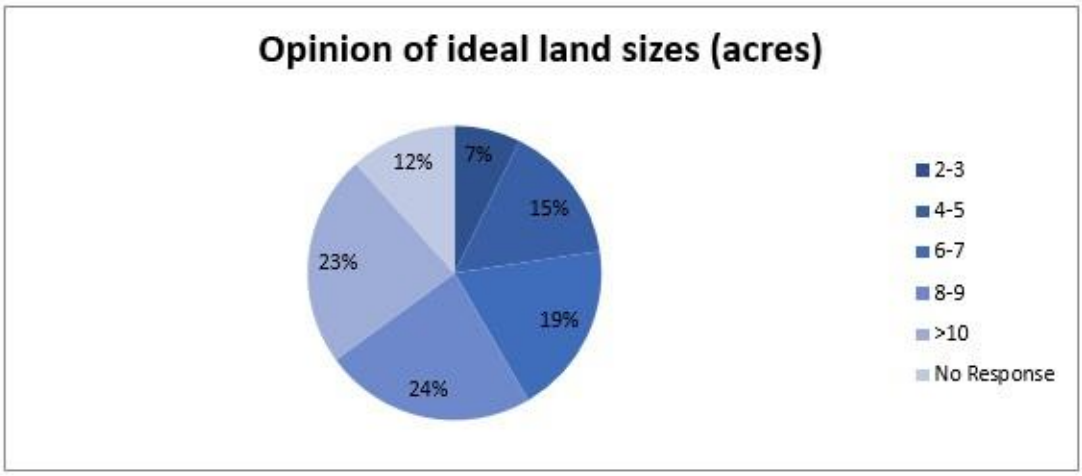
Source: Field Survey, 2018

Those that opposed the strategy felt that it would encourage laziness, over-dependence on others, and general mismanagement of farmlands. However, if there were fair ways of determining how to apportion benefits, they would support it.

Opinion of ideal land Sizes

When asked what they would consider to be the ideal land sizes, most of the household heads (24%) suggested 8-9 acres. An equally significant percentage (23%) suggested 10 acres. Others proposed 6-7 acres (19%), 4-5 acres (15%) and lastly, 2-3 acres (7%).

Opinion of ideal land Sizes



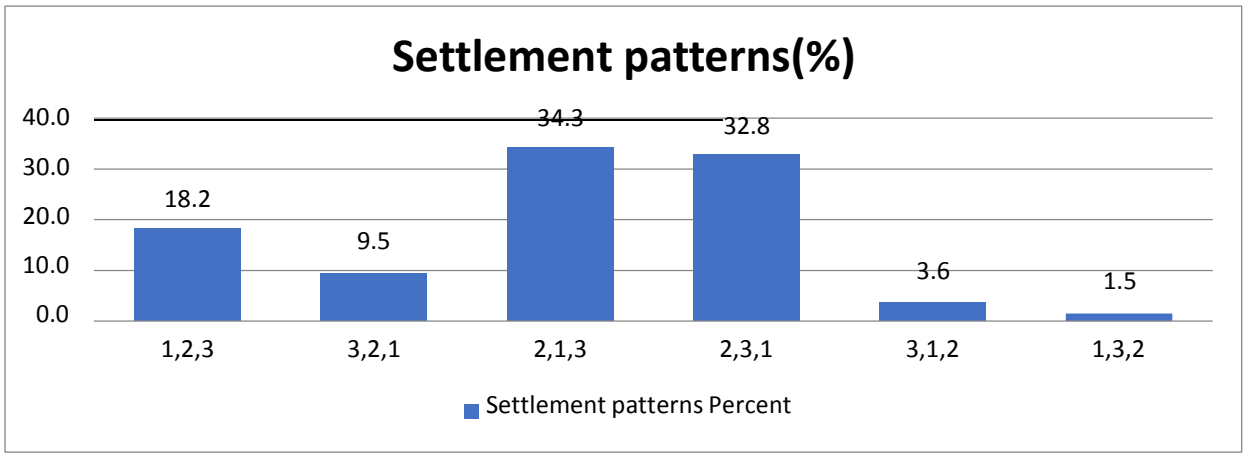
Source: Field Survey, 2018

It can be concluded that most residents consider bigger land sizes ideal.

Preferred Settlement Pattern

The people of Bogeche would rank the settlement patterns as shown in the graph below given that 1 is scattered, 2 is clustered, and 3 is linear. A majority (67.1%) preferred clustered settlement to the rest of settlement patterns because they believed it would free more land for agriculture.

Preferred Settlement Pattern



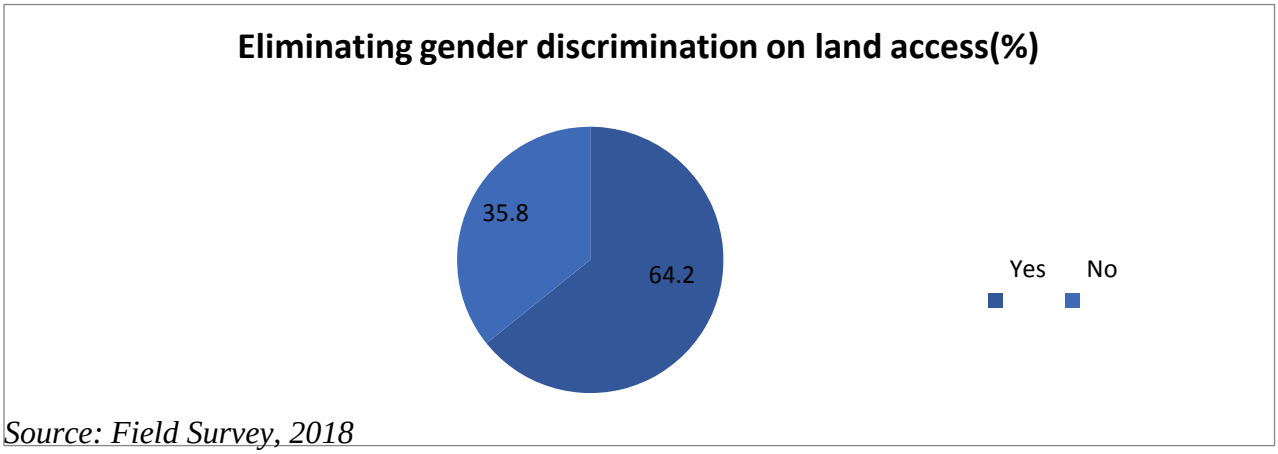
Source: Field Survey, 2018

Those opposed to the clustered settlement approach felt living closer to one another would encourage conflicts, whereas those supporting the policy argued that the measure would free agricultural land that is taken up by unnecessary access roads to each home stead, compound boundary delineations, and homestead space that characterize scattered settlements. Therefore, a clustered settlement policy will receive considerable support from the people.

Perceptions about Gender Inequality

A majority of the respondents (65.2%) would support gender equality when it comes to accessing land, whereas a significant percentage (35.8%) as shown in the chart.

Perceptions about Gender Inequality



Source: Field Survey, 2018

Therefore, there is considerable support from the people for policies that allow women to inherit land especially the disabled and unmarried or simply unfortunate ones.

People's Perception of the Problems Facing Farming

Majority of the respondents (35%) stated that farming has largely been affected by limited availability of land. Other problems facing farming include high prices of inputs such as seeds and fertilizers (20%) lack of agricultural extension services (17%), poor infrastructure (11%), lack of proper storage facilities (9%), and lastly, low quality seed (8%) as shown in **the Table** below.

Table: Problems Facing Farming

		Frequency	Percent
Valid	Limited land	48	35.0
	Lack of agricultural extension services	23	17.0
	Poor infrastructure	15	11.0
	Lack of proper storage facilities	12	9.0
	Low quality seeds	11	8.0
	High prices of inputs	28	20.0
Total		137	100.0

Source: Field Survey, 2018

These findings correspond with the Kisii County Integrated Development Plan (2013- 2017), which lists high cost of farm inputs, poor crop farming methods, use of uncertified seed and small farm sizes as main causes of food insecurity in the study area (Kisii County, 2013). Therefore, this study used the identified problems as a basis for proposing appropriate policy recommendations.

