

**A STUDY OF THE LINKAGE BETWEEN LAND
USE MANAGEMENT AND HOUSEHOLD FOOD
SECURITY IN RONGO DISTRICT KENYA**

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BY

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A RESEARCH PROJECT REPORT SUBMITTED IN PARTIAL
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DEDICATION

This work is dedicated to all agricultural land users, policy makers, planners and agricultural sector and community development practitioners in Kenya. By extension it is devoted to my dear family Gladys Akoth, Felix Onyango, Brenda Adhiambo, Pascal Okech, Zaddock Wasonga and Martha Anyango for the bearing moments they endeavored without my presence during my studies. I missed your formative years, but I hope this sacrifice will improve the quality of your life in the years to come.

Special dedication to my late bother John Isaiah Ochieng Okech for his sincere love, commitment, for his selfless efforts in educating me and passion for my educational foundations and career achievements and to all my former teachers for the solid beginning, career guidance, counselling and progress they instilled and laid for my future life.

To all my late parents Pascal Okech Okoth and Magdalena Atieno, late brothers Lawrence Ochola Okech, John Okoth Okech, Michael Ouma Nyapara and all surviving brothers, all beloved sisters including Christine Adoyo Okech, Silpa Adoyo, Herrina Anyango, Carren Auma, Mary, Everline, Hellen and Risper. To my mother, Christabel M. Okech and my sisters-in-law Florence Kaleha, Jane Aliviza Mbone, Cecilia Okoth, Phylis Okoth and all in-laws for the maximum cooperation and all forms of assistance extended to me at times of need. All my nieces and nephews you are included with specialty in this kind dedication.

Last but not least, special institutional dedication goes to the Ministry of Agriculture, Community Mobilization Against Desertification (C-MAD), PREMESE Africa Development Institute/Coady International Institute of St. Francis Xavier University, Nova Scotia, Canada, Kenya Methodist University (KeMU) and the University of Nairobi that responded and supported my deep inspiration to pursue higher education.

DECLARATION

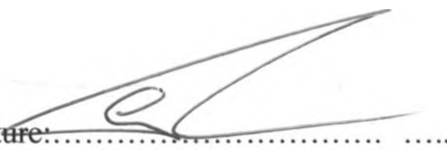
This Research Project Report is my original work and has not been presented for a degree in any other University.

Signature:.....

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L50/70915/2007

This Research Project Report has been submitted with our approval as the University Supervisors.

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ABBREVIATIONS AND ACRONYMS

AIC	Agricultural Information Resources Centre
CPMU	Central Planning and Monitoring Unit
ERSWEC	Economic Recovery Strategy for Wealth and Employment Creation
EU	European Union
FANTA	Food and Nutrition Technical Assistance
FAO	Food and Agriculture Organization
FGD	Focus Group Discussion
GDP	Gross Domestic Product
GOK	Government of Kenya
HFS	Household Food Security
IF	Implementation Framework
IFAD	International Fund for Agricultural Development
IFPRI	International Food Policy Research Institute
IPAR	Institute of Policy Analysis and Research
KARI	Kenya Agricultural Research Institute
KIHBS	Kenya Integrated Household Survey
KESREF	Kenya Sugar Research Foundation
LRTU	Land Reform Transformation Unit
LUM	Land Use Management
MDGs	Millennium Development Goals
MLFD	Ministry of Livestock and Fisheries Development
MOA	Ministry of Agriculture
MOCDM	Ministry of Co-operative Development and Marketing
MOF	Ministry of Finance
MOL	Ministry of Lands
NAEP	National Agriculture Extension Policy
NFNP	National Food and Nutrition Policy
NALEP	National Agriculture and Livestock Extension Policy
NASEP	National Agricultural Sector Extension Policy

NGO	Non-Governmental Organization
NPEP	National Poverty Eradication Plan
PRSP	Poverty Reduction Strategy Paper
R & D	Research and Development
RSCU	Regional Soil Conservation Unit
SIDA	Swedish International Development Agency
SRA	Strategy for Revitalizing Agriculture 2004-2014
UN	United Nations
UNCED	United Nations Conference on Environment and Development
UNDP	United Nations Development Programme
UNICEF	United Nations Children's Fund

ABSTRACT

This is a study of the linkages of land use management and sustainable household food security in Rongo District, seeking to examine the present state and the linkages of land use management and household food security. The district is having a problem of inappropriate land use management practices and household food insecurity. Hence, this study was to provide insights into sustainable solutions geared towards improving land use management and household food security situation. It is to benefit farmers, researchers, development practitioners, academicians, planners and other stakeholders.

The research was a cross-sectional survey that used mixed mode approach. A population of 3000 farm households residing in all the four divisions in Rongo District, Kenya was represented. The study sample size was 300 farm households. Using a farm household as a unit of analysis, the survey took place in 30 randomly selected cluster groups, each represented by 10 farm households, as representative probability sample from the larger population. *Secondary Data* collection included perusal of documents (document analysis). *Primary Data* collection involved key informant face-to-face in-depth FGDs interviews with 30 cluster FGDs, participant observations and field site visits. The field data collection was undertaken for a period of one month starting from June 30th to July 30th, 2009. Data was analysed and tested using Pearson's Chi-square test of independence with decision-making criteria at the critical alpha of 0.05 significance level. The study report was compiled in Microsoft Word and Tables formatted in Excel and presented in tables and percentages.

