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INTRAHOUSEHOLD DECISION MAKING AND IMPLICATIONS ON FOOD SECURITY AMONG SMALLHOLDER FARMERS IN CHEPALUNGU CONSTITUENCY, BOMET COUNTY, KENYA

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A Research Thesis to be Submitted to Graduate School in Partial Fulfilment for the Requirement for the Master of Science Degree in Agricultural and Applied Economics of Egerton University

EGERTON UNIVERSITY

2016

DECLARATION AND APPROVAL

Declaration

I declare that this work is wholly my original work and to the best of my knowledge has not been presented for the award of any degree in this or any other university.

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Approval

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DEDICATION

I dedicate this work to my loving wife Winny, my Prayerful mother Edna Kosgey, my sisters and brothers, my great friends the entire pentagon team, who always prayed and gave me moral support during my studies.

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ABSTRACT

Food insecurity is still prevalent in many parts of the world. Despite several research attempts to alleviate food insecurity in Kenya, estimates indicate that approximately 50% of Kenyans are food insecure with 10% in constant need of food relief. One of the causes of food insecurity as it has been reported by other scholars is gender inequality. Women, especially in developing countries have been reported to significantly contribute to food production compared to men while in decision making they are often subordinate to men. However, the role of intra-household decision making in influencing food security remains unclear. This study therefore sought to examine the implication of intra-household decision making on household food security among the smallholder farmers in Chepalungu constituency, Bomet County Kenya. Multistage sampling method was used to obtain a sample of 150 smallholder farmer households. Structured questionnaires and interviews were used to obtain the information. Data analysis was done using descriptive statistics, Logit and Poisson models with the use of SPSS and STATA computer programs. The results indicated that majority (52.7%) of the households were food insecure signifying high level of food shortages in the area. Male headed households were found to be food insecure as compared to their female counterparts. The logistic regression results revealed that age, gender, land size, household size, years of education and income significantly influenced household food security. The results also revealed the probability of household being food secure is high when consumption decisions are made by women than when they are made by men. The study proves that intra-household decision making has an important role to play in influencing household food security. Therefore, gender based resource allocation and women empowerment policies should be encouraged in order to ensure that households are food secure.

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LIST OF ABBREVIATIONS AND ACRONYMS

FAO	Food and Agriculture organization of the United Nations
FCS	Food Consumption Score
FCND	Food Consumption and Nutrition Division
FfW	Food for Work
GDP	Gross Domestic Product
GoK	Government of Kenya
HHDS	Household Dietary Diversity Score
IDS	Institute for Development Studies
IFRI	International Food Policy Research Institute
KFSN	Kenya Food Security Network
SPSS	Statistical Package for Social Science
UNFPA	United Nations Family Planning Agency
USDA	United States Development Agency
WHO	World Health Organization

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

The concept of food security is multidimensional, encompassing food affordability, availability, adequacy, quality and safety. According to The State of Food Insecurity 2001, food security is defined as a situation that exists when all people at all times have physical, social and economic access to safe, sufficient and nutritious food that meets their dietary needs and food preferences for an healthy and active life (FAO, 2002). Therefore, food insecurity arises when there is limited availability of adequate and safe foods or low capacity to obtain such foods. According to FAO (2012), food insecurity in the world still remain high with approximately 842 million people being food insecure, and developing countries account for 98 per cent of this global estimates.

In Kenya approximately 10% of the total population live in chronic state of food insecurity (USDA, 2009), the most vulnerable of whom include women and children (Kimani-Murage, 2011). Although women constitute 75 % of Kenya's agricultural labour force, gender inequalities undermine their productivity including limited access to essential resources and institutionalised barriers to credit and land ownership (IDS, 2006). In Kenya, food accessibility relies on agriculture as nearly 80% of its population lives in rural areas, deriving their livelihood from agriculture for food and income, implying that the agriculture sector will continue to play a key role in improving food security and reducing poverty. Therefore, agriculture sector in Kenya is still the backbone of the country's economy contributing 26% of the Gross Domestic Product (GDP) and 60% of the export earnings (GOK, 2008).

Households are defined as two or more closely related persons living under a common roof (Kirchler, 1999). In rural Kenya, households depend on Agriculture for their livelihoods in generating food security, employment and income (Bett *et al.*, 2007). Initial models of the household assumed a unitary framework that treated the household as a single production and consumption unit. This simply assumes away all of the dynamics of decision-making within the household. The unitary model implies that the distribution of income or assets or other measures of bargaining power within the household does not affect outcomes. However, qualitative research and analyses done by early researchers on women in development issues challenged these notions and new theoretical models work developed three broad categories

of collective models of the household decision making: Cooperative bargaining models, collective models and non-cooperative bargaining models (Doss, 1996).

The influence of decision making affects the distribution of resources, wealth, work, political supremacy, the enjoyment of rights and entitlements within the family as well as public life (DAW, 1999). To effectively examine women's role in decision making in the household it is important to discuss gender relations. Gender relations are critical in determining structural roles that men and women play in social relations such as household decision making. In most cases society characterizes gender in concept of masculinity and femininity (Sharon, 2013). Identifying individuals' differential power on access to resources and benefits is the fundamental feature of gender analysis, and ensuring equitable access and distribution will enhance food security.

Sharon (2013) explained the different roles and responsibilities that men and women have in their individual lives, families, households, and in their communities. Individual and household food security is mediated by individual actions and the choices they make in acquiring assets, producing food, feeding and caring for family members. Thus, it is critical to maximize these individuals' contributions by ensuring their equitable access to and control over the resources needed to meet their roles and responsibilities. Indeed, overcoming gender-based inequities in resource access and decision-making could very much enhance women's contributions to food security and its nutritional benefits (UNFPA, 1999). According to World Bank (2008), failure to realize women potential in agriculture as one of the contributing factor to low growth led agriculture and food security as it is observed that majority of the smallholders farmers are women. Additionally, improving women's health and nutrition, and their access to education and training opportunities, enhances their human capital as an input to ensuring individual and household food security.

The role of women in the household has been considered a critical issue in changing the social and economic position and the well-being of household members. While both men and women are income earners and agricultural producers, women also prepare and process food, and use their income for their children's benefit (Carr, 1991; Thomas, 1997). Women also provide the majority of care for their families, take their children to health services, and ensure a healthy environment, the very components of good nutrition (Levin *et al.*, 1999). Ironically women make these critical contributions with limited access to necessary resources, low decision making on allocation and use of those resources, and the derived benefits (Johnson-Welch, 1999). From the foregoing and considering the importance of intra-

household as a motivating unit for increased food production and the participation of men and women in national development, there has to be a well-guided incentives and policy to increase intra-household wellbeing and reduce gender inequity in decision-making especially in those decisions regarding household food security status.

According to KFSN (2011), over 10 per cent of people in Kenya are food insecure with majority of them living under food relief. However, scanty documentations about Chepalungu constituency exist and yet food insecurity cases among the households are frequently reported. Worth noting is that the role which intra-household decision making plays remain unclear. Thus, this study sought to establish the influence on intra-household decision making and its implication on food security among smallholder farmers in Chepalungu Constituency, Bomet County, Kenya.

1.2 Statement of the Problem

In Kenya approximately over 10 million people are food insecure with majority of them being recipients of food relief. Despite several research attempts to alleviate food insecurity in Africa, particularly Kenya the problem still persist. The design and implementation of policies at national and multilateral level are gender-blind in their orientation; but not gender-neutral in their effects. A lack of available gender-disaggregated data means that intra-household decision making contribution to food security is poorly understood and their specific needs may be missed in development planning. Food insecurity cases are commonly reported in Chepalungu constituency due to many factors; such as, climate change, soil type, maize disease (Maize Lethal Necrosis Disease). However the role that intra-household decision making plays in influencing food security remains unclear. Therefore, this study was attempting to fill the existing gap by examining the intra-household decision making and its implication on food security among smallholder farmers in Chepalungu Constituency, Bomet County, Kenya.

1.3 General Objective of the Study

The general objective of this study was to contribute towards improving food security by examining how the intra-household decision making influence household food security status among smallholder farmers.

1.3.1 Specific Objectives

i. To characterise the socio-economic attributes of smallholder farmer households.
ii. To determine the social economic factors influencing food security among smallholder farmers.
iii. To examine the effects of intra-household decision making on food security status among the smallholder farmer households in Chepalungu Constituency, Bomet County.

1.4 Research Questions

i. What are the socio-economic characteristics of rural smallholder farmer households?
ii. Which are the social economic factors influencing food security among smallholder farmers?
iii. What are the effects of intra-household decision making on food security status among smallholder farmer households in Chepalungu Constituency, Bomet County?

1.5. Justification of the Study

There is a need to recognise the fact that ensuring equity on intra-household decision making for both men and women would lead to improvement in household wellbeing. Despite the fact that research focusing on food security has now shifted from global and national to household and individual food security and from food availability to accessibility, much of the literature on food security is still concentrated at higher levels, paying little attention to households. Again food accessibility is yet to receive adequate attention in Kenya with the role that differences in intra-household decision making abilities plays remain little understood. Therefore, research is needed to examine how intra-household decision making influences household food security status. Moreover, socio-economic factors affecting food security status within the household needs to be known.

1.6. Scope and Limitation

The study was on the intra-household decision making and implications on food security among smallholder farmers in Chepalungu constituency, Bomet County, Kenya. The targeted population was smallholder farmer households. The main concern was the socio-economic factors influencing food security and the influence of intra-household decision making on food security status among the smallholder farmer households. The study was confined in Chepalungu constituency and made use of primary data that was collected from

the study area. It did not capture other factors that may influence food security situation in the area such as, climate change (recent droughts), soil type, maize disease (Maize Lethal Necrosis Disease)

1.7 Definition of Terms

Decision making– Is the process of selecting a logical choice from the available options.

Effect- Something that is produced by an agency or cause; result; consequence

Family- A basic social unit consisting of parents and their children, considered as a group whether dwelling together or not.