6. CONCLUSION AND RECOMMENDATIONS

6. Introduction

This chapter gives the conclusion and recommendations of the study. It suggests areas of further research.

6.0 Summary and Conclusions

A brief summary of key findings is as follows:

- Land size is positively correlated to food and livelihood security
- Food crops have a moderate positive correlation with food security
- Cash crops have a strong positive correlation with food security
- Settlements have a moderate negative correlation with food security
- The major source of livelihood for the small scale farmers' households in Bogeche sub location is agriculture.
- The main crops in the area include tea, maize, and napier grass.
- Many households had enough food provisioning during the months of June to August while in October to January food provisioning was inadequate.
- Maize was the main food item consumed among households daily
- The small scale farmers depended mainly on markets as their main source of household food as opposed to usual expectation that own crop production would be the lead source. This means own crop production played a supplementary role in food access.
- A significant proportion of households were food insecure.
- The main coping strategies employed by the households in the case of food shortages were reduction in size of meals, reduction in the number of meals per day and consumption of immature crop.
- Also, an increase in the reliable non-farm economic activities means more income to the family and enhanced food security

6.1 Recommendations

This chapter presents policy recommendations for ensuring food security in the study area. The recommendations are derived from the participants' proposals, particularly through quantitative data obtained from the household questionnaires, and qualitative data from the FGDs, institutional representatives, testimonials as well as literature review on best practices for enhancing food security. Adoption and implementation of the proposed interventions will ensure food security for everyone in the study area and will facilitate the realization of the MDG 1, Vision 2030, article 43

(1)(c) of the Constitution of Kenya that guarantees every person the "right to be free from hunger, and to have adequate food of acceptable quality." The key recommendations are outlined below. Notably, some of them need long-term planning.

This study established that economically operational farm units have the potential of transforming the agrarian economy for the better through ensuring efficient allocation of resources including labour and capital. Therefore, to ensure efficient farm sizes and avoid uneconomical land subdivision, this study proposes stipulation of laws for controlling subdivision of land. In particular, any parcel that is less than one unit of the standardized area set by the government should be considered unviable and therefore not transferrable to anyone. In particular, this study proposes a standard unit of 1 acre below which no transfer or subdivision should be allowed. However, such a policy should be reviewed from time to time because land productivity and technology changes overtime.

Another policy measure that received support from the people is voluntary land amalgamation. Therefore, for farms that are already subdivided below the minimum allowable size, this study proposes offering incentives such as credit or farm inputs to those farmers with agricultural parcels above the minimum unit so as to encourage people to voluntarily amalgamate their land.

Moreover, this study established that cooperative farming can be supported by a significant proportion of the people as a way of facilitate land amalgamation. Therefore, the study proposes creating awareness among the people on the importance of land amalgamation and encouraging them to participate in cooperative farming.

Additionally, this study established that lack of ready markets hinders agricultural production in the study area. Therefore, the county government should provide adequate and ready markets for agricultural produce. In particular, the government should prioritize buying of food directly from the farmers to ensure maximum guaranteed returns for them. One way of providing ready market for the produce would be through opening of local cooperative societies that purchase farmers produce and offer them timely pay. This policy measure will increase the farmers' income and protect vulnerable them from unscrupulous middle men who often exploit them by purchasing their produce at very low prices. Priority for market provision should be given for the main cash crops particularly tea and sugarcane as well as food crops especially maize.

This study also established that there are only a few processing industries for value addition in Kisii county and none is located in the study area. As such, the county government should invest in the establishment of small scale processing plants or factories in the study area for transforming the most common agricultural produce such as tea, sugar, milk, and vegetables into finished products. These factories will facilitate value addition to the agricultural commodities and thereby increase the farmers' income. They will also create market for the produce and prevent loss of

perishable commodities that such as milk that would otherwise have been sold at a low price. Moreover, they will create employment to the local people especially the youths.

Additionally, this study established the youths of thirty years and below as well as women in general were the most food insecure. A majority of the youth are unemployed and some even resort to social ills as a means of livelihood. As such, the study recommends Economic Empowerment of Youth and Women. Whereas the government has shown efforts to provide employment, especially for the youth and women through various initiatives such as the Women Enterprise Fund, Youth Enterprise Fund, and Uwezo Fund, these programs need to be intensified. Moreover, capacity building should be done through educating people on the benefits of micro finance, credit facilities, and proper financial management to avoid mismanagement and defaulting on repayment of the loans.

The study established that the agricultural land use types that were significantly related to household food security were those that generate household income. Therefore, this study proposes provision of income earning opportunities for the farming households by generating rural employment through the introduction of micro-enterprises. Investment in projects that enhance commercialization of small-scale farming is important because it can attract the young generation back into agriculture, thereby alleviating food insecurity.

Moreover, this study established that income from formal employment was found to be a significant determinant of household food security since most household depend on food purchases. Therefore, this study recommends promoting off-farm employment to serve as supplementary sources of income. However, care should be given on non-farm opportunities because increasing domination of the sector in rural livelihood may hinder the productivity of the agriculture sector thus creating a challenge for the food self-sufficiency of the country. Although higher priority to non-farm and manufacturing sectors is anticipated in the long-term, commercialization of the agricultural sector is indispensable in the short-term.

Moreover, the research found out that education is positively related to food and livelihood security. It also found out that whereas both private and public primary as well as secondary schools established in the area, tertiary and vocational training institutes are lacking in the study area and the few within the county cannot meet the rising need for higher education among the youth. As such, it is recommends that development efforts should be directed at providing equal access to affordable and quality educational opportunities for both males and females in the study area because formal education will ensure long-term improvement in farm efficiency and food security. Moreover, tertiary and vocational training schools should be established to offer higher education.

Furthermore, the research found out that there is gender marginalization of women especially in regard to land access and ownership because of unfavorable tradition. This imbalance impairs food and livelihood security especially among female-headed households. As such, this study proposes implementation of the anti-discriminatory laws that are provided for in the Constitution. Any female member that is excluded from inheriting family property unless by her own voluntary choice, is thus entitled to protection by the law. Moreover, women should be given leadership roles in the County government offices and projects to promote gender equity.

The study found a negative effect of household size and household size on food security in the area. These results call for education on the importance of family planning to the households. Enlightenment programs on health and birth control measures should be introduced to the farming households so as to educate them on the need to adopt modern family planning techniques and limit their family size. Moreover, programs targeting improvement of incomes for the economically productive age group (18-65 years) should be initiated and supported. Other programs targeting to assist the elderly, the physically challenged, and the female-headed households should be initiate to reduce the dependency burden.

Access to credit was found to have a positive effect on farm efficiency. It is recommended that micro-finance institutions be encouraged to extend affordable credit to the farming community. Farmers should be encouraged to form groups that serve as collateral and leverage in accessing credit.

The study also established that *Ugali* (maize meal) and vegetables are most commonly consumed foods and on daily basis. Therefore, this study proposes Change of Attitude and Eating Habits to Embrace Food Diversification. To promote access to a variety of food, this study proposes growing of a wide range of crop varieties and especially high value indigenous crops that thrive in the study area such as sweet potatoes and finger millet.

This research found out that the roads in the study area are impassable during rainy season, thus hindering access to farm inputs and markets. Accordingly, this study proposes Improving Road Network Facilitate Sale of Farm Produce and access to Food Markets. The current road infrastructure should be rehabilitated to make them passable during the rainy seasons.

Another observation is that extension services are largely lacking in the study area and farmers have not embraced modern technology. Therefore, this study proposes Provision of Agricultural Training to Farmers and Improved Extension Services. In particular, it entails having agricultural extension officers who will train farmers to increase agricultural production through the use modern farming techniques and latest information such as use of improved seed varieties, pesticides, green houses, fertilizers, irrigation, crop diversification, use of machinery and artificial insemination. Moreover, public and private research institutions (including universities) should be facilitated to conduct and disseminate research on technologies that improve productivity.