The present state of land use management, the researcher found out that for land tenure systems: there were 30% of the residents who lacked access to land resources and while 70% had access to and control over land resources and benefits. For the land use planning at the farm level, 73.3% of the farm holding lacked land use plans and only 26.7% had developed land use plans for agricultural development. Study revealed that on land use 73.3% of the farm households in the district practiced mixed farming involving the growing of food crops and rearing of livestock and the remaining 26.7% concentrated on food crop growing alone as their main land use practice. Land reform for accounted for by 63.3% of the farm household survey respondents who believed both land tenure and land use changes were influenced by land reforms, while 16.7% believed it influenced land use changes only as another 20% of the residents observed land tenure changes as being caused by land reforms taking place.

The study found out that agricultural policy determined the relationship between the *household food security* and *land use management* and the absence of national land policy compromised land use management practices. The researcher concluded that for land use management to be effective and efficient to contribute to improving household food security, there is the need for an integrated land use approach in land use management. The present approach of disjointed and uncoordinated land use practices cannot be expected to provide the desired outcome of sustainable household food security. Land use management in the district should be decentralized and new legislation that would reflect current thinking and approach to more humane and environmental friendly approach of sustainable development need to be embraced and instituted in the management of land resources.

CHAPTER ONE INTRODUCTION

1.1 Background of the Study

Agricultural growth and development was crucial to Kenya's overall economic and social development. The sector directly contributed about 26% of the GDP and a further 27% through linkages with manufacturing, distribution and related sectors. About 80% of the population lived in rural areas and depended mainly on agriculture and fisheries for livelihood. In addition, 87% of all poor households live in rural areas where their main land use activities are in agriculture. About 51% of Kenyans are food insecure, and the little available was of poor nutritional value, while a significant potential for increased agricultural productivity remained largely unexploited (MOA, *SRA Short Version 2004-2014:1*).

The factors of production were land, capital, labour and management. Land was a basic commodity that supported all forms of life. Land is used to produce food. Food is a basic right and one of the most basic needs of people that support all forms of life as well. Land is a factor of production and food is a product of production. Therefore, this suggested there may have been a relationship between the factors of production and the products of production. Hence, this created an interest on how the management of factors of production may have yielded sustainable products leading to a focus on land use management and household food security.

As envisaged, land use management factors had linkages with sustainable household food security. This generated the research question *are there linkages between land use management and household food security?*

This question could not be answered literally. It required a deep examination to come out with real supportive facts and any existing relationship. Land is used to produce food. Food production depends on land. Land is independent of food production. Therefore, land use management had an influence on agricultural production leading to sustainable household food security. A critical evaluation of land resources revealed that land use management had supported better food productivity. Land may have been managed well if there had been sustainable land use management systems. Land use management in itself may have had diverse effects on food productivity, and impacted on sustainability of household food security. Household food security was a factor that affected various household members and social groups.

Examinations of successive Rongo District Annual Reports (2005-2008) revealed Rongo District as a food deficit area. Comparatively, it was unfortunate there was still a lot of food insecurity at the local, national and international levels. Rongo District once regarded as the breadbasket of Southern Nyanza, in terms of food productivity, was now classified as a food deficit area (Rongo District Annual Report 2007:14).

The district had been struggling to meet its annual food requirements demand, but successive annual local production records had maintained a huge food deficit threatening sustainable household food security. Despite its high potential for agricultural productivity, and favoured with both vast fertile land and a bimodal rainfall pattern, many questions lingered as to what went gone wrong with the food production patterns of this previously food surplus area?

At national and district levels, the MOA, SRA 2004-2014, outlined several factors that had continued to constrain the growth of agriculture were many and varied. The main ones included unfavourable macro-economic and external environment; inappropriate legal and regulatory framework and lack of coherent land policy. Low and declining fertility of land; lack of capital and access to affordable credit; low absorption of modern technology; frequent droughts and floods; reduced effectiveness of extension services; poor governance and corruption in key institutions supporting agriculture; inadequate markets and marketing infrastructure and multiple taxes.

The constraints *lack of coherent land policy* and *low and declining fertility of land* above led to environmental degradation that was an effect of poor land use management. Degraded environment paralyzed the factors of production (land, labour and capital) leading to compounded effects of general low productivity across all sectors of the economy, especially household food security that relied heavily on environmental factors for support to yield viable and vibrant agricultural products.

Therefore, presence of environmental degradation that may have been mitigated by land use management had motivated and created the need for proper planning, design and land use management demanding a careful balancing of many goals, and the search for desirable land uses practices, coupled with effective and sustainable management practices.

Land use management had been made more complex by the interactions between the environment, the economy and society. One of the main reasons underlying the growing interest in the analysis for land use management was the need for improving sustainable

household food security through effective land use management approaches. Land use management and household food security analysis would have provided a basis to support the structuring of land use problems that allowed the concerns of major actors to be explored, giving trade-offs between conflicting goals, and leading to the evaluation of options from different perspectives geared to sustainable household food security improvement.