Food security-Refers to a situation when all people at all times have access to sufficient and nutritious food to maintain a healthy and active life.

Gender- Refers to how men and women interact in an attempt to influence decision.

Household –Defined as two or more closely related persons living under a common roof, typically sharing meals or a food budget.

Intra-household decisions - refers the choices made within the household.

Patriarchal- Refers to a system where men are the central authority figures who exercise power to influence decision making process.

Socio-economic factors- Refers to factors that influence both the social and economic wellbeing of an individual.

Smallholder farmers – are farmers who are characterized by land holding less than ten hectares.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This entire chapter is based from various related research on intra-household decision making regarding food security on smallholder farmers in different parts of the globe. Further, the sub topics are derived from the three specific objectives of the study.

2.2 Classification of Households

Intra-household decision making is delineated primarily on the basis of association to the head of the household. Level of education, and whether a person contributes financially to the households, may inform who a person lives with and is linked to. Modern relationships are characterized by a high degree of joint participation in carrying out tasks and taking decisions (Davis, 2001). Hagenaars and Wunderink-Van Veen (2000) stated that husband and wife have equal influence in a modern relationship. Also, the power distance between parents and children is shorter in modern than in traditional families. Kirchler (1999) states that in egalitarian relationships, spouses decide much less by role-segregation than in traditional relationships. However, both spouses wish to fulfil their individual desires. As a consequence, many decisions are made together but conflicts arise due to different opinions.

The family type is a structural dimension and has been defined generally. The influence on decision making process shows a relatively large variation in traditional family types and a relatively small variation in modern family types. Women have been ascertained to play a very significant role in national development but it is rather unfortunate that women are still being treated as second fiddle (Oluwatayo, 2008). This translates into a dramatic mismatch between rural women's voices and decision making roles and their enormous contribution to agricultural production, marketing, and livelihoods (IFAD, 2010). Redressing gender inequalities in developing economies since the United Nations Declaration for women between 1975 and 1985 has brought some progress to understanding gender related issues but a lot still need to be done to adequately address the problem associated with it. Gender inequality therefore describes the socially determined attributes of men and women including male and female roles and this has proved to be the most useful way to disaggregate the rural households and analyse intra-household behaviour (Sharon, 2013). The gender concept here will enable us to provide evidence for the fact that household food security status is determined mainly by intra-household differences.

2.3 Concept of Food Security

Food security is concept that has evolved over time. According to Maxwell and Smith (1992), many definitions and conceptual models on household food security have been put forward. Food security definitions have evolved from viewpoints ranging from emphasis on an increase in national food supply, to emphasis on improved access to food in the 1980s (FAO, 1983). It was redefined in 1990 by focusing on improved access where by livelihood was brought into account (Maxwell, 1996). Another round of evolutions in food security definitions was witnessed after the Rome Declaration of 1996 World Food Summit, when the definition was broadly set as achieving food security "at the individual, household, national, regional and global levels when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life" (FAO, 1996). The Rome declaration defined three key dimensions of food security; food availability; food accessibility and food utilisation.

Food availability: Emphasises the physical presence of food in sufficient quantities in a given nation, household, or within household on constant basis. At national level it means that food is physically present because it has been produced, manufactured, or imported. At household level it means that food is physically present through production, storage or purchases. For the case of within the household it means that the food is physically present through division of labour between different household members, that is, the allocation of responsibilities and resources. According to IFRC (2006), it means food that is visible in the area, region or country.

Food accessibility: Highlights the state of having sufficient resources to obtain appropriate nutritious diet food. It focuses on different ways through which different nations, households and people within the households obtain the available food. At national level, food accessibility is measured through per capital food availability and per capita income. Food accessibility at household level depends on such factors such as, household income, market prices and preferences and taste. Within household it normally depends on who has control over cash income; that is the major decision- maker and market prices. Food access is said to be ensured when households and all individuals within them have adequate resources, such as money, to obtain appropriate foods for a nutritious diet (IFRC, 2006). According to IFPRI (2008), Food access can be negatively influenced by physical insecurity such as conflict, loss of coping strategies, such as the collapse of safety net institutions that once protected people with low incomes or border closure preventing seasonal job migration.

Food utilization: According to WHO (2011), it emphasizes the appropriate use of food based on knowledge of basic nutrition and care, as well as adequate water and sanitation. When some members within the household are suffering from certain diseases there will not be maximum absorption of some nutrients on the food taken therefore increase in intake on certain specific food will be required. Normally food utilisation is affected by endemic diseases, lack of appropriate nutrition knowledge, poor sanitation culturally prescribed beliefs that affect access to nutritious food by certain family members or groups according to age, gender or religion. Food utilization is dependent on the quality of the food, its preparation and storage method, nutritional knowledge, and the health status of the individual consuming the food (IFPRI, 2008).

Conversely, food security alone is not sufficient to improve the nutritional status of individuals (Alderman, 1993; Alderman and Garcia, 1993;Malik, 1994). The essential determinants of household food security are access to food, availability of food and risks associated with either access or availability, household characteristics, such as, household consumption patterns, household income, and households living condition, and taste and preferences among other socio-economic factors.

2.4 Factors Influencing Food Security

Different literatures use different proxies and methodologies as determinants of food security. In various developing countries especially in Africa some literatures on determinants of food security exists and are most often not location-specific. Despite that different study areas have variant attributes on determinants of food security; some literatures show conflicting results for the same factor even if the majority seemed the same. For example, in a study that was done in Malawi by Greenwell and Pius (2012), using reported food security status, a continuous dietary diversity index and food end time as measure of food security. Logistic, ordinary least square, and quintile regressions were used as an estimation method. The research found that household food security is determined by credit access, age, gender of the household head, extension information, assets or wealth and education. In their literature age was found to have negative association with the food security status. The justification given was that although young farmers tend to be less experienced they are more food secure due to their dynamic and energetic nature. In another study carried out in Bangladesh by Majumder *et al.* (2012) on profession and crop cultivated, farm size and professional support was found to be significant determinants of the household food security. For instance the more the professional support received by the farmer the more

the household becomes food secure. In that study, it seemed that variables like age and other household characteristics are not controlled.

A study in Pakistan by Asghar and Muhammad (2013) found that household size, household income, irrigation facility, and age positively determine food security. In comparison to the results by Greenwell and Pius (2012), Asghar and Muhammad (2013) found that age has a positive impact on household food security and justified that experience has more weight for a household status to be food secure. The study conducted in Nigeria by Oluwatayo (2008) using probit model found out that gender of household head, educational level, age and income have positive influence on food security whereas household size, non-food and occupation have negative influence on household food security. That is, an increase in the value of any of these variables is associated with the likelihood (log-odds) of an increase in the value of the regressand. For example as educational status of respondents increase, their food security status increases as well. However, as household size increases there is the likelihood of household being food insecure. Study by Sikwela (2008) in South Africa using logistic regression model showed that per aggregate production, fertilizer application, cattle ownership and access to irrigation have positive effect on household food security whereas farm size and household size have negative effect on household food security.

In another detailed work on food insecurity in Nigeria, Babatunde *et al.*(2008) used a three-stage random sampling technique to obtain a sample of 94 farm households and a cross sectional data in year 2005. Using the recommended calorie required approach; the study revealed that 36 per cent and 64 per cent of the households were food secure and food insecure respectively. The Shortfall/Surplus index showed that the food secure households exceeded the recommended calorie intake by 42 per cent, while the food insecure households fell short of the recommended calorie intake by 38 per cent. A logit regression model estimated showed that household income, household size, educational status of household head and quantity of food obtained from own production were found to be positive determinants of food security status of farming households in the study area. For instance as educational status of respondents increase, their food security status the household increases as well.

In a study carried out in Mwingi District, in the eastern province of Kenya by Kaloi *et al.* (2005) to assess the household food security status in the Food for Work (FfW) program area in Mwingi district where 125 households were involved in the study. Household food

security was measured using daily household calorie acquisition. The study established that 62 % of the sampled population was food secure, the rest were not food insecure. Significant determinants of food security in the area were, participation in the FfW program, household size, the on- farm income, marital status of the household head and their education level. For example whenever the respondent belongs to FfW program the more the household becomes food secure. Using dietary diversity among household in a poor Vihiga district in Kenya, Nyangweso *et al.* (2007) found that household income, number of adults, ethnicity, savings behaviour and nutritional awareness are critical when addressing the question of food security from the demand side. Other factors hypothesized in the literature to negatively influence food security include: family size and dependency ratio.

A study by Haile *et al.* (2005) at Korodegaga, a peasant association found in Oromia region of Ethiopia, used cross sectional data and a binary logistic regression as the econometric model. The study controlled for many factors which meant to have an impact on food security status of a given household in the district. Out of eleven factors that were fitted to the model, farmland size, oxen ownership, fertilizer application, education of the household head, and household size were found to be significant determinant of household food security. In other words, an increase in the value of any of these variables is associated with the likelihood of an increase in the value of the regressand. For instance the more the number of oxen owned by the respondents the more the household becomes food secure. A similarly study at Ada Berga, a district in the central Ethiopia by Beyene and Muche (2010) found that off farm income, livestock and land holdings, agricultural practices and farming activities significantly affect household food security. Chemical fertilizer use also affects food security positively. Also a study at Jiggiga district of Ethiopia, which uses an empirical analysis by a logit model, Hussien and Janekarnkij (2013) found out that fertilizer use, credit access, extension service, and household income has positive influence on food security. For instance increase in household income and extension services by respondents increase rises food security status.

In the same country, Ethiopia, a study carried out in the southern part by Feleke *et al.* (2003) categorized the determinants into supply and demand side factors. The factors which were said to be demand side were household size, per capita aggregate production and access to market. The result pointed out that supply side factors which include technological adoption, farming system, farm size and land quality, are more powerful than the demand size factors in determining food security status of the farm household in the Southern

Ethiopia. In another study at the household level, Feleke *et al.* (2005) and Kidane *et al.* (2005) probed the household food security in rural households of Ethiopia. The studies link food security and technology adoption (adoption of high yield varieties of maize and fertilizer application). They concluded that technology adoption do increase household food security. Other factors analyzed include farm size, livestock ownership, education of head of household, household size and per-capita production of the household. With the exception of household size all the other factors increase food security.