This Study also established that there are no modern storage facilities in the study area. Although a majority do not produce enough to store until the next farming season, the few that have anything to preserve incur losses due to attack by pests. Therefore, this study recommends Construction of Modern and Proper County Storage and Strategic Food Reserves to facilitate storage of grains and cereals for farmers during bumper harvest at a fee to be deducted from the farmers' proceeds when the produce is sold.

The study established that the clustered settlement model was supported by a significant proportion of the people. Therefore, a clustering program should be adopted to spare large space of agricultural land as shown in **map 6.0**. However, the strategy may face resistance from the people and thus adequate participatory process is required.

Map 6.0: Proposed Clustered Settlement Program

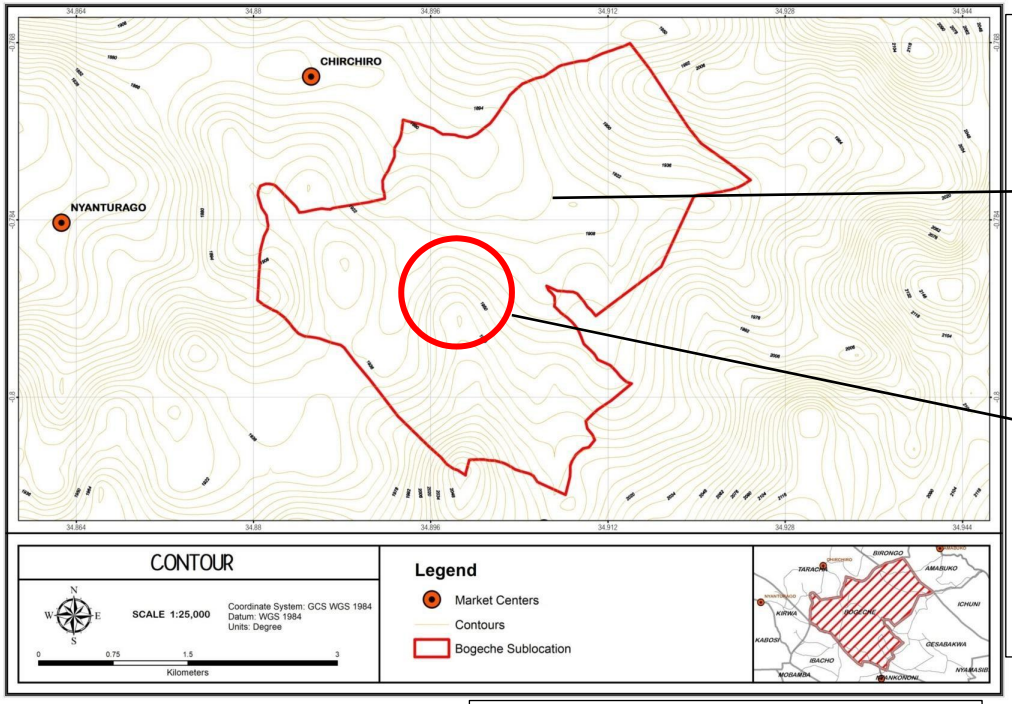


Image of Clustered Settlement and the Freed Farm Land

Established Tea Plantations after Land Amalgamation

***Note**: The red circle is the proposed location of the clustered settlement*

The idea is that clustering of settlements frees agricultural land that would otherwise be wasted by scattered settlements

Source: Author, 2018

Lastly, this study proposes establishment of an Enforcement Mechanism for Ensuring Food Security. In particular, a legislative framework should be developed that will enforce food security programs including the family support program, cash transfers, and other initiatives aimed at the implementation of Article 43 (1) (c) of the Constitution. In this framework it is proposed that a food security authority be established and the governors take responsibility at the County level. This is in line with best practices in other countries such as Columbia, Mauritius, South Africa and India.

The summary of recommendations is given in **table 6.0** below as per the objective.

Table 6.0 Summary of Recommendations

Objective	Findings	Recommendations
To identify the current household land size and use and determine how they influence household food and livelihood security in the study area	There was widespread uneconomical subdivision of land	**Set a standardized unit of land** (herein suggested to be 1 acre), below which subdivision or transfer of land should not be allowed
	Agricultural land use types that are significantly related to household food security are those that generate household income	Provide **income earning opportunities** through the introduction of micro-enterprises.
To analyze the factors influencing the size and use of household land and their impact on food and livelihood security of the rural population	**Age:** Youths of thirty years and below as well as women were generally the most food insecure	**Empower youth and women** economically through educating them on the benefits of micro finance, credit facilities, and proper financial management to avoid mismanagement and defaulting on repayment of the loans.
	Household size is negatively correlated with food and livelihood security because it increases the dependency ratio	**Establish enlightenment programs on health and birth control measures**
	There is **gender** marginalization of women especially in regard to land access and ownership because of unfavorable tradition	Implement anti-discriminatory laws and **give women leadership roles** in the County government offices and projects to promote gender equity
	Education is positively related to food and livelihood security. However, tertiary institutions are inadequate throughout the county	Provide access to **formal educational opportunities** and establish **tertiary institutions** in the area to offer vocational training
	Income from formal employment is positively correlated with household food security since most household depend on food purchases	Promote **off-farm employment** to serve as supplementary sources of income. However, this strategy should be implemented cautiously to avoid domination of the sector in rural livelihood because it may cause a challenge for the food self-sufficiency of the country

	There are only a few processing industries for **value addition** in Kisii county and none is located in the study area	**Promote value addition of agricultural produce** through establishment of small scale processing plants or factories in the study area
	Access to credit has a positive effect on food security.	Encourage **micro-finance institutions to extend affordable credit** to the farming community
	Access to credit has a positive effect on food security.	Encourage **micro-finance institutions to extend affordable credit** to the farming community
	Roads in the study area are impassable during the rainy season thus hindering access to farm inputs and markets	**Improve road network** to facilitate sale of farm produce and access to food markets
	Extension services are largely lacking in the study area and farmers have not embraced modern technology	**Provide agricultural training to farmers and improved extension services** for improving agricultural productivity
To determine and propose appropriate policy interventions on land holding size and use that can ensure sustainable food and livelihood security for rural households in the mixed farming system of Kisii County	The **clustered settlement** model was supported by a significant proportion of the people.	A **clustering program** should be adopted to spare large space of agricultural land
	The strategy of **voluntary land amalgamation** received support from significant proportion of the people	**Offer incentives** such as credit or farm inputs to those farmers with agricultural parcels above the minimum unit to encourage them to voluntarily amalgamate their land
	Cooperative farming as a way of facilitating land amalgamation was supported by a significant proportion of the people	Create awareness among the people on the importance of land amalgamation and encourage them to participate in **cooperative farming**

6.2 Contribution of the study

This study builds the scientific body of knowledge for future reference by establishing that land size and use have a direct association with food security in the study area. Moreover, it provides understanding of the area-specific factors that affect household food and livelihood security, thereby making it useful for context-specific decision- making.

6.3 Areas of Further Study

This study has demonstrated how land size and use affect food and livelihood security. However, household food security is not only affected by these two variables but also physical factors such as the availability of transport systems and food stores. Therefore, the study recommends further research into how physical infrastructure affects food production and market efficiencies and, in turn, how it ultimately impacts on household food security. A study should also be conducted to determine the best ways of providing value addition for agricultural products in Kisii County.

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APPENDICES

Appendix A: Household Schedule

HOUSEHOLD SCHEDULE

DECLARATION: The information obtained from this questionnaire is confidential and will be used for academic purpose(s) only.

Sub-location ……..……...….. Questionnaire No……...……..….

Name of Interviewer..……..……..… Date of Interview…...…….

Telephone No. of Interviewer……..…….……

1.0 Respondent Profile

Tick (√) in the bracket provided, the appropriate answer.

1.1 Name of the respondent

(Optional)…….

1.2 How old are you?

(Years).....