The Rongo District Annual Report (2007), revealed the district was a food deficit area, despite its high potential for agricultural production and being in an industrial sugar-belt blessed with a bimodal rainfall pattern. With its population of 291771 persons, the district annual cereal grain requirement was 437656.5 bags against 2007 cereal grain production of 327000 bags leading to a deficit of 110 656.5 bags (25%). Annual legume requirement was 268828.25 bags against a production achievement of 53 440 bags with a huge deficit of 215 388.25 bags (80%). This presented a bleak future of food outlook and persistent food insecurity. As a coping mechanism, the food deficit was bridged by food imports from outside the district and other sources such as cassava consumption.

Best guess was that earnings from sugar cane, tobacco and other income sources were used for purchasing the cereal and legumes to bridge the wide food deficit realized. The district was therefore consistently food insecure (Rongo District Annual Report 2007:15). National estimation showed that about 51% of the Kenyans, by extension Rongo District residents lacked access to adequate food and the little available was of poor nutritional value (CPMU, 2007:3).

A critical examination of the proportions of farm households growing various food crops discovered that 72.5% grew crops with 94.8% and 27.6% growing maize and beans

respectively. Other food crops grown were sorghum 27.6%, cassava 19.3%, sweet potatoes 10.6%, sukuma wiki 7.4%, bananas 2.9%, cowpeas 0.8% and other crops 41.9% of the farm households. It was also revealed that those owning livestock were 64.1%, with cattle, 64.7%, sheep 14.7%, goats 39.7%, pigs 3.4%, chicken 84.5%, other poultry 8.6%, donkeys 3.4% and other animals 0.9% of the farm households (KIIHBS-Basic Report, 2005/2006: 163, 173, and 177).

In view of the above factors, the researcher got motivation to carry out a study that was seeking to examine the present state and the linkages of land use management and sustainable household food security to offer sustainable solutions for land use management and household food security in Rongo District.

The study, therefore, examined the linkages of land use management and household food security to add to filling the gap of annual food deficit recurring in the study area due to inadequate and unsustainable land use management. The research intention was to benefit the public, researchers, development practitioners, government policy makers, planners, academicians and other stakeholders. The product of this research was a published Masters Degree scholarly manuscript of the Department of Extra-Mural Studies of the University of Nairobi for reference and use by the stated audience.

1.2 Statement of the Problem

The research sought to examine the present state and existence of inappropriate land use management practices and household food insecurity to offer sustainable solutions of their relationship in Rongo District.

Land degradation, lack of and/or poor land use policies and unguided land use management were factors that may have been contributing to lower agricultural production leading to consistent household food insecurity. When land development occurred in an isolated, haphazard fashion outside a formal planning and development structure, many issues of social or physical design nature too often remained unresolved or allowed only short-term solutions that worked to the ultimate detriment of the total environment. Effective response to this problem was to look into and offer solutions to this question: *What are the linkages of land use management and household food security in Rongo District?*

1.3 The Purpose of the Study

This study sought to examine the present state and the relationship between land use management and household food security in Rongo District. This is to provide insights into sustainable land use management in addition to influencing policy issues with a view to improving household food security and contributing to restoring the district lost status of being a vibrant food surplus area.

1.4 Research Objectives

The specific objectives of this research were to;

- 1) determine the present state of land use management in the study area.
- 2) determine the relationship between land use management and household food security.
- 3) identify the policy influences on land use management and household food security.

- 4) search for sustainable solutions for changes in land use management and policy for improvement of household food security.

1.5 Research Questions

The research questions, where the study was focused included;

- 1) What is the present state of land use management in the study area?
- 2) What is the relationship of land use management and household food security?
- 3) How does policy influence land use management and household food security?
- 4) What are the sustainable solutions for changes in land use management and policy that can improve on household food security?

1.6 Justification

There are a number of practical reasons for doing this research. At that time when the total production of food in the country and the district was decreasing and could not adequately feed the growing population, there was an urgent need to look into the constraints of farmers who produce food. This helped to identify farmers' priority needs with the aim of addressing these constraints to increase agricultural productivity.

Threats posed by unguided land use management, weak land and agricultural policies and laws included severe environmental degradation, food shortages and famines made sustainable food production a priority in development planning. Some of the explanations for Kenya are declining ability to feed itself included lack of a comprehensive land policy, uncoordinated sectoral policies formulation and implementation, environmental degradation, poor land use planning and management, continuous land fragmentation and high population growth. This had accelerated vulnerability to begging for food aid or the

government suspending some on-going projects reallocated financial resources to buying food to bridge the food deficit gap.

Land use management may have a major impact on natural resources including water, soil, nutrients, plants and animals. Land use management information may be useful in developing sustainable solutions for natural resource management issues such as salinity and water quality that have a bearing on food production. For instance, water bodies in a region that has been deforested or having erosion will have different water quality than those in forested areas.

In this regard, this study was important, as it contributed to generation of knowledge and information for policy influencing and decision-making. It provided information on the present food security situation, how land use management influences changes in sustainable household food security and had identified linkages and influences that existed between agricultural policy and sustainable household food security. It had established linkages and influences that existed between land policy and sustainable household food security and offered sustainable suggestions for changes in land use management, policy and legislative frameworks to improve on sustainable household food security.