Consequently, complex sets of variables such as size of land, quality of available land educational level of the farm owner, quality and quantity of technology and capital available are important factors in influencing the level of food production (Foster, 1992). Thus controlling for all these complex sets of variables is useful to obtain an unbiased estimate of these variables and their corresponding impacts on food security

2.5 Effects of Intra-Household Decision Making on Households Food Security Status

For a long time economic analysis did not sufficiently address intra-household decision-making power and the impact of individual preferences on household decision-making. However, overwhelming empirical evidence and theoretical work showed that individual-specific preferences matter (Chiappori, 2001). Furthermore, the evidence demonstrated that men's and women's preferences systematically differ. Individual-specific preferences also have implications for the welfare of other household members, which, at least in economics, did not become apparent until new analytical techniques were developed. Until the advent of collective household or intra-household bargaining models, it was difficult to include female empowerment in economic analyses.

The classic economic approach starts with the assumption that household decision-making is characterized by either a single decision-maker, who dictatorially makes all decisions, or a household decision, which implies that all household members share the same preferences, views or values such that it makes no difference who in the household eventually takes decisions (Lundberg and Pollak, 2005). In essence, this approach treats households as a single unit and individuals within the household are analytically neglected. Starting in the 1980s, this view has been challenged by Manser and Brown (1999) and later by Horney and McElroy (2001). The models of Manser and Brown and of McElroy and Horney are based on game theory and utilize a cooperative bargaining framework based on the Nash equilibrium.

In their approach, household members do not necessarily share the same preferences and try to pursue, at least partly, their own interests.

It is well-documented that women almost everywhere are disadvantaged relative to men in their access to assets, credit, employment, education and in decision making. Consequently, it is often suspected that female-headed households are poorer than male-headed households, and are less able to invest in the health and education of their children. Though numerous case studies confirm these claims (Kumari, 1989; Mencher and Okongwu, 1993), the empirical evidence is far from conclusive.

Buvinic (1997) for example, reviewed 61 studies on headship and poverty and found female-headed households to be disproportionately represented among the poor in 38 cases. In a similar study however, Quisumbing (2003) found out that the relationship between female headship and poverty is strong in only two out of ten countries in their sample (Ghana and Bangladesh). The rural sector is made up of small-scale poor farmers, food processors, informal traders and other micro enterprises that are said to account for about two-thirds of the population living in poverty (Okunmadewa, 1998; Oluwatayo*et al.,* 2004). Afonja (1996), also in the same study, observed that there are regional differences in the distribution of poverty; for example, while poverty was found to have declined in the south from 42 percent to 26 percent, extreme poverty in the north only declined from 36 percent to 32 percent. On the whole, an understanding of the importance of gender issues in decision making as it relates to rural household food security, access and control of resources will among other things ensure effective resource allocation, bridge gender gap and play a pivotal role at giving women their prime place in the scheme of things through empowering and equipping them adequately as the task of enhancing household welfare rest on them.

The allocation of available household resources is based on a bargaining process in which the outcome is determined by the bargaining power of household members. Lundberg and Pollak (2003) define bargaining power slightly different by stating that household members may not necessarily quit the household, but stop or reduce collaborating in the daily life. Chiappori's (2001) approach suggests that household members may not share the same preferences but, different from the other approaches, that household allocations are always Pareto efficient. Pareto efficiency implies that by reallocating resources no household members' welfare can be improvedwithout lowering welfare of others.

Measures used in the empirical literature largely rely on a woman's fallback position that defines her range of options once marriage dissolves. Education is a widely used indicator in the literature because it increases access to information; the likelihood to find a job in the wage labour market; the likelihood of technology adoption and use among others. Another measure used is income earned because wage income is likely to be available to a woman even after a divorce. Additionally, assets controlled by women have been used to approximate their bargaining power. Here, assets such as land or livestock are particularly important because these may be used as a 'credible threat', that is, women would keep these assets after leaving the household. According to Schiglimpaglia(2005), a part from economic factors, social norms determine the status of people.

Most studies in developing countries have pointed out that men dominate the household decision making in most places while women have subordinate position Hyder *et al.* (2005), Holmboe-ottesen *et al*. (1991). For example, in Nepal, men culturally are accepted as being the decision makers in the household. However, the decisions that they made are usually suggested by their wives. This is because the community is paternalistic and thus the husband usually shows supremacy especially in decision making (Upadhyay, 2002).

Kazi (1997) examined women's autonomy in rural areas of Punjab, Pakistan, by probing into the decision-making process in the household, women's access to productive household resources, women's mobility, inter spousal communication, and the prevalence of domestic violence. It was observed that women's involvement in economic decisions is extremely limited. The majority of women participate only in decisions related to the purchase of food. In all other decisions, either domestic or economic they are consulted but do not act as major decision makers. The study observes a strong and positive association between mobility and decision making authority. Age, education, nature of employment, and family structure are the determining factors of mobility and, hence, of the role in major decisions.

Holmboe-ottesen *et al.* (1991),Quisumbing (1995) and HKI (2006) all concluded in their studies that the more the command a woman has over the household resources the better the food supply and nutrition situation. This is because women were observed and reported to spend more of their time and income to secure food in the household and to invest in children education and health than men (Quisumbing, 1995). Therefore, if a woman has enough say they will not jeopardize food security.

In a study done in Rural Nigeria by Oluwatayo (2008), on examining how the level of participation in decision making influences households' food security status, the most surprising observation was that less than 30% of the female respondents actively participated in all the decision making roles considered except the decision making on the types of food to buy while the rest of the decisions are made by their male counterparts. The findings therefore underpins the need to implement the recommendation made at the Beijing Conference that at least 30 per cent of decision-making on any issue should be left to women. Based on the study findings, it was recommended that empowerment of women educationally and financially (giving them more access to resources) and awareness of men on gender issues should be intensified and given utmost priority in the study area and the country at large if the clamour to achieve the Millennium Development Goals (MDGs 1 and 3; reduce poverty by half and ensure gender equity by 2015) is anything to go by.

2.6 Theoretical Framework

This study utilized altruistic/neoclassical theory which solves the problem of aggregation of individual family members' utility functions into a single joint utility function representing the household. The neo-classical school uses altruism (perfect democracy), where the husband shares his income with the household members as opposed to exploitation theory which uses dictatorship where the head of the household allocates consumption goods to other members (Becker, 1991). Hence, even though the outcome both these theories appear to be at the two opposite ends of the spectrum, both concentrate family decision-making on the household head. In fact, Becker's notion of altruism is not totally a polar case of exploitation, since it only implies consistent internalization of the welfare of the other family members. 'Pure exploitation' is simply a limiting case of altruism. It seems inconsistent to assume that households operate at the two extremes, that is, they either behave altruistically or exploitatively (Folbre, 1995).

Thus the study maximised on two main approaches on modelling household behaviour: unitary and collective models. The unitary model views the household as a collection of individuals who behave as if they agree on how best to combine time, goods bought in the market, and goods produced at home to produce commodities that maximize some common welfare index (Becker, 1991; Haddad *et al.*, 1997; Quisumbing and Maluccio, 2003).

The earlier models on households assumed a unitary framework; they treated the household as a single production or consumption unit. This assumes the absence of the dynamics of decision-making within the household. Unitary model attributes that the distribution of income or assets or other measures of bargaining power within the household does not affect outcomes. Qualitative research and analyses done by early researchers challenged these notions and new theoretical models were developed that use a bargaining framework leading to the development of collective model of the household. Collective models such as Chiappori (1992, 2001) emerged as an alternative to unitary models that allows for differing preferences. Two subgroups of collective models emerge, one rooted in cooperative and the other in non-cooperative game theory. The cooperative models attributes that individuals choose to form a household or other grouping when there are significances associated with being in the entire household or just from single member. The second class of collective models depend on cooperative game theory. The non-cooperative approach (Kanbur 1991; Lundberg and Pollak 2005) depends on the assumption that individuals cannot enter into binding contracts with each other. Hence, the individual's actions are conditional on the actions of others. The implications are that not all non-cooperative models produce Pareto-efficient outcomes. However, the neoclassical economic approach of the household continue to exert a powerful influence in both research and policy design (Akresh, 2005; Doss, 1996).

2.7 Conceptual Framework

This is an illustration of the underlying basic and immediate causes influencing household food security status and intra-household decision making. The framework shows that the main outcome is household food security status. The household can either be food secure or food insecure depending on socio-economic variables, intra-household decision making and a number of intervening variables. The socio economic factors in this case include household head; age, gender, marital status, household size, land size, education level, income, belonging to a social group. These factors are closely linked to underlying factors which include: Agricultural policies, Economic policies, and gender policies to determine the decision maker on food related activities of a household which in turn result into household food security status. However, socioeconomic variables alone without any intervention of other variables can determine the household food security status as shown in figure 1.