1.3 Marital status

Married ( ) Single ( ) Widowed ( ) Divorced ( ) Separated ( )

1.4 Gender of respondent

Male ( ) Female ( )

2.0 Household Data

2.1 How many members constitute your household (nuclear family)?

…….....

2.2 How many sons do you have?

……

2.3 How many daughters do you have?

……

2.4 What is the number of other males living in your household?

……

2.5 What is the number of other females living in the household?

……..…….

2.6 What is the highest education level attained by the household members?

Household members	**Age**	**Education levels**					Occupation
		None	**Pre-primary**	**Primary**	**Secondary**	**Tertiary**	
Father							
Mother							
Son/Daughter							
1.							
2.							
3.							
4.							
5.							
6.							
7.							
8.							
9.							
10.							

3.0 Land Holding Arrangements

3.1 Do you own land?

Yes ( ) No ( )

3.2 If yes, in 3.1 above, how many pieces do you own?.....

3.3 What is the total household land size in acres?.....

3.4 Owned land characteristics

No.	Spatial Location and distance (Km)	Size in Acres	Mode of Acquisition	Main use	Tenure System	Ownership document
1						
2						
3						
4						
5						
	Total					

3.5 Do you rent any land? Yes ( ) No ( )

3.6 If the answer to 3.5 is yes, then complete the table below.

No.	Spatial Location and distance (km)	Size in Acres	Main use	Duration of renting	Cost of renting (annually)
1					
2					
3					
4					
5					
	Total				

3.7 Provide the following information about the off-farm income generating activities for this household.

Other Sources of Income	**Frequency**	**Estimated amount per month (Ksh)**

3.8 Have you bought or sold important assets such as land in the last two years?.....

3.9 If you bought land, explain why?.....

3.10 If you sold land, explain why? ……..

4.0 Inheritance and Cultural Practice Surrounding Land Ownership

4.1 Did your parents sub-divide their land?.....

4.2 If yes, why did they do so?.....

……

4.3 How big was your parents` land parcel before any sub-division (in acres)?.....

4.4 If they subdivided the land for inheritance purposes, then to how many beneficiaries/heirs?

…….……

4.5 Did you inherit any land? If yes, how many acres?.....

4.6 How many brothers did you have at the time of inheriting the household land?

……

4.7 Did all the brothers inherit equal share of your parents' land? Explain your answer.

.....

4.8 How many sisters did you have at the time of inheriting the household land?

……..……..……

4.9 Did any of the sisters inherit land from your parents?.....

4.10 If yes to 4.9 above, how many acres did each inherit?.....

4.11 Are there any cultural practices around the use and inheritance of land? If yes, explain.

.....

4.12 Do you think as a country we should continue sub-dividing land among heirs?……..……

4.13 If yes to 4.12 why do you think so?.....

4.14 If no to 4.12 what do you think should be done?.....

4.15 State one major problem of land subdivision to a farmer……

4.16 In your opinion how much land would be enough to feed your household (in acres)?.....

4.17 Explain your reason for the preferred number of acres in 4.16 above

……

……..……

5.0 Land Use in Relation to Livelihood Security

5.1 What is the main economic activity that the household head engages in?

.....

5.2 Do you practise any agriculture?

Yes ( ) No ( )

5.3 If **Yes to 5.2**, what are the main crop and livestock land use activities on the farm?

Activity	**Area (Acres or Sq. Metres)**	**Yield (kgs) (other) in Seasons**		**Use (Kgs) (Other)**		**Price per unit weight (Min-Maximum)**		**Average income to the family (Kshs.)**
CROPS		**Season 1**	**Season 2**	**Consumed**	**Sold**	**Min**	**Max**	
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								

LIVESTOCK TYPE	**No. Animals**	**Yield/Animal/Year**	**Use (Kgs) (Other)**		**Value (Ksh)**	**Average income to the Family**
			Consumed	**Sold**		
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						

6.0 Food and Nutrition Security

6.1 Compare the yield you get currently in your farm and the yields that used to come from your father's farm before sub-division.

Yields are the same ( ) Currently yields are lower ( )

Yields are more ( ) I`m not sure ( )

6.2 By how much has the yield changed? A Quarter ( ) Half ( ) Three Quarters ( )

6.3 What do you think is the reason for the changes in the yield?

……

……

……

6.4 For how many months in a year do the current yields from your farm feed your family?

6.5 How many months in a year do you have the following situations

Intensity of scarcity		**Duration of farm yield availability (months)**	**Coping Strategies Employed**
A	Sufficient food	At least 12 Months	
B	Mild Scarcity	9 Months	
C	Moderate Scarcity	6 Months	
D	Severe Scarcity	3 Months	

6.6 In the last 3 months, has your family ever skipped a meal because of food shortage?

Yes ( ) No ( )

6.7 In a typical week, what food does your household feeds on?

	Foods	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Morning	a.							
	b.							
	c.							
Lunch	a.							
	b.							
	c.							
Supper	a.							
	b.							
	c.							

6.8 How often do you take the following types of food?

Type of Meal/Food	Frequency of intake: (Daily, Weekly, Monthly, Annually, Other specify)
Milk	
Beans	
Chicken	
Fish	
Beef	
Pork	
Mutton	
Goat meat	
Fruits	
Beans	
Green/Yellow grams	
Njahi	
Ugali	
Rice	
Chapati	

6.9 What challenges do you face in obtaining food?.....

6.10 Do you have sufficient water for drinking and domestic use?

……..

6.11 Do you consider hygiene in preparation of food?.....

6.12 Do your religious beliefs prohibit you from eating certain foods and/or using land for particular purposes? If yes, please explain

……...

6.13 What is your main source of cooking energy?

a. Firewood b. Charcoal c. Gas d. Crop residues e. Kerosene f. Electricity g. Other – specify

6.14 What is challenges do you face in obtaining the energy for cooking?

7.0 Views on Land Subdivision

Give your opinion or comment on the effect of land sub-division on food security. State whether you agree or disagree with the comment.

7.1 Land subdivision exists due to population pressure

Agree ( ) Disagree ( ) Not sure ( )

7.2 Small sub-divided parcels lead to low crop yield

Agree ( ) Disagree ( ) Not sure ( )

7.3 Modern farming techniques can easily be applied on small land sizes

Agree ( ) Disagree ( ) Not sure ( )

7.4 With small land sizes, number of cattle kept has gone down

Agree ( ) Disagree ( ) Not sure ( )

7.5 If you agree in 7.4 above, describe the changes (the change was from how many to how many?)

7.6 Small land holdings have made people adopt new farming techniques and skills

Agree ( ) Disagree ( ) Not sure ( )

7.7 In your opinion, what is the ideal minimum land size for a household that is dependent on agriculture?

.....

7.8 Given the way land is being sub-divided among heirs - what is your proposal on how farms should be organized in the future?

……..

……..

7.9 Given the following possible patterns of human settlement – rank them in your order of preference.

a. Scattered
b. Linear along the roads
c. Clustered low density
d. Clustered high rise
e. Others - Specify

7.10 Which of the following land policy measures/strategies would you support for this area? Tick in the bracket provided, where appropriate.

i) Eliminating gender discrimination in access to land by disregarding cultural barriers that prohibit females inheriting property ( )

ii) Dictating minimum size of parcel division ( )

iii) Discouraging absentee landowners by imposing penalties ( )

iv) Prevention of transfer to non-farmers ( )

v) Imposing a maximum limit on the size of a holding ( )

vi) Land funds and land banking ( )

vii) Voluntary parcel exchange ( )

viii) Cooperative farming ( )

ix) A clustering programme ( )

8.0 Human Settlement

8.1 Sketch the current arrangement of the homestead?

Home compound parameters	**Remarks**		
a. Total area of homestead compound (Sq. metres)			
b. Main house - total area (Square metres)			
c. Main house number of rooms			
d. Main family house construction materials	Floor	Wall	Roof
e. Indicate the total **number** of other houses in the compound			
f. Estimate total **area** of the other houses in the compound (Square meters)			
g. List other structures in the homestead and their estimated area in square metres.	Food granary…… Hay store…… Firewood store……... Cowshed…… Chicken house…… Dog house…….. Other……..		