The research information provided vital data to assist researchers, development practitioners, academicians, policy makers, planners and programmes implementers to monitor and evaluate existing land use management programmes and to design new strategies and policies for sustainable land use management for improved household food security. The survey further provided data to monitor the district's achievement of the Millennium Development Goals Nos: 1 - Eradicate extreme poverty and hunger; 7 -

Ensuring environmental sustainability (MDGs Report, 2006:4, 16); the Strategy for Revitalization of Agriculture (SRA 2004-2014) and Vision 2030 objectives.

It is essential to small-scale farmers, researchers, development practitioners, academicians, policy makers, planners and other development stakeholders. The benefits included generation of knowledge and information on land use management for enhancing sustainable household food security. This could catalyze policy influencing, decision-making processes, development planning and serve as a reference for further research.

1.7 Delimitations of the Study

The delimitation of the study included;

- 1) Definite scope and the research was within the government and university policies of research and development (R & D) hence possessed supportive legal and ethical issues for considerations for national development and academic research achievements.
- 2) Performing a chi-square test of independence in SPSS, allowed for combining of categories as it was noted that the some p-values produced by a chi-square test were inappropriate with the expected count of less than 5 in 20% of some frequencies or more. This situation was controlled by redefining coding scheme (combining the categories with low cell counts with other categories) in the analysis.
- 3) The other facilitating factors for carrying out this study were the convenience and practicality of its implementations and achievement of the expected outputs.

1.8 Scope and Limitations of the Study

As with any other research, this study has limitations and a finite scope. These restrictions include;

- a) Time and budget constraints were limiting factors in the study process. These factors almost impeded effective data collection and analysis resulting in degraded quality of the research. It was overcome by adhering to study plan of work and ensuring minimum costs in the research process to avoid diluting study quality.
- b) The research was designed to give estimates hence the estimates may not been very reliable. This situation may have compromised reliability of data. Therefore, measures of internal consistency were used for estimating and determining data reliability to defeat the constraint.
- c) Production figures were based on farmers' own self-reporting without objective tests validated responses. Hence, there may have been high chances of invalid responses. Prior to study, pre-testing of survey instruments and use of open-ended questions were used to help establish data validity.
- d) Data on crop and livestock productions were scanty as no national crop and livestock census had been carried out; therefore, proper data were not easily accessible. This constraint may have impaired the research that was mainly after valid and current data. It was overcome by using estimates from existing records and responses after thorough data crosschecking for validity and reliability.

1.9 Assumptions of the Study

During the study, investigative framework assumptions were based on the following;

- 1) that the selected sample was representative of the entire research population;

- 2) that data collection instruments had validity and gave an accurate measure of constructs;
- 3) that survey respondents honestly and truthfully answered survey questions exhaustively;
- 4) that prospective survey respondents cooperated with the research team;
- 5) that the relevant documents were available and accessible to researchers for secondary data collection.

1.10 Definitions of Significant Terms

The section contained definitions of significant terms that may have been unique in this field of inquiry or that might not be easily understood by the general reader.

Agricultural Land

For the purpose of this research, agricultural land was operationally defined as all land, which was used for purposes for agriculture that was the growing of crops and/or rearing of livestock for food production and subsistence, but not being land, which, under any law relating to town and country planning was proposed for use for purposes other than agriculture.

Cluster

A cluster is the primary sampling unit under the sampling frame from which the researcher obtained district and divisional representative farm household survey samples.

This was because cluster-sample frame was the mode of determining the number and locations of representative survey respondents for interviews.

Cluster Sample

When the population was divided into groups (clusters) with a subset of the groups chosen as a sample. After groups are chosen, all or a sample of individuals in each group are chosen for inclusion in the study.

Farm Household

A person or a group of people living in a unit of land holding carrying out the business of farming, answerable to the same household head and sharing common source of food and/or income. Domestic servants and other workers residing with the family members are included as farm household members.

Household Head

The household head was the senior-most member of the household who made key decisions in the household and whose authority was acknowledged by other members.

Land

Land referred to the soil, the subsoil, any sub-terrenean deposits beneath it, any body of water wholly contained within or beneath any land and the airspace immediately above it (Wafula, 2003:7). Land for this research was a unit of earth surface used for agricultural production.

Land Development

Land development included any measures aimed at, or likely to have the effect of, commencing, establishing or maintaining improvements on land. For the study, land development was any measure of land use aimed at supporting the growing crops and

rearing of livestock for increasing food productivity. It included land use management practices and other issues of land management.

Land Holding

Land holding is defined as all the land owned and/or operated by a household regardless of the ownership status of the land for growing of food crops and/or rearing of livestock to sustain human life.

Population

Population is the people who lived in an area, a city, a country etc. The population for this study is defined as all adult farmers above 18 years of age who grew cash crops for commercial and subsistence crops for household food security and/or rear livestock for sustenance during the sampling period.

Respondent

A respondent is a member of the household who provided household information to the interviewer. For this survey, respondent was an individual who participated in the study process by providing information using an instrument provided by the evaluator. The head of the household or any other adult contributor to the household food security provided responses to sensitive issues such as land use management, and sustainable household food security. Any adult respondent was provided responses to other routine issues provided he/she would have accurate information and was above 18 years of age.