Dependent variable

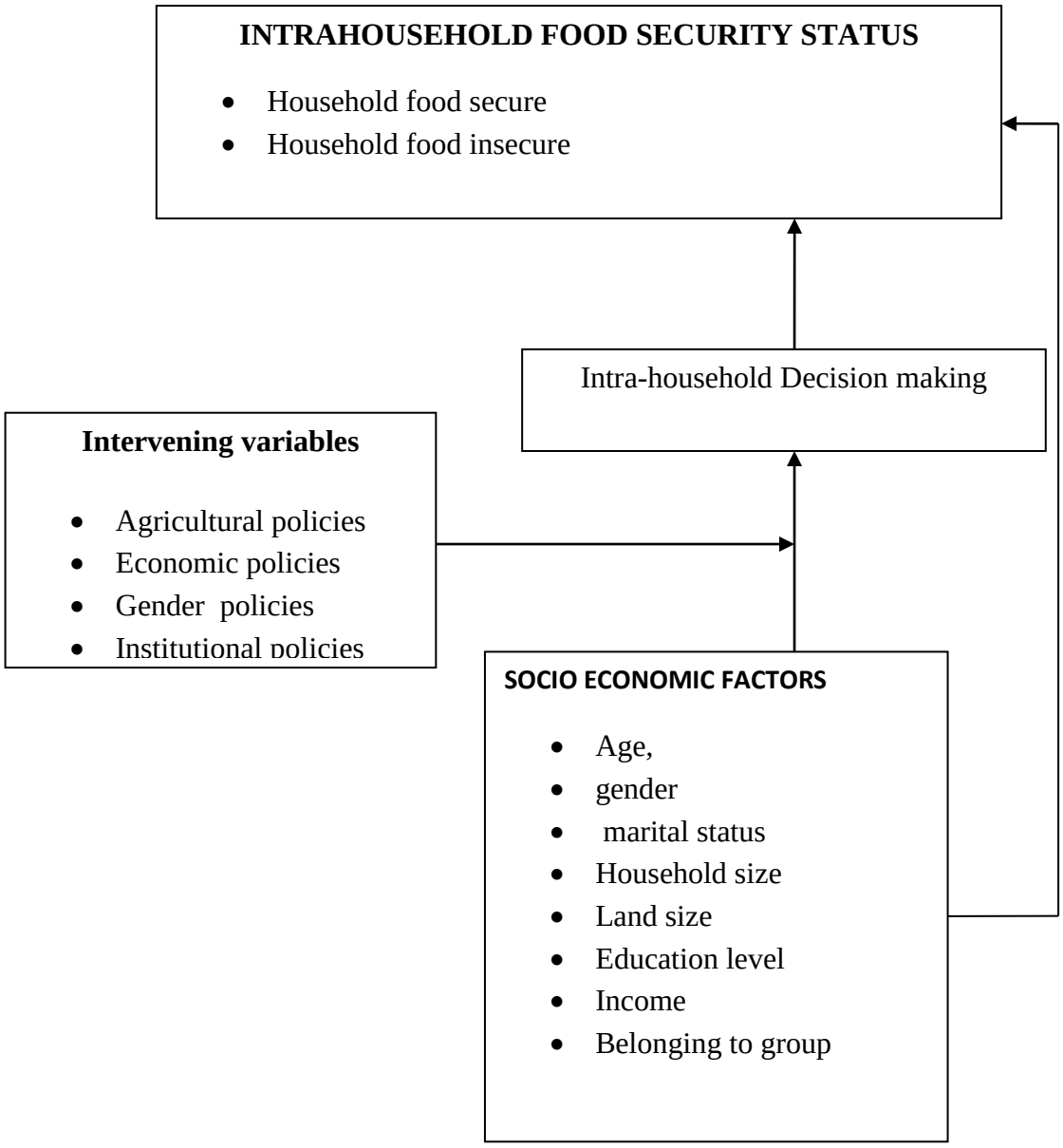

Figure 1: Conceptual framework

Source: *Author's Conceptualization***.**

CHAPTER THREE

METHODOLOGY

3.1The study Area

The study area was Chepalungu constituency. The constituency is in Bomet County, which is one of the 47 counties in Kenya, with an area of 490.60 km². It is one of the constituencies in the former Rift Valley Province of Kenya. Its geographical coordinates are 0° 47' 0" South, 35° 21' 0" East. The constituency is bordering Bomet central, Bomet east and Konoin constituencies. The constituency has five electoral wards: Nyangores, Chebunyo, Sigor, Siongiroi and Kongasis. The constituency has a population of 163,833 (GOK, 2009), of which 49% are males while 51% are females and 58.7% of the population live below the poverty line. The Constituency has a mean monthly temperature of 18ºC with an annual rainfall ranging between 1,100 mm and 1,500 mm. The area also receives rainfall for a good part of the year which allows agriculture to flourish. Food crops are grown in the area with maize being the area's staple food. Beans, Irish potatoes, sweet potatoes millet, cabbages, and onions, are grown both for subsistence and sale locally and in distant markets. Dairy production in some parts is practiced contributing to households' incomes. The map of the study area is shown in figure 2 below.

3.2 Sample size determination

A sample size of 150 farmer households was targeted. The required sample size was determined by proportionate to size sampling methodology (Anderson *et al.*, 2007);

$$n = \frac{pqZ^2}{E^2} \quad \text{.....} \quad (1)$$

Where:

n = the sample size.

p = proportion of the population containing the major interest.

q = 1-p.

z = confidence level ($\alpha = 0.073$).

e = acceptable/allowable error.

Since the proportion of the population is not known: $p = 0.5$; $q = 1-0.5 = 0.5$; $z = 1.793$ and $e = 0.073$. This will result to a sample size of 150 respondents.

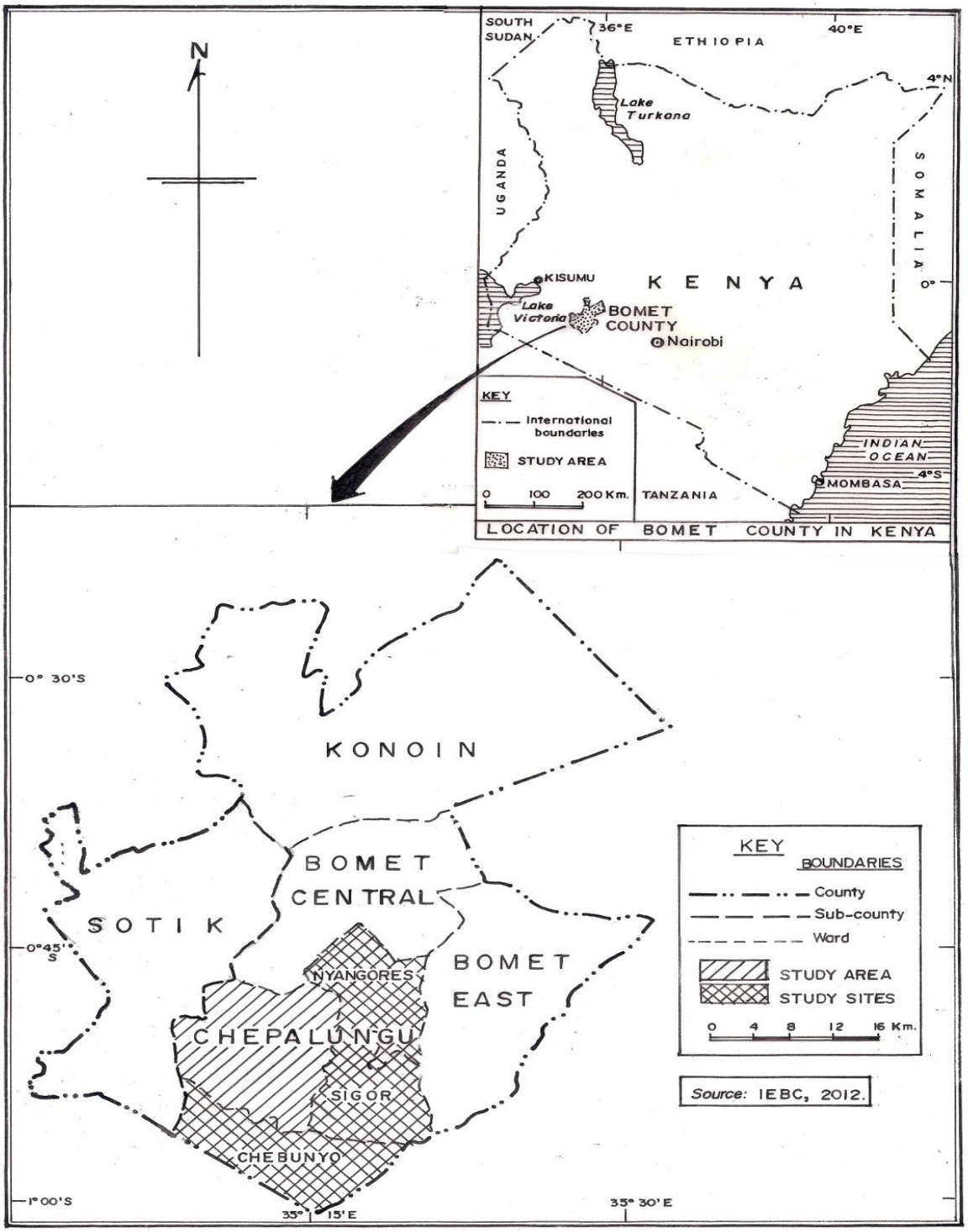

Figure 2: Map of the study area.

Source: Independent Electoral and Boundaries Commission (IEBC), 2012.

3.3 Sampling Procedure

Multistage sampling procedure was employed in selecting the respondents, where first Bomet County was purposively selected owing to food insecurity problem. Within Bomet County, Chepalungu Constituency was purposively selected because food insecurity cases are commonly reported as compared to other constituencies in Bomet County. The third stage involved random selection of three wards from the five in Chepalungu constituency (Nyangores, Chebunyo and Sigor, wards). Then fourth stage used simple random sampling to select the number of smallholder farmers from each of the three wards. Using the 2009 population of Chepalungu constituency as reported by the Kenya population and housing census, a proportional to population size for each of the three wards was calculated to arrive at 150 respondents who were interviewed proportionately. The probability of selection for each individual in each of the sampled ward was calculated as; $\text{Prob.} = \frac{\text{ward population}}{\text{Total population}} \times 100$

Table 1: Proportionate to Population Size of Respondents per Ward.