8.2 Describe the changes that have occurred to the land uses below and how they relate to food security (fill in with the answer)

Land use	**Land Size Change (Increased or decreased) Rapidly, Moderately or Gradually**	**Effect on Food Security (Increased food security, no effect or decreased food security)**
Forest Cover		
Settlement		

8.3 Do you have any question for us?.....

Appendix B: Key Informant Interview Guide – The Assistant Chief

DECLARATION: *Information generated through this questionnaire will be held professionally and will be used solely for research purposes.*

Name of respondent……. Name of Interviewer……

Position of respondent……..Gender of respondent……

1. What is the average household land size in Bogeche sub location?
2. What are the predominant land uses in the area? Why do people prefer these activities?
3. How do the people obtain their food?
4. Do you have food insecurity in this area? If yes, explain the severity.
5. Do you think household land size and use affect household food security and why?
6. What factors are driving the increasing land subdivision in this area?
7. How have the people coped with the decreasing land sizes and declining agricultural use?
8. Have the livelihood strategies identified above been effective? Explain your answer.
9. Is there change in cropping pattern, crop choice, adoption of technologies, and frequency of cultivation? Explain your answer.
10. How important is dairy farming to household food and livelihood security in this area?
11. What proportions of the people have title deeds?
12. What are the gender bottlenecks or advantages in accessing and managing land in this area?
13. What implication does the gender equity or disparity described above have on food security?
14. Do you have any land conflicts in this area? What is there nature?
15. Do you have conflicts in the utility of common resources such as rivers?
16. Are there cases of environmental degradation in this area? If yes, explain your answer.
17. Supposing the current trend of subdividing agricultural land continues in the next decade or so, what implications will that have on household food and livelihood security?
18. What policy intervention could be adopted to ensure sustainable food and livelihood security for the people of Bogeche sub location?
19. What policy measures/strategies could be adopted to ensure household food and livelihood security for this area?

Appendix C: Key Informant Interview Guide – Village Elders

Respondent name (optional)…… Village……..……

1. Do you have food insecurity in this area? If yes, explain the severity.
2. Do you think household land size affects household food security? Explain your answer.
3. What factors are driving the increasing land subdivision in this area?
4. How have the people coped with the decreasing land sizes and declining agricultural use?
5. Have the livelihood strategies identified above been effective? Explain your answer.
6. Is there change in cropping pattern, crop choice, adoption of technologies, and frequency of cultivation? Explain your answer.
7. Do you think land uses (e.g. settlements, tea, maize, dairy, forestry, wetlands etc) have any effect on food and livelihood security? Explain your answer.
8. Do you have any land conflicts in this area? What is there nature?
9. Do you have conflicts in the utility of common resources such as rivers? If yes, please explain.
10. Supposing the current trend of subdividing agricultural land continues in the next decade or so, what implications will that have on household food and livelihood security?
11. What policy intervention could be adopted to ensure sustainable food and livelihood security for the people of Bogeche sub location?
12. Which of following policy measures/strategies could be effective for this area?
    - i) Eliminating gender discrimination in access to land
    - ii) Dictating minimum size of parcel division
    - iii) Discouraging absentee landowners
    - iv) Prevention of transfer to non-farmers
    - v) Voluntary parcel exchange
    - vi) Cooperative farming
    - vii) A clustering program

Appendix D: Key Informant Interview Guide – Oldest People in the Sub Location

Name of respondent…… Age of the respondent……..

1. How big was your parents' land parcel before any sub-division (in acres)?
2. How did your parents acquire the land?
3. Did they eventually sub divide the land?
4. If yes, to how many beneficiaries/heirs?
5. Did you inherit any land? If yes, how many acres?
6. How many brothers did you have at the time of inheriting the household land?
7. Did all the brothers inherit equal share of your parents' land? Explain your answer.
8. How many sisters did you have at the time of inheriting the household land?
9. Did any of the sisters inherit land from your parents?
10. If yes to 12 above, how many acres did each inherit?
11. Are there any cultural practices around the use and inheritance of land? If yes, please explain.
12. Would you support policies that enable females to obtain equal share of inheritance as the males?
13. Compare the yield you get currently in your farm and the yields that used to come from your father's farm before sub-division.

    Yields are the same ( ) Currently yields are lower ( )

    Yields are more ( ) I`m not sure ( )

14. By how much has the yield changed? A Quarter ( ) Half ( ) Three Quarters ( )
15. Have the changes in land sizes influenced the number of cattle being kept? Explain your answer
16. Have the cattle breeds and ways of keeping livestock changed overtime
17. Have the types of crops grown in this area changed overtime? If yes, please explain.
18. Have the types of food being consumed in this area changed overtime? If yes, please explain.
19. Are there any cultures that surrounded the preparation and consumption of food during significant occasions?
20. Do cultural vices such as witchcraft have any effect on food and livelihood security?

21. Have the cultivation practices changed over time? If yes, please explain.
22. What cultural values and practices guided how people settled on land?
23. Describe how housing typologies have changed over time
24. Were there cultures that dictated how male and females lived in their parents' home and eventually moved out to start their families?
25. Were there any cases of food insecurity in the past?
26. If yes, how did you cope with the situation?
27. Have the methods of food storage changed over time?
28. Describe the changes that have occurred to the land uses below and how they relate to food security (fill in with the answer)

Land use	**Land Size Change (Increased or decreased) Rapidly, Moderately or Gradually**	**Effect on Food Security (Increased food security, no effect or decreased food security)**
Forest Cover		
Settlement		

29. If the vegetation and tree cover has changed over time, describe the changes (give specifics such as the types of indigenous or exotic trees that have been lost or added)

Appendix E: Youths Focus Group Discussion Guide

Consent details

To participate in this discussion, please read the terms below:

All information obtained through this forum will be held completely confidential and the participants' identities will not be disclosed

You may refuse to answer any question or withdraw from the discussions at any time

If you have any questions now or after the discussions, feel free to contact any of our team members through the contacts provided below

We may have to tape the discussions to help us capture every idea shared in this group

Please check the box below to confirm that you agree to the terms of participation

☐ This is to confirm that I have voluntarily and without any coercion consented to partake in the deliberations of this group discussion as long as the terms stated above are not violated.

Demographic Sheet: Record of FGD participants

Name	**Age (Years)**	**Gender**	**Marital status**	**Land owned acres (if any)**
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				

Youths Focus Group Discussion Guide

a. How do youths obtain their food and livelihoods in this area?
b. Do youths have access to sufficient land for farming?
c. If no in 2 above, how have they coped with the land scarcity?
d. Do you think land sizes have any effect on food and livelihood security? Why?
e. Do you think land uses (e.g. settlements, tea, maize, dairy, forestry, wetlands etc) have any effect on food and livelihood security? Explain your answer.
f. What factors are driving the increasing land subdivision in this area?
g. What implication does the gender equity or disparity in land ownership and control have on food security?
h. Supposing the current trend of subdividing agricultural land continues in the next decade or so, do you think you will have land to give to your children? What implications will the subdivisions have on household food and livelihood security?
i. What minimum household land size do you think can guarantee food and livelihood security for the people of Bogeche sub location?
j. What policy intervention could be adopted to ensure sustainable food and livelihood security for the youths of Bogeche sub location?
    i) Eliminating gender discrimination in access to land
    ii) Dictating minimum size of parcel division
    iii) Discouraging absentee landowners
    iv) Prevention of transfer to non-farmers
    v) Voluntary parcel exchange
    vi) Cooperative farming
    vii) A clustering program

Appendix F: Women Focus Group Discussion Guide

Consent details

To participate in this discussion, please read the terms below:

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You may refuse to answer any question or withdraw from the discussions at any time
If you have any questions now or after the discussions, feel free to contact any of our team members through the contacts provided below
We may have to tape the discussions to help us capture every idea shared in this group
Please check the box below to confirm that you agree to the terms of participation

☐ This is to confirm that I have voluntarily and without any coercion consented to partake in the deliberations of this group discussion as long as the terms stated above are not violated.