1.11 Organization of Chapters

This research project report was organised into five chapters as follows:

Chapter One is on the introduction that gave an overview of the background of the study, statement of the problem, research objectives, research questions, significance of the study, delimitations and limitations, assumptions and the definitions of significant terms in that order. The introduction chapter contained general statements about the need for the study using illustrations and quotes to describe the factors that motivated the researcher to carry out this study.

Chapter Two shows what previous researchers have discovered. It contains the information on the relevant literature reviewed and a conceptual framework analysis illustrating diagrammatically variable relationships. It was structured into two subsections; first literature reviewed that shows what previous researchers had found out in this area of study. The literature review cited similar areas of study or studies and last, the conceptual framework analysis that led up to this research.

Chapter Three describes research methodology and plan. It explains the research design for the study, target population, sampling frame and sample size, methods of data collection and instruments, data processing and analysis, reporting procedures and information dissemination.

Chapter Four is the descriptive statistical data analysis, presentation and interpretation of the study findings. It contained important descriptive statistics of the sample and the analysis plan as laid out in Chapter Three. It also presented the interpretation of findings and discussion. Each research question had been addressed individually.

Chapter Five contains information on detailed summary of findings of what was done and found out, conclusions, recommendations and suggested areas of further research. Conclusions key findings and recommendations are the actions researcher put forward to policy makers, planners, researchers and other development stakeholders based upon the data findings.

1.12 Summary

This is a study of the linkages of land use management and sustainable household food security in Rongo District, seeking to examine the present state and the linkages of land use management and household food security. The district was having a problem of inappropriate linkages of land use management and household food security. Hence, this study was to provide insights into sustainable solutions geared towards improving land use management and household food security situation. It is to benefit farmers, researchers, development practitioners, academicians, planners and other stakeholders.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This Chapter contains the relevant literature reviewed and conceptual framework, structured into two sections; first the literature reviewed that show what previous researchers have found out in this area of study and last, the conceptual framework analysis of the linkages of land use management and sustainable household food security, illustrated diagrammatically in Figure 2-1. The scope of the literature review and research was the last twenty-five years (1984-2009).

2.2 Land Use Management

This is an overview of the relevant literature reviewed describing, summarizing, evaluating, clarifying, critiquing and/or integrating views of other researchers' findings in relation to land use management. The aim was to identify what linkages may have existed about these components of land use management in relation to household food security. Review under land use management focused on land use management and its sub-variables the land tenure systems, land use planning, land use and land reforms and their respective relationships with sustainable household food security.

Heffernan, W.D and Green, G.P (1986) observed that a growing body of literature had linked the increasing concentration of agricultural production to severe ecological problems. The most prevalent argument had been that large-scale farmers were less concerned about the environment and therefore less likely than small-scale farmers to employ environmentally sound methods and practices of land use management. The loss

of society's soil resources was perhaps more likely than any other single-factor to threaten the sustainability of agricultural production leading to food insecurity.

From their argument, it may be possible to believe small-scale farmers had a concern for practicing land use management. This provided a good ground for small-scale farmers in Rongo District to be engaged in land use management for household food security through the results of this research.

Land tenure systems in Kenya fell into three broad categories, that was, communal or customary land tenure; private or individual land and public or state land (LPE, 2004:18). Changes in land tenure systems may be crucial in determining agricultural productivity. The land ownership patterns may dictate production trends and level of resource investment in any land holding. Many farm households in rural Kenya depended on crop and livestock productions for food and income. For this reason, this study on land use management was inseparable with its sub-factor land tenure systems.

FAO reported that land degradation had been exacerbated where there had been: an absence of any land use planning; lack of its orderly execution; the existence of financial or legal incentives that had led to the wrong land use decisions and one-sided central planning leading to over-utilization of the land resources - for instance for immediate production at all costs.

Therefore, the result had often been misery for large segments of the local population and destruction of valuable ecosystems. Such narrow approaches may have needed replacement by a technique for the planning and management of land resources that was

integrated and holistic and where land users were central. This ensured the long-term quality of the land for human use, the prevention or resolution of social conflicts related to land use, and the conservation of ecosystems of high biodiversity value.

The effects of human activity were visible throughout the biosphere. Rapid human population growth, combined with increasing resource consumption, had resulted in the widespread transformation of the Earth's land cover. Land was used to grow crops, manage livestock, conserve biodiversity and house families. These worldwide changes in land cover may have had profound impacts on environmental systems around the globe – including the linkages between land, water, air and food security. SAGE scientists were working to document the patterns of land use and land cover change across the world (SAGE: 2009).

Scientists now recognized that land use management was an important driver of worldwide environmental change. However, how the land had been *changing*, or *why*? We still did not know exactly. As a first step, we needed to document the current land use management practices across the globe, and estimated how these patterns had changed through recent history (SAGE: 2009).

Relatively, however, the case of the central highlands of Kenya indicated that it was possible to overcome widespread poverty and land degradation. Replication of successful land use and land management strategies in other areas may be possible or adaptation to different environments. Although the agricultural options available to some communities were limited by physical and climatic conditions, many opportunities

existed to improve livelihoods and promote sustainable use of natural resources through changes in land use management (IFPRI).