Ward	Population	Cumulative Sum	Prob. (%)	Proportionate Respondents per Cluster (c)
1.Nyangores	11,336	11,336	34.70	52
2.Chebunyo	10,749	22,085	32.90	49
3.Sigor	10,592	32,677	32.40	49
TOTAL	**32,677**		**100.00**	**150**

Source: Own calculation from Population (GoK2009).

3.4 Data collection Method

Before data was collected, the questionnaire was pre-tested on selected farmers to evaluate the appropriateness of the design, clarity, and relevance of questions. A cross sectional data set was used and collected from a sample of smallholder farmers. The methods for data collection included observations, interviews, and formal questionnaires. Primary data was collected through the administration of semi- structured questionnaire to the 150 respondents in the study area. The questionnaires were administered to the farmers by team of trained enumerators.

3.5 Methods of Data Analysis

Data from the field was edited, coded, cleaned to ensure consistency, uniformity, and accuracy. Both qualitative and quantitative techniques were used to analyse the data collected. Qualitative data for objective one was analysed using descriptive statistics such as mean, percentage, standard deviation, graphs, and frequency distribution. The logit model was used to analyse objective two while Poisson model was used for objective three on the social economic factors which influence food security and the influence of decision making on household food security status respectively. Both SPSS and STATA computer programs was used to process the data.

3.6 Analytical Framework

Data regarding objectives outlined was analyzed as follows:

Objective 1

Socio-economic Attributes of Rural Smallholder Farmers

The first objective was analysed using descriptive statistics. This captured the use of both quantitative and qualitative variables that are important in understanding the socioeconomic characteristics of rural smallholder farmers. The graphs, percentages, means and standard deviations were employed to analyse the socioeconomic characteristics of respondent households on various variables. The *t-test* and Chi-square tests were used to compare the selected household and farm characteristics between the two categories of smallholder farmer households (food secure and food insecure).

Objective 2

Social economic factors which influence food security

The first step in analysing this objective was to assess if a household is either food secure or insecure. Since no method has been accepted as a "gold standard" for an analysis of household food security (Maxwell, 1995), this study employed Food Consumption Score (FCS) as measurements of households food security status.

Food Consumption Score (FCS)

The Food Consumption Score (FCS), a tool developed by WFP, is commonly used as a proxy indicator for access to food. It is a weighted score based on dietary diversity, food

frequency and the nutritional importance of food groups consumed (WFP, 2011). Data was collected on the number of days a household ate specific food items in 7 days period. This was achieved by taking the food diary to the selected households 7 days before the study was conducted. A seven day recall period was used to make the FCS as precise as possible and reduce recall bias (Hoddinott and Yohannes, 2002). The food items following the United Nations Food and Agriculture Organization (FAO) are grouped as shown in table 2.

The FCS of a household was calculated by multiplying the frequency of foods consumed in the last seven days with the weighting of each food group. The weighting of food groups has been determined by WFP according to the nutrition density of the food group. Table 2 shows the food group weights.

Table 2: Food groups and weights for FCS

Food Group	Food groups	Weight for FCS
1.Cereals	Cereals and Tubers	2
2.Root and tubers		
3.Pulses/legumes	Pulses	3
4.Milk and milk products	Milk and Eggs	4
5.Eggs		
6.Meat	Meat and Fish	4
7.Fish and seafood		
8.Oil/fats	Oil	0.5
9.Sugar/honey	Sugar	0.5
10.Fruits	Fruits	1
11.Vegetables	Vegetables	1
12.Condiments/spices	Condiments	0

The sum of the scores is then used to determine the FCS. The maximum FCS has a value of 112 which would be achieved if a household ate each food group every day during

the last 7 days. The total scores were then compared to pre-established thresholds whereby household with a score of 0 to 42 was categorised as food insecure and a score of above 42 was categorised as food secure household (WFP,2011).

Logit model:

Once the food security status of a household was known, the Logit model was used to determine the social economic factors which influence food security in the study area. Logit model was used in estimating the probability of events based on dependent dichotomous variables (Gujarati, 2004). Dichotomous dependent variables assume only two values, that is, either zero or one.

In this study dependent variables was food security represented by '*fs*' where, *fs* is 1 if a household is food secure and 0 otherwise. Thus the logit model was specified as:

$$P_{fs}(Y_{it}=1)=\frac{\exp(\beta_{fs}Z_{it})}{1+\exp(\beta_{fs}Z_{it})} \quad \text{..... (2)}$$

$$P_{fs}(Y_{it}=0)=1-P_{fs}(Y_{it}-1)=\frac{1}{1+\exp(\beta_{fs}Z_{it})} \quad \text{..... (3)}$$

Where, Y_{it} is the dependent variable, which takes on the value of '1'if the ith household is food secure and '0'otherwise,

β is a vector of unknown coefficients and

Z_{it} is a vector of explanatory variables related to i^{th} household (X1, X2...X9).

X1 = Gender of household head (GEND) – Male =1, Female = 0)

X2 = Age of household head (AGE) in years

X3 = Marital Status of household head (MRTS) – Married =1, Single = 0)

X4 = Household Size (HHSIZE)

X5 = Household head education level (EDU)

X6 =Land size (LANDSZ)-Hectares

X7 = Income of Household head (INCOME)-KES

X8 = Belonging to Social Group (GROUP) - Yes =1, No = 0

Table 3: Description of the variables used in the Logit Model

Variables	Description	Expected Sign
Dependent Variable		
Food security status	Food insecure (FCS: 0- 42)	
	Food secure (FCS: Above 42)	
Independent Variables		
Gend	Gender of the household head	-
Age	Age of the household head in years	±
Mrts	Marital Status of the household head	±
Hhsize	Household size by number of members	+
Edu	Household head education level	+
Landsz	The size of farm for farming (hectares)	±
Income	Household Income	+
Group	Belonging to a social group	+

Objective 3

Influence of decision making on household food security status

In this objective Household Dietary Diversity Score was used to measure household food security status (HDDS). Through targeting the respondents' dietary history, a 7 day dietary recall was conducted to obtain food groups information from respondents 'food intake. This was achieved by taking the food diary to the selected households 7 days before the study was conducted. The respondents were asked to mark all food items eaten and beverages taken for a period of seven days. A scale of twelve food groups was used in assessing the HDDS of the respondents as summarised in Table 4.

The HDDS for the respondents were therefore estimated using information collected. A single point was awarded to each of the food groups consumed over the reference period giving a maximum sum total dietary diversity score of 12 points for each individual household in the event that his/her responses are positive to all food groups (FAO, 2007).

Table 4: Food group points

Food groups	Points
1.Cereals	1
2. Roots and tubers	1
3.Pulse/legumes	1
4.Milk and milk products	1
5.Eggs	1
6.Meat	1
7.Fish and Sea food	1
8.Oil/fats	1
9.Sugar/honey	1
10.Fruits	1
11.Vegetables	1
12. Condiments/spices	1

Poisson model was then used to analyse this Objective. To model food security data we define Yi, (i = 1, 2…12) as the Household Dietary Diversity Score. Questions on who makes decisions on food related activities were asked. Decision makers of the household are divided into two categories; male (husband) decision maker and female (wife) decision maker. A household whose main decision maker is male was noted 1 and 0 otherwise. Socio-economic variables and decision making were then regressed against HDDS. Hence, the Poisson model was specified as:

$$f(Y_i) = \frac{\mu^{Y} e^{-\mu}}{Y!} \qquad Y = 1,2............12 \quad \text{(4)}$$

Where *f* (*Y*) denotes the probability that the variable *Y* takes non-negative integer values, and where *Y*! (*Y* factorial) stands for *Y*! = *Y* × (*Y* − 1) × (*Y* − 2) × 2 × 1. It can be proved that

$$E(Y) = \mu \quad \text{(5)}$$

$$\text{var}(Y) = \mu \quad \text{(6)}$$

The Poisson regression model may be written as

$$Y_i = E(Y_i) + u_i = \mu_i + u_i \quad \text{(7)}$$

Where Y's are independently distributed as Poisson random variables with mean μi for each individual expressed as

$$\mu_{i=E(Y_i)=}\beta_1 + \beta_2 GEND + \beta_3 AGE + \beta_4 MRTS + \beta_4 HHSIZE + \beta_5 EDU + \beta_6 LANDSZ + \beta_7 INCOME + \beta_8 GROUPMBSHP + \beta_{10} MA + \beta_{11} FE \quad (8)$$

CHAPTER FOUR

RESULTS AND DISCUSSIONS

4.1 Introduction

This chapter presents descriptive results of the socio-economic characteristics of the respondents from the area of study in relation to food security status. It also presents empirical results of the binary Logit model and Poisson model, providing detailed discussion of the significant variables and comparing them with findings from other past researchers. The chapter has been organized into three sections to address the objectives of the study.

4.2 Descriptive results

The socioeconomic characteristics of the respondents were categorized as either continuous or discrete variables. In this case continuous variables included age, household size, land size and income. Discrete variables included gender, marital status, level of education and belonging to a group. To test the mean significance differences in continuous variables, a t-test was carried out while a chi square was performed on discrete variables.

As presented in Table 3, the mean age of the respondents from the study area is 42 years while the overall youngest and oldest age is 19 and 92 years respectively. The overall mean of the household size was found to be approximately 5 members, which coincides to the Kenya's national mean figure of 5 members per household (GoK, 2009). The aggregated annual income (both farm and off-farm) was found to have an overall mean of KES.19, 798.00 for the year 2015 with the least having KES.1000 and the highest having KES.94, 000. While the overall mean land size was 5.5 hectares with the smallest and the largest sizes being 0.1 and 12 hectares respectively.