Demographic Sheet: Record of FGD participants

Name	**Age (Years)**	**Gender**	**Marital status**	**Land owned acres (if any)**
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				

a) Let us start the discussion by talking about our history and origin. When did we settle in this place and what brought us here? What size were our farms when we first settled in this area?

b) Has the land/farm sizes changed overtime, what brought about these changes?

c) What were the main land uses then? What are the current land uses?

d) Has farm productivity been changing over time? Why is it so?

e) Is productivity dependent on ownership of land?

f) Is the current farm produce sufficient for your households? How long does it last?

g) What factors do you consider when choosing the types of crops to grow?

h) Do you think food and livelihood security is dependent on the type of crop grown such as tea, maize, and Napier grass? Explain your answer.

i) How have settlement patterns and number of housing units evolved since you settled here? Do these changes affect land size and use?

j) How do women obtain their food and livelihoods in this area?

k) In your opinion who between men and women can manage land effectively to ensure household food and livelihood security? Give reasons for your answer.

l) Do you think gender disparity in land ownership and management has any effect of household food and livelihood security?

m) Would you support policies that allow women to inherit land?

n) What factors are driving the increasing land subdivision in this area?

o) Supposing the current trend of subdividing agricultural land continues in the next decade or so, what implications will that have on household food and livelihood security?

p) In your opinion, what is the minimum household land size that can guarantee food and livelihood security for the people of Bogeche sub location?

q) What other policy interventions could be adopted to ensure sustainable food and livelihood security for the women of Bogeche sub location?

Appendix G: Men Focus Group Discussion Guide

Consent details

To participate in this discussion, please read the terms below:

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If you have any questions now or after the discussions, feel free to contact any of our team members through the contacts provided below
We may have to tape the discussions to help us capture every idea shared in this group
Please check the box below to confirm that you agree to the terms of participation

☐ This is to confirm that I have voluntarily and without any coercion consented to partake in the deliberations of this group discussion as long as the terms stated above are not violated.

Demographic Sheet: Record of FGD participants

Name	**Age (Years)**	**Gender**	**Marital status**	**Land owned acres (if any)**
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				

a) Let us start the discussion by talking about our history and origin. When did we settle in this place and what brought us here? What size were our farms when we first settled in this area?

b) Has the land/farm sizes changed overtime, what brought about these changes?

c) What were the main land uses then? What are the current land uses?

d) Has farm productivity been changing over time? Why is it so?

e) Is productivity dependent on ownership of land?

f) Is the current farm produce sufficient for your households? How long does it last?

g) What factors do you consider when choosing the types of crops to grow?

h) Do you think food and livelihood security is dependent on the type of crop grown such as tea, maize, and Napier grass? Explain your answer.

i) How have settlement patterns and number of housing units evolved since you settled here? Do these changes affect land size and use?

j) How do men obtain their food and livelihoods in this area?

k) In your opinion who between men and women can manage land effectively to ensure household food and livelihood security? Give reasons for your answer.

l) Do you think gender disparity in land ownership and management has any effect of household food and livelihood security?

m) Would you support policies that allow women to inherit land?

n) What factors are driving the increasing land subdivision in this area?

o) Supposing the current trend of subdividing agricultural land continues in the next decade or so, what implications will that have on household food and livelihood security?

p) In your opinion, what is the minimum household land size that can guarantee food and livelihood security for the people of Bogeche sub location?

q) What other policy interventions could be adopted to ensure sustainable food and livelihood security for the people of Bogeche sub location?

Appendix H: Professionals Focus Group Discussion Guide

Introduction

Consent details

To participate in this discussion, please read the terms below:

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You may refuse to answer any question or withdraw from the discussions at any time
If you have any questions now or after the discussions, feel free to contact any of our team members through the contacts provided below
We may have to tape the discussions to help us capture every idea shared in this group
Please check the box below to confirm that you agree to the terms of participation

☐ This is to confirm that I have voluntarily and without any coercion consented to partake in the deliberations of this group discussion as long as the terms stated above are not violated.

Demographic Sheet: Record of FGD participants

Name	**Age (Years)**	**Gender**	**Marital status**	**Occupation**
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				

1. Do you think land sizes have any effect on food and livelihood security? Explain your answer.
2. Do you think land uses (e.g. settlements, tea, maize, dairy, forestry, wetlands etc) have any effect on food and livelihood security? Explain your answer.
3. What factors are driving the increasing land subdivision in this area?
4. Propose a minimum household land size that can guarantee food and livelihood security for the people of Bogeche sub location
5. What are the gender bottlenecks or advantages in accessing and managing land in this area?
6. What implication does the gender equity or disparity described above have on food security?
7. Supposing the current trend of subdividing agricultural land continues in the next decade or so, what implications will that have on household food and livelihood security?
8. Do you think as a country we should continue to subdivide land to heirs?
9. What policy intervention could be adopted to ensure sustainable food and livelihood security for the people of Bogeche sub location?
10. Which of following policy measures/strategies could be effective for this area?
    i) Eliminating gender discrimination in access to land
    ii) Dictating minimum size of parcel division
    iii) Discouraging absentee landowners
    iv) Prevention of transfer to non-farmers
    v) Voluntary parcel exchange
    vi) Cooperative farming
    vii) A clustering program

Appendix I: Observation Checklist

The following will be observed during the data collection field survey:

Description of Element for Observation	**Provide a brief description and, where applicable, list the items from the most to the least dominant.**
Dominant land use activities such as settlements, napier grass, tea, maize, trees (indicate which type)	
Settlement patterns (dispersed, cluster, linear etc)	
Housing typologies	
Demarcation of farm sizes	
Use of modern technology in farming e.g. zero grazing, irrigation, green houses etc	
Off-farm economic activities of the people	
Livestock types and breeds as well as their numbers (many versus few)	
Topography and drainage (slope and water channels)	
Forest and vegetation cover	
Boundary demarcation as indicated by hedge mark ups (specify materials that are used to mark boundaries)	
Potential sources of conflicts in the utility of common resources e.g. rivers	
Hygiene (solid and liquid waste management or mismanagement)	
Areas of environmental concern (that is, evidence of environmental degradation)	

Appendix J: Photography Checklist

The photographs of the following items will be captured during the field survey:

Description of Element for Photography	**Tick if the photo has been taken**
Cropped farms	
Non-cropped farms	
Aerial photographs showing the land sizes and well delineated boundaries (if possible)	
Visible boundary demarcations and the materials used to mark the boundaries	
Housing structures	
Settlement patterns	
The people in their natural state (with their consent)	
Use of modern technology in farming such as zero grazing, irrigation, and green houses	
Livestock types and breeds	
Topography and drainage (slope and water channels)	
Solid and liquid waste disposal mechanisms	
Evidence of environmental degradation	
Forest and Vegetation cover	
Wetlands	
Off-farm economic activities of the people	

Appendix K: Research Timelines

Task	Week Number (March to July)		2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1.	Identify research problem																
2.	Develop Research Design																
3.	Search, capture and synthesis relevant literature																
4.	Prepare Research Proposal																
5.	Finalize sampling plan																
6.	Prepare draft literature review																
7.	Develop data collection instrument including coding																
8.	Pre-test data collection instrument																
9.	Carry out data collection																
10.	Analyze data and raw conclusions and recommendations																
11.	First draft of complete write up																
12.	Review draft with supervisor																
13.	Final editing. printing, binding and submission																