According to the same IFPRI study, this successful pattern of productive and sustainable agricultural development in the central highlands of Kenya, however, was the exception, not the rule. Success stories in the East African highlands were rare, and poverty and resource degradation were the norm. Worse yet, the growing trend were a downward spiral of increasing population pressure and land degradation, declining agricultural production, and entrenched poverty. Land degradation problems, such as soil erosion, nutrient depletion, and poor vegetative cover, were not only widespread, but they were also increasing. Studies showed that much of the land degradation in the Kenyan highlands was due to poor land use management practices. Unlike the relatively wealthy farmers of central Kenya, the poor invest little in soil management. Poor farmers also had fewer opportunities to obtain information and learn about appropriate technologies.

Although appropriate land management strategies were key to reducing poverty and land degradation in the highlands of Kenya, these strategies were not narrow or rigid pathways to development. Agricultural technologies should be adapted for local use, and farmers should consider various land use options, including diversification. The pattern of intensification practiced in the central highlands, for example, was characterized by diversification, rather than specialization. In the smallholder highlands, the intensifying systems are often characterized by several commercial enterprises. With the right set of policies, targeted for specific situations, hunger, poverty and environmental degradation can be reduced (IFPRI).

In contribution to the above, this study as well investigated how land use management changes modified complex earth processes at local scales and their impact on sustainable household food security.

Previous research observed that the increasing human population had led to a rising demand for food and intensified crop and livestock activities. This had put excessive pressure on land, which had resulted in rapid soil degradation, and declining fertility. The result was reduced productivity of land and if allowed to continue would have resulted in severe food shortages (Maobe *et al*, 2000: 110). This revealed a gap may have existed that facilitated reduced productivity of land with the outcome of food shortages at household level.

Whereas in dry areas, research had shown that, there were many other promising opportunities to increase agricultural production and household incomes, while practicing sustainable use of natural resources. Some of the strategies that are particularly profitable include soil and water conservation measures, planting trees, small livestock production, development of non-farm activities, and improved management of community resources. Farmers in drought-prone areas do best when they focus on soil and water conservation measures, such as construction of stone terraces, reduced tillage and burning, and increased use of manure and compost. By conserving soil moisture, these land use management practices significantly increase crop production, while slowing down land degradation (IFPRI).

Wafula (2003) noted that the Government was committed to agriculture and rural development that provided linkage with industrialization strategy and the development of

infrastructure and other sectors. This was important because Kenya was predominantly rural and an agricultural economy. Hence, land use management practices must have been streamlined in trying to maximize output from land. Best rural land management had secure food supply, increased income and created a favorable environment for better living standards.

Similarly, land being Kenya's primary resource and the basis of livelihood for the people, should be held, used and managed in a manner which was equitable, efficient, productive and sustainable (Wafula, 2003:7).

Currently, research on land use management for sustainable food security had focused on policy approaches, soil management, land use and land cover change to understand land use management and little research had been done on the contribution of land use management on sustainable household food security.

Land Reforms aim at altering the system of right to the use of farming land in such a way as to achieve the most efficient utilization of agricultural resources for security improvement. Kenya had pursued a Land Tenure Reform Policy aimed at changing customary land tenure to modern law ownership of land by individuals. The Land Tenure Reform Legislation provided for registration of land titles in the name of the head of the family; such heads were usually men. In an agrarian economy such as that of Kenya, arable land was the most valuable form of property, for its economic as well as its political and symbolic importance. It was a productive, wealth creating and livelihood-sustaining asset. For many, land provided a sense of identity and rootedness within the village and in people's minds land had a durability and permanence which no other asset

possesses. In the last twenty-five years, meaningful land reforms had not been carried out. This had encouraged the culture of land grabbing by the advantaged and elites in the society, the results of which were felt everywhere across all sectors of the economy and included inter-and intra-clan conflicts over land disputes related to ownership and land use.

1.3 Household Food Security

The factors of sustainable household food security included consistent food availability, food access, food stability, food equity and food quality.

Despite many years of research effort to improve crop and livestock output, farmers in western Kenya were still unable to produce adequate food for subsistence and for sale. Several factors had contributed to this, among them population growth, land fragmentation, continuous cropping, fragile and erodable soils, poor soil management practices and unguided land use management practices (Mbugua, *et al.*, 1996:78).

Improvements in agricultural productivity aimed at small-scale farmers may benefit the rural poor first. Increased agricultural productivity enables farmers to grow more food, which translated into better diets and, under market conditions that offered a level playing field, into higher farm incomes. With more money, farmers were more likely to diversify production and grow higher-value crops, benefiting not only themselves but the economy as a whole.

1.4 Agricultural Policy

The agricultural policy in this context focused on the linkages of *NALEP*, *NASEP*, *NFNP* and *the SRA 2004-2014* and sustainable household food security.

Agricultural policies consisted of government decisions that influenced the level and stability of input and output prices, public investments affecting agricultural production, costs and revenues and allocation of resources. These policies affect agriculture either directly or indirectly. Agricultural policy in Kenya revolved around the main goals of increasing productivity and income growth, especially for smallholders; enhanced food security and equity, emphasis on irrigation to introduce stability in agricultural output, commercialisation and intensification of production especially among small-scale farmers; appropriate and participatory policy formulation and environmental sustainability (Alila, P.O. and Atieno R., 2006:3).