Table 5: Summary statistics of continuous variables for household heads

Characteristic	N	Min	Max	Mean	Std
Age	150	19	92	42.42	15.1224
Household size	150	1	12	4.88	2.7119
Income	150	1,000	94,000	19,798.00	22,060.38
Land size	150	0.1	12	5.5273	4.3773

Source: Survey data 2015

Table 4 presents households' level of food security status in the area of study. It was noted that the majority (52.7%) of the households were found to be food insecure while the remaining 47.3% were food secure households. Thus, the number of food insecure households in Chepalungu is significant. This indicates that many of the households in the area are prone to shortages of food. This therefore calls for the immediate intervention to change the situation. This result concurs with the fact that approximately 50% of Kenyans are food insecure with 3 million in constant need of food relief (Kinyua, 2004). This trend seems also more or less similar to findings from other parts of Kenya; Nyamweso *et al.* (2007) found that about 57.6% of the population in Vihiga were food insecure.

Table 6: Household's food security status

Food security status	**Percentage**
Food secure	47.3
Food insecure	52.7

Source survey data 2015

In terms of intra-household decision-making, figure 1 show that the majority (more than 50 percent) of production and sales decisions are made by males in male headed households. On the other hand, females account for a lion's share of consumption decisions. Over 70 percent of consumption decisions are made by females, compared to fewer than 30 percent for the male counterparts.

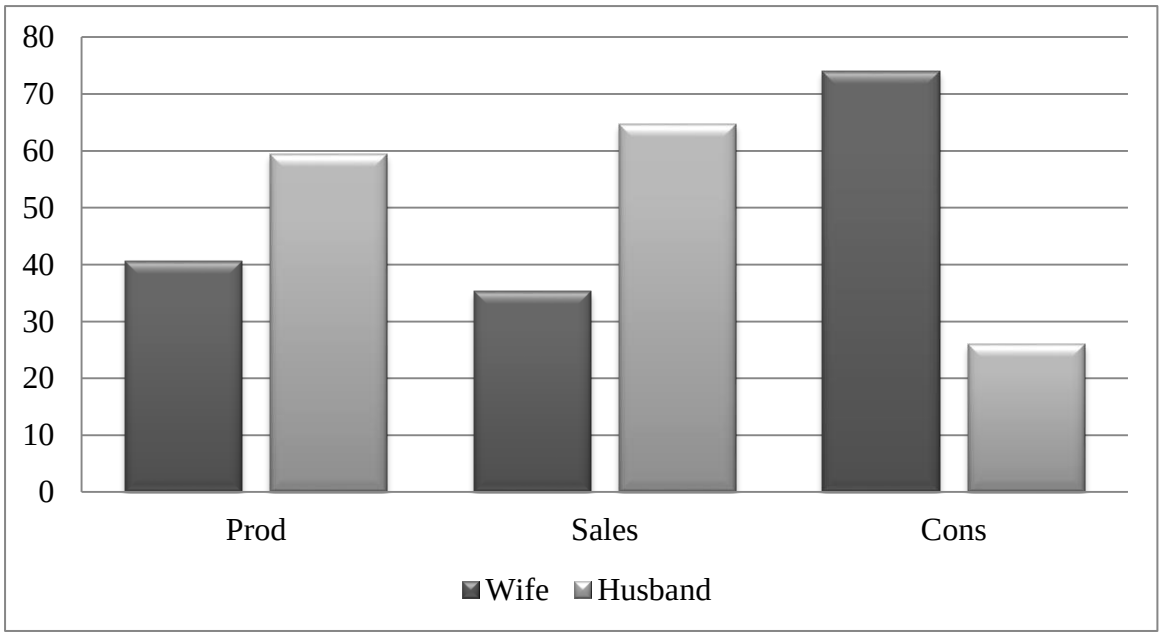

Figure 3: Intra-household decision making by gender

4.2.1 Socioeconomic characteristics in relation to food security

In Table 5, the age of food insecure respondents had a mean age of 49.33 years while for food secure households were 34.73 years. The t-test result show that age was significant at 1% revealing that the mean difference in age has an imperative role in household food security status. It showed that the younger the household head, the more the likelihood of that particular household to be food secure. This may be attributed to the fact that younger farmers easily adopt new farming technologies. These findings were consistent with Langynintuo and Mulugetta (2005) who found that old farmers fail to embrace new farming technologies rendering them food insecure. However, the results were contrary to Hofferth (2003) who argued that the higher the age of the household, the more stable the economy of the farm household.

The results in Table5 showed that food insecure households had an average of 6 members while food secure households had 3 members. The t-test result showed that household size was statistically significant at 1%. It could be that higher number of household members lowers the per capita food consumption among household members, thereby condemning them to being food insecure. By contrast, households that had few members were food secure, since they could comfortably meet their food needs. Typically, it is envisaged that more mouths to feed could increase the likelihood of a household being food insecure. This finding concurs with Feleke *et al.* (2003), who found that pressure on consumption and labour availability is best described by household size. A number of researchers who include Sonya and Helen (2003), Kraybill and Bahaasha (2005) and Oluwatayo (2008), have found out that adding more family members creates more pressure on consumption than the labour it contributes. It is thus expected that as the number of family size increases, food security decreases as there are more family members who are share from the available yield or income.

In this study, annual income from both off-farm and farming activities were aggregated in assessing the impact of income on household food security. This is because farm income activities alone could have not reflected the true picture of the area due to a shock by Maize Lethal Necrosis Disease which has affected the region for the last three years. It was noted that the food insecure households had a lower income with a mean of KES. 9,836.70 compared to food secure households who had KES. 30,881.70, the t-test result revealed that income was statistically significant at 1%. This showed that the higher the income available to the household, the higher the likelihood of the household being food

secure and the lower the income, the higher the probability of that household being food insecure. This finding was again expected since households with higher incomes can afford and meet their family food needs, either through investing in farm production and productivity enhancing technologies, or simply through buying food in case of shortages. By contrast, families with lower incomes could find themselves in a situation of food insecurity as they can't afford to invest in such farm technologies or sufficiently meet their food needs through purchases. Adebayo (2004) found that Kenyans often have scanty savings and few other sources of income to purchase food items hence contributing to food insecurity.

The t-test results showed that the mean difference in land size was significant at 1%. For food insecure households the mean size of land was 3.76 hectares while for food secure households, it was found to be 7.49 hectares. From the results it is noted that the more the land size available to the household, the higher the likelihood of the household being food secure. This finding is in line with Haile *et al.* (2005) who also found a positive and significant relationship between land size and food security. On the Contrary, Altieri (2008) found that there is an inverse relationship between farm size and food security because households with small farm size are able to invest more for land improvement hence they tend to be more productive thereby ensuring more food products available to the household.

Table 7: Socioeconomic continuous variables in relation to food security status

Characteristic	**Mean**			**t- Test**
	Overall mean (n=150)	Food insecure (n=79)	Food secure (n=71)	
Age	42.42	49.33	34.73	0.0000***
Household size	4.88	6.24	3.37	0.0000***
Income	19,798.00	9,836.70	30,881.70	0.0000***
Land size	5.53	3.76	7.49	0.0000***

Source: Survey data 2015

Note: ***: significant at 1% level.

Table 8: Socioeconomic discrete variables in relation to food security status

Variable	**Description**	**Overall**		**Household respondent**		**Pearson's *Chi*^{2}**	**Pr**
		Frequency	Percentage %	Food secure (n = 71)	Food insecure (n = 79)		
Gender	Male	82	54.67	49 (69.01)	33 (41.77)	3.6468*	0.056
	Female	68	45.33	38 (53.52)	30 (37.97)		
Marital Status	Married	139	92.67	66 (91.95)	73 (92.40)	0.0168	0.897
	Single	11	7.33	5 (8.05)	6 (7.60)		
Education Level	No formal education	15	10.00	2 (2.82)	13 (16.46)	40.027***	0.000
	Primary	40	26.67	4 (7.04)	36 (45.57)		
	Secondary	38	25.33	23 (32.39)	15 (18.99)		
	Tertiary	29	19.33	22 (31.00)	7 (8.86)		
	University	28	18.67	20 (28.17)	8 (10.12)		
Belonging to a group	Yes	104	70.00	60 (84.50)	44 (55.69)	14.5981***	0.000
	No	46	30.00	11 (15.50)	35 (44.31)		

Note: The figures in parentheses are percentages; n is the number of observations (respondents); *** is significant at 1%level;*significant at 10% level.

Table 6 presents discrete variables in relation to food security status. In terms of education level of the household head in Chepalungu, it was noted that only 10% of the respondents had no formal education (not gone to school) implying that 90% of the

respondents accessed at least formal education. However, majority (52%) of them attained primary and secondary education while only (38%) attained tertiary and university education. Among the food secure households, 16.46% had no formal education, 45.57% had primary education and 18.99% had secondary education. On the contrary, 2.82% of the food insecure respondents had no formal education, 7.04% attained primary education and 32.40% got secondary education. In terms of higher level of education the results showed that 8.86% of the food insecure respondents had tertiary education and 10.12% attained university education. On the other hand 31.0% and 28.17% of food secure respondents had tertiary and university education respectively. The chi square showed that education level had significant impact on household food security and was significant at 1% level. It is expected that a higher level of education is accompanied with improved entrepreneurial skills that smallholder farmers could take advantage of the skills by diversifying farm operations to improve on their food needs. This finding concur with that of Degefa (2001) who found out that those household with literate heads more food secure compared to the illiterate counterparts.

Gender was found to have imperative effect on household food security. The results showed that 54.67% of the households were male headed while 45.33% were female headed. For food secure households 69.01% were male headed while 53.52% were female headed. On the other hand 41.77% of food insecure households were male headed while 37.97% were female headed. This showed that more male-headed households were food insecure as compared to female-headed households. Further, the Chi-square results in table showed that gender is statistically significant at 10% level.

The Marital status of the household heads revealed that a higher proportion of the respondents (92.67%) were married implying that only a small percentage of (7.33%) were singles. It reveals that 47.48% of the married household heads were food secure while 52.52% were food insecure. On the other hand 45.45% of single household heads were food secure and 54.55% were food insecure. However, the difference in marital status was not statistically significant.