Appendix L: Itemized Budget

Budget Items	**Quantity**	**Cost/Unit**	**Total cost (Kshs)**
Mileage claim for reconnaissance study to the sub location	500 km.	40 per km	20,000
Accommodation during reconnaissance study	1.5 days	4,000 per day	6,000
Printing of research instruments	20 pages	10 per page	200
Photocopy of research instruments	20pages × 140	3 per page	6,500
Payments to Research assistants (Fees, Lunch and Transport	5 people for 12 days	1500 per person	90,000
Focus Group Discussions	4 Groups	6,000 per group	24,000
Data input	187 schedules	100 per schedule	18,700
Data analysis	7 days	1,500 per day	10,500
Mileage claim for all researchers	500 km.	40 per km	60,000
Other facilitators at field level (Asst. Chief, Extension Staff)	4 days	1000 per person	12,000
Accommodation and meals for students (3 students)	12 days	2,000 per day	72,000
Plastic tape measures of 150 metres each	1Piece	500 per piece	500
Other Costs	-	-	10,000
Sub – Total			**330,400**
Institutional administration costs (5%)	-	-	**16,520**
Grand Total			**346,920**

Appendix M: Household Schedule Translated in the Local Language

OBOTUKI IGORO Y' OBONENE BW' AMAREMO ASE KERA OMOCHIE ORE ASE ESUB LOCATION YA BOGECHE NA ENCHERA AMAREMO AYWO AGOTUMEKA NARIO ENDAGERA ERAGESWE ESAINE ABANTO BONSI NA KOBAA EBITOKI BARAMENYERE AIGA ASE ABANTO ABANGE BASEMERETIE OBOREMI BW' EBITUMA N' ECHAE AMO N' OBOTUGI BW' ECHIOMBE CHI' AMABERE

RIBORI RI' EMECHIE

Amangana aya togochia gokoboria na amachibu ogotoa nigo agotigara koba obobisi gati yao naintwe naende tagotumeka ase enchera ende yonsi otatiga okogendereria amasomo aya twakomanyirie

---

Erieta ri' esub location…… Enamba y' eriboria…..……...

Erieta ri' oyo okoborigwa……..……. Chitariki chi' obotuki…..……

Enamba y' esimi y' oyo okoboria……..…….

1.0 Obotuki igoro y' oria okoborigwa

Charokia ase egwenerete korengana n' erichibu

1.1 Erieta ri' oyo okoborigwa……..……..

1.2 Emiaka y' oyo okoborigwa.....

1.3 Oyo okoborigwa nanywomete gose nanywomire?

Ee nanywomete/nanywomire ( )

Taranywoma/taranywomwa ( )

Nigo akwereire ( )

Nigo batigaine korengana n' erichiko ( )

Nigo batigaine egenka ( )

1.4 Oyo okoborigwa n' omosacha gose n' omokungu?

N' omosacha ( ) N' omokungu ( )

2.0 Obotuki bw' Omochie

2.1 Abanto mbarenga bare ase enyomba yao (abana bao na abamenyi baria bagosemeretie naende bataranywoma gose konywomwa)?

……..**.....**

2.2 Abana bao abamura mbarenga bare (baria bataranywoma naende bagosemeretie)?

……

2.3 Abaiseke mbarenga obwate (baria batarasoka naende bagosemeretie)?

……

2.4 Abamura mbarenga bamenyete mwao otatiga abana bao? ……

2.5 Abaiseke mbarenga bamenyete mwao otatiga abana bao?……..…….

2.6 Abanto b' enyomba eye ng'ai basomete bagaika?

Abanto ba mwao	**Emiaka babwate**	**Ekerengo kia amasomo**					Emeremo agokora
		Tasometi	**Aigete nasari**	**Aigete epremari**	**Aigete esekondari**	**Aigete eyuniversity gose ecollege**	
Omogaka							
Omongina							
Abana abamura/abaiseke							
1.							
2.							
3.							
4.							
5.							
6.							

3.0 Obotuki igoro y' emegondo

3.1 Nobwate omogondo/emegondo yao etari yogokomboa?

Ee ( ) Yaya ( )

3.2 Onye gwateba nobwate emegondo, totebie n' ebitari birenga?.....

3.3 Omogondo/emegondo yao yonsi otatiga eria okomboete ne chieke irenga?.....

3.4 Obotuki igoro y' omogondo/emegondo yao eria ogorete gose koegwa n' abaibori

No.	**Oboremo bwao ng'ai bogotoka naende mboare ki bore korwa igaa (Km)?**	**Obogare ase chieka**	**Nigo oeire oboremo gose nigo ogorete?**	**Naki bogotumeka?**	**Inchera ki oboremo bore obwago** ***Freehold*** (nobwago pi) ***Leasehold*** (Oeire ase emiaka 30 gochia igoro) ***Customary*** (oeire na omoibori)	**Imasakara ki obwate akoorokia buna omoremo nobwago**
1						
2						
3						
		Chieka chionsi chi' emegondo				

3.5 Nokomboete omogondo onde bwensi?

Ee ( ) Yaya ( )

3.6 Ichoria igaa onye gokomboete omogondo.

No.	**Oboremo bwao ng'ai bogotoka naende mboare ki bore korwa igaa (Km)**	**Nigo oeire oboremo gose nigo ogorete**	**Naki bogotumeka?**	**Chingaki ching'ana naki okomboete?**	**Naki ogoakana omwaka?**
1					
2					
3					
	Chieka chionsi chie emegondo				

3.7 Nchera ki okonyora ebitoki otatiga okorema n' obotugi?

Chinchera chinde chi' okonyora ebitoki	**Okonyora kwao ebitoki, nkera rituko, kera ewiki, kera omotienyi gose kera omwaka?**	**Chibesa irenga enchera eywo egokoa ase omotienyi?**

3.8 Kwanya koonia gose kogora omogondo bwango iga (ase emiaka ebere yaetire)?.....

3.9 Onye kwanya kogora omogondo bwango iga, naseki?.....

3.10 Onye kwanya koonia omogondo bwango iga, naseki? ……..

4.0 Okobaga omogondo ase abana n' ebimira bikobwatigwa ekero gia okonacha emegondo

4.1 Abaibori bao mbabagete oboremo?.....

4.2 Onye babageke, ninki kiagerete?.....

……

4.3 Oboremo bw' abaibori bao naki bwangana konyora botarabagwa?.....

4.4 Onye oboremo bw' abaibori mbwabagetwe gochia ase abana, mbarenga baetwe egetari?

……

4.5 Aye nkwanyorete oboremo? Onye kwanyorete n' echieka irenga?.....

4.6 Abana abamura mbarenga barenge mino engaki oboremo bwabagetwe?

…….

4.7 Abana abamura bonsi mbanyorete oboremo? Eresa ango richibu riago.

.....

……

4.8 Abaiseke mbarenga barenge mino chingaki chi' okobobagerwa oboremo?

……..……..……..

4.9 Omoiseke nare seino oetwe oboremo?.....

4.10 Onye abaiseke mbaetwe oboremo seino, chieka irenga banyorete?.....

4.11 Mobwate ekemira kende gionsi igoro yokobagwa kw' oboremo? Onye keroo, erasa ango.

.....

.....

.....

4.12 Okorengia buna mbuya togenderere kobaga amaremo gochia ase abana baito intwe buna ense ya Kenya?

……

4.13 Onye koroche mbuya, naseki ogotebera igo?.....

4.14 Onye gwateba mbobe, ninki oroche gekorwe?.....

4.15 Teba ango obokongu obomo okonacha emegondo kobwate gochia ase omoremi……

4.16 Ase okorora kwao, chieka irenga chiraisane korageria abanto b' enyomba yao?.....

4.17 Eresa naseki gwatebera ng'a chieka echio nachio chiraisane korageria abanto b' enyomba yao

……

5.0 Buna ogotumeka kw' emegondo gokogera abanto banyora gose basiria ebitoki

5.1 Meremo ki omonene bw' enyombe eye agokora? .....

5.2 Nkorema more gose gokora obotugi ase omochie oyo?

Ee ( ) Yaya ( )

5.3 Ichoria onye mokorema gose gokora obotugi

	Chieka oremete	**Rigesa ase chikiro**		**Obotumeki ase chikiro**		**Chibesa kera egepimo gekoonigwa**		**Chibesa oboremi obwo bokoreta ase omochie**
Ebimeri		**Rigesa ritangani**	**Rigesa riakabere**	**Chitumegete inka gaa**	**Chionirie**	**Chinke pi**	**Chinyinge pi**	
1								
2								
3								
4								
5								
6								
7								
8								
9								

Etugo yao nereri	**Enamba y' etugo**	**Ebitoki ase chikiro gose chirita ase omwaka**	**Obotumeki ase chikiro gose chirita**		**Chibesa etugo eyio eraonigwe**	**Chibesa etugo eyio ekoreta ase omochie**
			Chitumegetenkaa	**Chionirie**		
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						

6.0 Obonge n' obuya bw' ndagera ase omobere

6.1 Ekero okorengania endagera mokogesa boniga neri mware kogesa korwa omogondo bw' abaibori bao konye otarabagwa, intobauti ki oroche?