Nyagito (1998) argued that agricultural policies in Kenya since independence had varied from direct government controls of and participation in agricultural production, marketing, and investment to liberalised ones whereby market forces as well as private individuals or organisations played an important role. The first set of policies initially led to rapid agricultural growth but later problems encountered due to inefficiencies of the policies. As a result, policy reforms geared towards a liberalised market economy were introduced in the 1980s. Although the policies cover most or all activities in the sector, the implementation had not been comprehensive, and or where full implementation had occurred, the period was too short to allow for a complete analysis of the impact.

A focus on agricultural policy also readily brought to mind other contextual factors not addressed in the analysis such as natural resource base including arable land, grassland, water, climate, etc, environmental degradation through soil erosion and deforestation and a rural economy with an enduring subsistence sub-sector.

Staudt (1985) revealed that most Kenyans depended on agriculture and cattle for their livelihood. Through policy the government aimed to supply information, inputs and incentives, the Ministry of Agriculture relied on for reaching agricultural extension. The overall purpose of agricultural policy was to improve yields of cash crops and food crops and thereby secured national self-sufficiency, more exchange earnings from export crops and improved livelihoods of rural people.

As well, Njuguna E.M and Andima D. (1996) in their study concurred that the overall agricultural policy thrust was first to; achieve internal food self-sufficiency; maintained adequate levels of strategic reserves and generated additional supplies for export. This policy thrust also contributed towards the attainment of the national objectives of employment, income, rural-urban balance, food security and overall growth (National Development Plans 1989-93).

Policy and legislative reform challenges influencing the existence of chronic rural poverty, despite abundant natural resource wealth, had created a sense of urgency for improving the productivity and competitiveness of agricultural sector in Kenya, specially the small-scale farmers not easily reached by public and private services.

On the contrary, larger-Scale farmers felt the extension agents had nothing to offer. Research stations claimed to have had many new technologies "on the shelf," that were not being adopted by the farmers. Experience had shown that no single extension model was universally relevant, and situation-specific models needed to be developed. Challenge was looking for innovative ways of passing these technologies efficiently and effectively to farmers, ensuring that farmers receive relevant information while avoiding past mistakes.

In order to address the above stated problems and to guide and develop the production of food to meet the country's requirements, the government had over the years formulated a series of agricultural policies which addressed various aspects in the agricultural sector, the main goals being self - sustenance, growth, employment and diversification (Republic of Kenya 1984a, 1986, 1989a, 1994).

Land was a significant factor in the household food security equation. Therefore, supportive agricultural policies and agricultural laws recognizing this critical links between land use management definitely influenced their ability to contribute to sustainable household food security.

From a review of the Agriculture Act CAP 318, it was observed that legal and legislative reforms had not yielded any tangible changes. For example, the Agriculture Act had remained static with colonial and outdated clauses that may not have been relevant to the present food production trends and demand. Without doubt, it lacked a clear legal framework for enhancing mutual land use management and household food security linkages.

In 2001, as a strategy to responding to agricultural challenges, the Ministry of Agriculture and Rural Development formulated the National Agricultural Extension Policy (NEAP) to guide improvements in delivery of extension services. The NEAP recognized the need to diversify, decentralize and strengthen the provision of extension services to increase their sustainability and relevance to farmers. The NEAP was meant to form the basis for all extension work within the government and in its interaction with other stakeholders in agricultural research and development.

To operationalize the NEAP, the ministry prepared a National Agricultural and Livestock Extension Programme (NALEP) and NALEP Implementation Framework. The policy and the Implementation Framework (IF) had since then been criticized on the grounds they lacked clarity on who is responsible for specific aspects particularly for initiating and coordinating linkages with other stakeholders (Republic of Kenya 2005c). The policy also was ambiguous on the specific roles of various actors in extension provision and particularly failed to specify how the private sector would have been encouraged to play a stronger role in extension (Nyoro, 2006:4-5).

NASEP was a successor policy to NALEP. The same policy lacked clarity and diversity of content. These successive policies had concentrated on agricultural extension improvement and delivery but continued to ignore the basic factors of production.

Maize and beans were the main staple food commodities in the country and therefore important for food security. A National Food and Nutrition Policy and the ability to meet the country's food security needs were therefore a major concern with respect to maize,

beans and other essential food security crops. The majority of Kenyans were food insecure due to inadequate strategic reserves in major food commodities, and lack of proper distribution systems that facilitated the efficient movement of food commodities from surplus to deficit areas. Majority had limited access to adequate quantities of food, and even what they had access to, was of poor nutritional value.

Together with this, the Government policy on nutrition and food security aimed at increasing and diversifying food production at the household level (Republic of Kenya, 1989a:22).

Nyoro (2006) criticized the policy geared towards attainment of self-sufficiency but with limitations to Maize, Wheat and Rice. It was biased towards producers and discriminate consumers and had limited consideration to urban poor and rural landless. Further, it was geared towards more high potential areas and towards crops with no consideration for livestock production.

The researcher concurred with the above author and failed to notice in the policy document any factors of production such as land, by extension, land use management taken into account to contribute to improving national food and nutrition security status.