The chi square results in table 6 showed that belonging to a group was statistically significant at 1% level. The proportion of food secure households belonging to groups was higher than that of food insecure households. Food secure households had 57.14% of respondents belonging to groups while food insecure households had 42.86%. Belonging to a farmers group enhances group activities such as access to credit, training, bargaining power

thereby improving food productivity and subsequently food security. In addition, belonging to a group has its privileges in terms of reducing cost (such as transportation) as well as improving income margins for farmers. This finding is similar with that for Oluwatayo *et al.* (2004), who observed that households that belong to a group were more food secure compared to those who do not since the group could assist to loan the members thereby augmenting households needs especially during short falls.

4.3 Econometric results

4.3.1 Factors influencing food security among smallholder farmers

The logit model was used to determine factors influencing food security. The variables included in the model were gender, age, marital status, household size, and years of education, income, land size and belonging to a social group. The Logit regression results are presented in table 7. The pseudo-*R* squared of 0.5780 was above the statistical threshold of 20% demonstrating that the explanatory variables described about 57.80% of the variables considered in the model. The goodness-of-fit measured by the Prob>Chi^2 = 0.000 showed that the choice of explanatory variables included in the Logit model explained households' food security status. The chi-square value of -43.784416 showed that the likelihood ratio statistics are highly significant and that the slope coefficients were significantly different from zero for food security status.

Among the eight factors considered in the model, six were found to have significant impact in determining household food security status. These included gender, age, marital status, household size, years of education and income. From the analysis gender, years of education and income were found to have a positive relationship with household food security status. However age, marital status and household size had a negative significant impact on household food security status.

With reference to gender, results in Table 7 indicate a positive correlation between gender and household food security status at 1% level. The observed results revealed that, with regards to base category, female headed households were more likely to be food secure than male headed households. This finding was not expected since female headed households may be facing challenges such as limited access to land, markets and extension services that limit their potential to become food secure. Also culturally, in the rural setting, women are viewed as the inferior to their male counterparts, while it is also expected that they have limited access to information that limits their potential to become food secure. However, this

finding supports previous studies by Rogers, (1996) who noted that female headed households spent more on higher-quality, more expensive and protein-rich foods making their households more food secure. Bahiigwa (2009) also observed that female-headed households were more food secure than male headed households. This finding was in contrary with that of Babatunde *et al* (2008) who found that female headed households were vulnerable to food insecurity than their male counterparts. According to Green and Pius (2012) gender in Africa is much more related to access to resources. Thus most female headed households in Africa are food insecure as compared to male headed households since most females are resource poor.

Table 9: Logit regression results of the determinants of household food security status

Variable	**Coefficient**	**Standard Error**	**Z**	**P>z**
Gender	1.687325	0.6498263	2.60	0.009***
Age	-0.068609	0.0216214	-3.18	0.001***
Marital status	-2.1118552	1.133269	-1.86	0.062*
Household size	-0.3901706	0.1409501	-2.77	0.006***
Education	0.2533968	0.0638501	3.97	0.000***
Income	0.0000365	0.0000191	1.91	0.056*
Land size	0.0904385	0.0929256	0.97	0.330
Group membership	0.073747	0.6602441	0.11	0.911
_cons	2.197574	1.958029	1.12	0.262

Number of observations = 150

LR $Chi^2(7) = 119.95$

Prob>$Chi^2 = 0.0000$

Pseudo $R^2 = 0.5780$

Log likelihood = -43.784416

Note: ***: significant at 1% level;* significant at 10% level.

The age was found to negatively influence food security status and significant at 1% level. This implied that the older the household head, the more food insecure the household was likely to be. This can be attributed to traditional farming practices and low ability to adoption of new farming technologies by older household heads. On the other hand younger farmers adopt easily new farming methods and modern technologies rendering them more food secure. This finding was in agreement with that of Greenwell and Pius (2012). The justification was that although young farmers tend to be less experienced they are more food

secure due to their dynamic and energetic nature. However, this outcome was in contrary with that of Jean *et al.* (2002) who found that food insecurity increases until age 35 and then steadily decreases as the household head becomes older. Other researchers who have also found out that the older the household head the more food secure the household are (Bickel *et al*., 1999; Andrew *et al*., 2000; Nord *et al*. 2002).

From the analysis, marital status was seen to influence household food security status negatively. It was found to be statistically significant at 10%. This revealed that households with unmarried heads were more likely to be food secure than households with married heads. Households with unmarried heads in the area of study were mostly found to be headed by women. This implied that unmarried household heads are able to allocate larger share of their resources towards household food security without having to seek for husband approval hence ensuring the household is food secure. This result was in line with that of Aidoo *et al.* (2013) who found that married people were more likely to be food insecure compared with the unmarried people.

Household size has a negative effect on household food security status and is statistically significant at 1% level. It can be argued that an increase in household size indirectly reduces the household per capita income and this affects the household purchasing power thus increasing the likelihood of household being food insecure. This means that the probability of food security decreases with an increase in family size. An increase in household size by one member increases the probability of the household being food insecure by 39.04%. The finding concurs with that of Paddy (2003) who found out that as household size increases the likelihood of a household being food insecure increases. Although it is expected that an increase in household size increase the labour available, Frankenberger (2002) and Flores (2004) findings revealed that households with more people exert more pressure on food than the labour it contributes to agricultural production. Sonya and Helen (2003) observed that households with 5 or more members were more likely to be food insecure compared to households with less than 5 family members.

The education level of the household head was positive and significant at 1% level. A one year increase in the household head's year of schooling increases the probability of a household being food secure by 25.3%, all other factors held constant. Education empowers farmers with entrepreneurial skills that could enable them intensively diversify farm operations which could increase food security among the rural households. Njafi, (2003) argued that education of household head could lead to awareness of technologies that can be

used in modernizing agriculture such as improved inputs. Furthermore, educated household heads are able to read instructions on fertilizer packages. This enhances productivity and household food security. This finding concurs with that of Asogwa and Umeh (2012) who found that as the household head gets more and more educated he may easily adopt technologies and practices which may increase productivity and yield that has direct implication on food supply. Similar results were also reported by Haile and Kudhlande (2005) who found out that education had a positive and significant relationship with household food security indicating that households with relatively better education were more likely to be food secure than those households with uneducated heads.

The amount of income available to the household was positive and significant at 10% level. This meant that a household with more income was more likely to be food secure compared with a household with less income. This result is consistent with the outcomes by Asghar and Muhammad (2013) who found out that income that is invested in agriculture increases production and food availability at the household level. FAO (1999) also reported the same that income from off farm activities and non- farm activities are essential for households' food security.

4.3.2 The effects of intra-household decision making on food security

In addressing the effects of intra-household decision making on food security status of the respondents, information bordering on decisions about food security was obtained and analysed using Poisson regression. In this case household food security status was measured using Household Dietary Diversity Score (HDDS). The decisions relating to food security were categorised as production decisions (Prod_ Decision), sale decisions (Sale_ Decision) and consumption decisions (Cons_ Decision). Thus decisions relating to household food security status were coded 1 for households whose main decision maker is male and 0 otherwise. The decision making on food related activities and socio economics variables were regressed against the HDDS in a Poisson model.

The results in table 8 revealed that decision on consumption (Cons_ Decision) along other social variables which included age, household size and years of education were found to have effect on household Dietary Diversity Score. Age and household size were shown to influence HDDS negatively. While the years of education and consumption decision variables were influencing HDDS positively.

Table 10: Effects of intra-household decision making on food security

Variable	Coefficient	Standard Error	Z	P>z
Gender	0.1044664	0.0706448	1.48	0.139
Age	-0.0046677	0.0023561	-1.98	0.048**
Marital status	0.0186282	0.1182951	0.16	0.875
Household size	-0.0399753	0.0135831	-2.94	0.003***
Education level	0.0194448	0.0069485	2.80	0.005***
Income	0.0002680	0.0001850	1.45	0.146
Land size	-0.0002331	0.0099656	-0.02	0.981
Group membership	-0.0716006	0.0776038	-0.92	0.356
Prod-Decision	-0.040537	0.1121837	-0.36	0.718
Sales-Decision	-0.055177	0.1087691	-0.51	0.612
Consum-Decision	0.1322229	0.0790585	1.67	0.094*
_cons	2.106075	0.2255879	9.34	0.000

Number of observations = 150

LR Chi^2 (11) = 80.46

Prob>Chi^2 = 0.0000

Pseudo R^2 = 0.1069

Log likelihood = -336.16046

Note: ***: significant at 1% level; **: significant at 5% level; *: significant at 10% level.

Age was found to have a negative influence on HDDS at 5% significance level. The results revealed that the older the household head the lower the HDDS as compared to households with young households' heads. This is attributable to nutritional knowledge and economic abilities. Young households' heads tend to balance the diet for their households by consuming a number of food groups from the food basket. While the old people prefer large quantities of one food type for their families especially the traditional food types. This results were in contrary with that of Qi (1999) reported similar findings in which household with heads over 60 years old were less food insecure than younger households.

Household size was found to be negative and statistically significant at 1% level. This is attributable to a situation whereby households with many family members have to purchase many quantities of one type of food stuff before considering on another type. This therefore

affects household food accessibility since the household may not be having sufficient resources to obtain appropriate nutritious diet food. This increases the chances of that household to be food insecure. This finding is in agreement with that of Similarly, Sikwele (2008) reported that larger household size has negative impact on food security. However it is in contrary with Lee and Brown (1989) who found that larger household are expected to consume a more varied diets.

In terms of education the results showed that years of education of household head was significantly influencing HDDS positively at 1% level. It may be that educated people are more concerned about their nutritional balance and diets and hence, dietary diversity will increase in their household. Level of formal education reflects a person's ability to understand the various aspects of knowledge, including knowledge of nutrition. These results suggest that the more household heads are educated the more they are likely to attain a high dietary diversity. Similar comparable findings were suggested by several authors who noted that educated women assign a significantly larger proportion of their household food budget to food groups that are nutritionally rich in micronutrients (Smith and Haddad, 2000; Smith, L. 2004; Block, 2003), mainly because of greater awareness and understanding of nutritional health benefits (Smith, 2005). Households' dietary diversity increases with the highest level of education of the head of the households (Moon *et al*., 2002; Variyam *et al.,* 1998).