Rigesa erirengaine ( ) Endagera ere enke ( )

Endagera ere enyinge ( ) Timanyeti buyaigo ( )

6.2 Rigesa erio naki riachenchirie angana? Erobo ( ) Enusu ( ) Chirobo isato ( )

6.3 Ninki okorengia kiaretire etabauti eye ase okogesa kwe' endagera?

……

……

6.4 N' emetienyi erenga ase omwaka rigesa ria omogondo oo rigoisana korageria abanto bao?.....

6.5 N' emetienyi erenga ase omwaka obwate endagera eisaine?

Naki endagera eborete ang'ana?		**Chingaki obwate andagera (ase emetienyi)**	**Nchera ki ogotumeka konyora endagera amatuko onsi?**
A	Ndagera teboretie	Emetienyi ikomi n' ebere	
B	Eborete akeigo	Emetienyi kianda	
C	Eborete igatwa	Emetienyi etano Nemo	
D	Eborete mono	Emetienyi etato	

6.6 Ase emetienyi etato yaetire, abanto bao banya koba batabwati endagera ?

Ee ( ) Yaya ( )

6.7 Ndagera ki mokoria omochie oyo ase ewiki?

	Chumatatu	**Chumanne**	**Chumatano**	**Aramisi**	**Ichumaa**	**Chumamosi**	**Chumapiri**
Emambia	a.						
	b.						
	c.						
Mogaso	a.						
	b.						
	c.						
Marogoba	a.						
	b.						
	c.						

6.8 Nkarenga mokoria chindagera chikobwatia?

Chindagera ao ao	**Nkarenga mokoria, mbotambe, kera ewiki, kera omotienyi, gose kera omwaka?**
Amabere	
Edengu	
Chingende	
Engoko	
Chinswe	
Enyama	
Amatunda	
Obokima	
Omochere	
Echabati	

6.9 Mbokong'u ki mogoetera ase okorigia endagera?.....

6.10 Mobwate amache aisene y' okonywa na korugera nyomba?

……..

6.11 Nkobwati more amachiko y' obochenu ekero mokorosia endagera?.....

6.12 Okwegena kwao ngogotanga kore korwa koria chindagera gete gose gotumeka omogondo chingecho gete? Onye nabo igo, eresa.

.....

6.13 Nki mogotumeka korugera endagera?

a. Chinko b. Amakara c. Egasi d. Ebichachuti bie ebimeri

e. Amaguta ye taya f. Estima g. Onye kwobate enchera ende eng'ao nyetebe

6.14 Mbokong'u ki mogoetera ase okonyora eng'encho yo okorugera eyio gwateba mogotumeka?

7.0 Ebirengererio biao igoro y' okobagwa kw' emegondo

Teba gose ngwancherana ore gose tori gwancherana na amangana akobwatia

7.1 Okonachwa kw' emegondo nigo gokoretwa na obonge bw' abanto

Ee nabo igo ( ) Yaya tari boigo ( ) Timanyeti buya igo ( )

7.2 Ebitari ebike bi' emegondo ebikogera endagera yageswa enke

Ee nabo igo ( ) Yaya tari boigo ( ) Timanyeti buya igo ( )

7.3 Ndaisi gotumeka etekinologi n' oboremi bwa kisasa ase emegondo emeke

Ee nabo igo ( ) Yaya tari boigo ( ) Timanyeti buya igo ( )

7.4 Emegondo emeke yagerire obotugi bw' echiombe bwakeire

Ee nabo igo ( ) Yaya tari boigo ( ) Timanyeti buya igo ( )

7.5 Onye obotugi bw' chiombe bwakeire, nkerengo ki bwakeire?

Erobo ( ) Enusu ( ) Chirobo isato ( )

7.6 Emegondo emeke yagerire abanto bachakire gotumia oboremi bwa kisasa

Ee nabo igo ( ) Yaya tari boigo ( ) Timanyeti buya igo ( )

7.7 Ase ebirengererio biao, omogondo ongana naki oisaine korageria enyomba esemeretie oboremo?

7.8 Kobwatekana n' okobagwa kw' emegondo n' ogokeana kwaye, inaki oroche tobwenerete kobanga obomenyo bwaito ase chingaki chigocha?

……

……

7.9 Teba ango naki oraganie tobange emechie yaito nario tonyore emegondo esaine y' okorema. Chora korwa ase chinchera chi kobwatia chi' okobanga obomenyo

a. Gosebererekania emechie are are ase emegondo
b. Kobanga emechie ase eraini eyemo, ase omofano, ange n' epara
c. Kobeka emechie amo ase esenta na gotiga ase ande onsi abe y' oberemi
d. Kobeka emechie amo na komenya ase chigoroba
e. Onye kobwate enchera ende eng'ao totebie

7.10 Imachiko ki oraganie atumeke ase emegondo igaiga Bogeche? Chora korwa ase aya oeire (charokia ase egwenerete)

i) Gosiria ebimira biria bigotanga abaiseke korwa koegwa oboremo n' abaibori ( )
ii) Kobeka amachiko agotanga abanto korwa konacha oboremo gwetania ekerengo gete ( )
iii) Korwa egesusuro gochia ase abanto baria babwate amaremo atari gotumeka ( )
iv) Gotanga abanto baria batari gotumeka emogondo ase oboremi korwa kogora oboremo aiga Bogeche ( )
v) Kogacha emegondo nario echa gotumeka chingaki chigocha ( )
vi) Okwerwa gochenchania amaremo nario gokeania ebitari ( )
vii) Okorema amo buna egesangio ase oboremo botanyare kobageka ( )
viii) Kobeka emechie amo ase esenta na gotiga ase ande onsi abe y' oboremi ( )
ix) Gotumeka chibesa chi' eserekari gochencheria abanto emegondo nario baria batatageti korema baegwe ase ang'ao ( )

8.0 Obomenyo bw' mwanyabanto

8.1 Ichoria buna kera omochie obangete obomenyo bwaye.

Omobango bw' omochie	**Karwe oborori bwao buna omochie obangire naende oichorie igoro y' obogare bw' chinyomba ase chimita**		
Ribaga rionsi omochie oirete ase chimita			
Ribaga enyomba enene eirete ase chimita			
Enamba y' echirumu enyomba enene ebwate			
Ebinto bitumegete korosia enyomba enene	Ebinto bitumegete korosia inse y' enyomba	Enyasi	Ekerama
Enamba y' echinyomba chionsi ase omochie. Ribaga rionsi chinyomba chinde gwetania eria enene chiirete			
Teba amaagacho ande are ase omochie, ase omofano, ekiage, egusumu g' echingoko, amo n' obweri bw' chiombe			

8.2 Teba naki emete amo n' emechie yamentekire gose gokeana korwa ocha igaa Bogeche na enchera rigesa ri' endagera ri' onchokire kobwatekana n' okomentekana gose ogokeana kw' emechie eyio gose emete

Buna omogondo Otumegete	**Ogochenchia kw' emete (yamentekire gose yakeire)(bwango, igatwa gose ngora**	**Inaki rigesa ria endagera ria onchokire kobwatekana na okomenteka gose ogokea kw' emete n' emechie**
Okwama kwe emete		
Emechie		

8.3 Nobwate riboria rinde rionsi?.....

Appendix N: List of Households in Bogeche Sub Location as per the Villages