With reference to gender consideration in decision making, Table 8 results revealed that decision on consumption was positive and statistically significant at 10%. The observed results suggested that, with regards to the base category, consumption decisions when made by female have a higher probability of attaining a high dietary diversity than their male counterparts. This means that there is high probability of a household being food secure when the wife makes decisions on what that household consumes than when a husband makes such a decision. When consumption decisions are left to females the households are much more likely to consume more varied diets. This could be indicative of role women could play in enhancing the quality of food consumed by the households if empowered and given more resources. This finding was in agreement with Axinn (1997) who found that women's involvement is significant on household consumption contributes to improved variety in the family diet. This results also concurs with Quisumbing *et al.,*(1998) who argued that since women are involved in food preparation, food selection is therefore expected to be influenced by women`s knowledge regarding nutritional benefits of different foods and their power to allocate household family budgets towards high quality. Past studies have shown that when

women's power is increased, they use it directly in improving the health and nutritional status of their households (Smith *et al*., 2005).

CHAPTER FIVE

CONCLUSION AND RECOMMENDATION

5.1 Conclusion

The objective of this study was to examine how intra-household decision making influences household food security status among smallholder farmers in Chepalungu constituency, Bomet county in Kenya. According to descriptive statistics of the sample households, a priori expectation about the relationship between indices of food security and factors influencing it are satisfied for majority of the cases considered. This was further supported by a binary logistic regression model applied to randomly selected data of 150 sample farm households.

Factors identified as having a significant influence on food security by a logistic regression model include gender, age, marital status, household size, education level and income of household head. Among these factors gender, education level and income were found to influence food security positively at the household level. On the other hand age, marital status, household size had negative influence on household food security status in the study area.

Age had a negative influence because younger household heads easily adopt new farming technologies as compared to their older counterparts. Marital status was found to negatively influence household food security status meaning unmarried household heads are able to allocate larger share of their resources towards household food security without having to seek for their partners approval hence ensuring the household is food secure. Another variable found to have negative influence on household food security status was household size this revealed that as household size increases the likelihood of a household being food insecure increases.

Gender had a positive influence on household food security status. The observed results revealed that, with regards to base category, female headed households were more likely to be food secure than male headed households. Education level of a household head had positive influence. This is attributed to the fact that educated farmers are empowered with entrepreneurial skills that could enable them intensively diversify farm operations hence increasing their probabilities of their households being food secure. Also income was found to have a positive significant effect on household food security status since high income promotes greater access to food by increasing their purchasing power.

Poisson results on effects of intra-household decision making and using HDDS as a measure of household food security status. The results revealed that social factors which included age, household size and education level of household head were found to have significant influence on household food security status. Age and household size had negative influence while years of education of household head was found to have a positive effect. In this case HDDS was used and revealed that the older the household head the lower the HDDS this is attributable to nutritional knowledge and economic abilities. Larger household were found to consume less varied diets. Hence, the larger the household size the lesser the HDDS. The results also showed that educated people are more concerned about their nutritional balance and diets and hence, dietary diversity will increase in their household. Level of formal education reflects a person's ability to understand the various aspects of knowledge, including knowledge of nutrition.it was also revealed that. The observed results also revealed that, with regards to the base category, consumption decisions when made by female have a higher probability of attaining a high dietary diversity than their male counterparts. This means that there is high probability of a household being food secure when the wife makes decisions on what that household consumes than when a husband makes such a decision.

5.2 Recommendations

Different policies and coping mechanisms have been applied in combating food insecurity in Kenya and across the world. However, policies on gender inequality in decision making within the households still need to be supported and implemented swiftly especially on developing economies. The study has provided gender-disaggregated data showing how differentials in intra-household decision making negatively influence household food security. Therefore the study has made the following recommendations.

- The inverse relationship between household size and food security underscores the need to encourage emphasis on family planning methods so as to have smaller families.
- Efforts by both county and national government should be intensified at capacity building through investment and creating awareness on the importance of education at higher levels and encouraging rural education programmes specifically targeted for women to broaden their understanding of the nutritional health benefits of a diverse diet
- In order to increase intra-household wellbeing and reduce gender inequity in decision making, gender based resource allocation and women empowerment policies should

be encouraged. Since it has been documented that when consumption decisions are left for females the households are much more likely to consume more varied diets than when such decisions are made by males. This could be indicative of role women could play in enhancing the quality of food consumed by the households if empowered and given more resources

5.3 Area of further Research

The intention of this study was to examine how intra-household decision making influences household food security status as well as looking into socio-economic factors affecting food security status within the household. However, the study proposes a further research on the gender division of labour in production and women's decision making in rural households in the region. This will ensure that the role of women on household food security is well documented and necessary policies put in place.

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QUESTIONNAIRE

This study intends to examine the intra-household decision making and its implications on food security among smallholder farmers in Chepalungu constituency, Bomet County, Kenya. The objectives of the study are; a)To characterize the socio-economic attributes of smallholder farmer households' in Chepalungu constituency Bomet County, b) to determine the social economic factors influencing food security among smallholder farmers and c) to examine the effects of intra-household decision making on household food security status among the smallholder farmers. Your response to the questions herein will be used to assess the current position and help to formulate viable policies and strategies that will contribute to improving the intra-household decision making for both men and women would lead to improvement in household wellbeing. The information you provide will be treated with the confidentiality it deserves and will be used only for the purpose of this study.

Instructions for the enumerators

1. Introduce yourself and give the purpose of the study before starting the interview
2. Tick the box on the closed questions as indicated
3. Write interview answers clearly

Name of enumerator…….

Name of the farmer (optional)……..

Name of the village……..

Relation to the household head……

Date ……

A. SOCIO-ECONOMIC CHARATERISTICS OF THE RESPONDENT

1. Gender

   Male [ ] Female [ ]

2. What is your age ……

3. Marital status

   Married [ ] Single [ ]

4. If married, do you stay with your spouse?

   Yes [ ] No [ ]

5. Household size (number of people living and eating together) ……

6. What is your highest level of education?

No formal education [ ]

Primary [ ]

Secondary [ ]

Diploma [ ]

University [ ]

Education level…….

7. What is your occupation?

Farming [ ]

Business person [ ]

Salaried employee [ ]

Casual labourer [ ]

Others, Specify……..

8. What is the size of your household farm land……..

9. What is your income level per year……

10. Do you belong to a farmer/social/financial group or organization in the community?

1. Yes [ ] 2. No [ ]

11. If yes, how many groups do you belong to.....?

B. HOUSEHOLD FOOD SECURITY STATUS

B.1 Dietary Diversity Data (24 hr. recall)

Did YOU OR ANYONE ELSE IN YOUR HOUSEHOLD eat any kind of the following foods yesterday during the day and at night?

Food group	Examples (any other locally available food)	Code 0.N0 1.YES
1. Cereals	millet, sorghum, maize, rice, wheat, or	
2. Root and Tubers	potatoes, yams, manioc, cassava or any other	

3.Pulses/legumes	beans, peas, lentils, or nuts	
4. Milk and milk Products	cheese, yogurt, milk or other milk products	
5. Eggs	Eggs	
6. Meat	beef, pork, lamb, goat, rabbit wild game, chicken,	
7. Fish and Seafood	fresh or dried fish or shellfish	
8. Oil/fats	Oil/ fat	
9. Sugar/honey	Sugar, honey	
10. Fruits	Mangoes, oranges, pineapples	
11. Vegetables	Kales, cabbage, carrots, French beans,	
12.Beverages	coffee, tea	

B.2 Household food consumption frequencies

Did any member of the household consume the following foods and drinks?

Food item	**Yes**	**No**	**Qty Day 1**	**Qty Day 2**	**Qty Day 3**	**Qty Day 4**	**Qty day 5**	**Qty Day 6**	**Qty day 7**	**Total**
Cereals										
Maize flour										
Millet flour										
Sorghum										
Other (specify										
Porridge from										

Maize meal										
Millet/										
Sorghum										
Rice										
Bread										
Chapatti										
Starchy foods										
Sweet potatoes										
Irish potatoes										
Cassava										
Yams										
Cooking										
Legumes										
Beans- fresh										
Beans- dry										
Peas- fresh										

Peas dry										
Peas- dry										
Green grams										
Groundnuts										
Other legumes										
Vegetables										
Tomatoes										
Onions										
Spinach										
Kales										

Pumpkin leaves										
Carrots										
Cabbage										
Other										
Fruits										
Bananas										
Citrus										
Passion fruits										
Avocado										
Pineapples										
Pears										
Pawpaw										
Mangoes										
Guavas										
Other										
Animal foods										

Beef										
Chicken										
Rabbit										
Mutton										
Pork										
Other meat										
Eggs										
Fish										
Drinks										
Milk										

Oil and fats										
Margarine										
Cooking fats and Oils										

C.DECISION MAKING:

C.1. Who has more influence in making the following decisions in your family?

S/N	**Category**	**Intra-household decisions:**	**0. Husband 1. Wife**
1	Production decisions	When to prepare land? What crops to grow? When to plant and when to harvest?	
2	Consumption decisions	When to take the food? What to eat? The type of food to eat? The number of times to take the food?	
3	Sale decisions	When to sell food crop? When to buy food? To sell livestock? To buy livestock? Keep money after selling crops?	

C.2. Tick the factors that you think determines decision making in the households**.**

FACTORS	**YES**	**NO**
Age		
Level of education		
Individual's income level		
Respect		
Acceptance		
Fitness (Physically, mentally, emotionally)		
Honesty		
Trustworthy		

List (if any) what you consider to be the major problems you face when making a decision in your household.

……

……

……

……

……

YOUR PARTICIPATION IN THIS STUDY IS GREATLY APPRECIATED.

Thank you for your time!