The overriding objective of the SRA was to achieve a progressive reduction in unemployment and poverty. The primary objective of the strategy was to provide a policy and institutional environment that was conducive to increasing agricultural productivity, promoting investment, and encouraging private sector involvement in agricultural enterprises and agribusiness. Important for this environment was the creation of a legal

and regulatory framework that was fair to all farmers, producers, processors and marketers of agro products. Among the objectives of the institutional reform agenda set out in the SRA were: increasing productivity to lower per unit costs of production, improved the extension service system, improved the link between research, extension and the farmer, improved access to financial services, encouraged growth of agribusiness, reduced taxation of agriculture, increased market orientation and improved the regulatory framework. However, the SRA was quite silent on land use management, which forms the base of all agricultural and non-agricultural production activities. Hence, this was a clear indication of a wide gap not included in the current agricultural policy, making it suitable for investigation to determine how best it links with agricultural production for household food security improvement.

The objectives and policy concerns among policy makers could be discussed in terms of whether they were consistent with what were outlined in the SRA 2004-2014. These were the areas of concern for the development of agricultural sector in terms of boosting agricultural productivity and incomes, and ensuring food security, irrigation farming and enhancing diversification into non-traditional commodities.

2.5 Land Policy

Literature review on previous researchers' findings on land policy concentrated on one legislative and two policy frameworks; the national land policy and land use policy. These factors as with agricultural policy may moderate influences of land use management and sustainable household food security.

It was observed that land management and administration in Kenya was governed by several statutes without a comprehensive guiding policy instrument, among them the are Land Act, Land Control Act, Land Adjudication Act, Trust Lands Act and Physical Planning Act. Implementation of these laws had often been contradicting and discriminatory to the farming community, landless and marginalized groups (LPE 2004:49).

In this state of affairs and with respect to sustainable household food security, there was bound to be a gap in land use management with a potential negative impact on agricultural production, hence contradicting land laws remain a threat to sustainable household food security.

Kenya does not have a comprehensive National Land Policy and hence important issues such as land administration, access to land, land use planning, restitution of historical injustices, the institutional framework, land information management systems, environmental concerns, household food security, conflict/dispute resolution, public land allocation and the informal sector were usually inadequately addressed (LPE 2004:23).

The Kenyan National Land Policy was still on the formulation process. The First National Stakeholders' Workshop on the National Land Policy Formulation Process was held on 10-11 February 2004. The overall objective of this National Land Policy was to provide for sustainable growth, investment and the reduction of poverty. The specific objectives are to develop a framework policy and law designed to ensure the maintenance of a system of land administration and management that will provide:

- a) all citizens, particularly the poor, with the opportunity to access and beneficially occupy and use land;
- b) the economic, socially equitable and environmentally sustainable allocation and use of land;
- c) the efficient, effective and economical operation of the land market; and
- d) appropriate regulatory arrangements for the productive, sustainable use and equitable distribution of land (LPE 2004:23-24).

With these observations, land use management factors may just be operating at the mercy of God. This was a sad state of affair to realize now that our country that had been independent for over 45 years was developing a National Land Policy at this time to facilitate occupation and use of land; allocation and use of land, operations of land markets, enhance sustainable use and equitable distribution of land according to the above objectives. Unfortunately, this proposed National Land Policy was silent on its linkages with household food security. At the same time, land in Kenya was already occupied and under various controlled and uncontrolled uses. This leaves one wondering what this National Land Policy helped as we were already in total land mess, in terms of land use. As a corrective measure, an investigation into the linkages of National Land Policy and sustainable household food security yielded some viable way forward.

The absence of a clearly defined National Land Policy in Kenya after many years of independence had resulted in a haphazard approach to land administration and management issues. In addition, these issues continue to be addressed through complex

and outdated legal frameworks that have done little to unravel the land use and ownership question (LRTU, 2004:1).

There are inter-connected factors accelerating poor land use management and food insecurity. Such included lack of coherent land policy to guide on proper land use management and practices for sustainable food productivity, presence of environmental degradation possibly related to unguided land use management and the prevalence of perennial annual food deficits, as reported in successive District Agriculture Annual Reports 2000-2007.

Land Use Policy and National Land Policy were different policies as defined and applied (see operational definitions 3.7.4 b, c). Like with national land policy, lack of a comprehensive land use policy had over time led to difficulties of access and utilisation of land. The country lacks a clearly articulated land use policy with the result that issues like land use, management, tenure reforms and environmental protection were often inadequately addressed through the existing systems. Land was an important resource in agriculture in Kenya and lack of access to or ownership of land was considered one of the major causes of poverty. The scarcity of agricultural land makes the issue of land use policy a critical one. Only less than 20% of the country's land surface was high and medium potential. The PRSP identifies the improvement of land use management as one of the ways of improving agriculture and food security.

Issues on land that are relevant to agricultural development include conflicts between different land uses due to the lack of a coordinating body that ensured harmony between different users (Republic of Kenya 1994). Harmonization of different development

activities that fostered optimal land use and control of environmental degradation remained a critical issue.

In Kenya, land use information, agricultural policies and land policies may have existed mostly in paper form with little practical implementation as may be evidenced by a lack of record of accomplishment of achievement both physical and documentary. This made it inefficient, time consuming and cannot support timely decision making about land use management that can secure a sustainable household food security. In addition, Kenya lacks an up to date inventory of the amount of land under different uses such as forests, water and infrastructure among others. Lack of this vital information complicated effective land use planning, zoning and overall land use management of both urban and rural land.

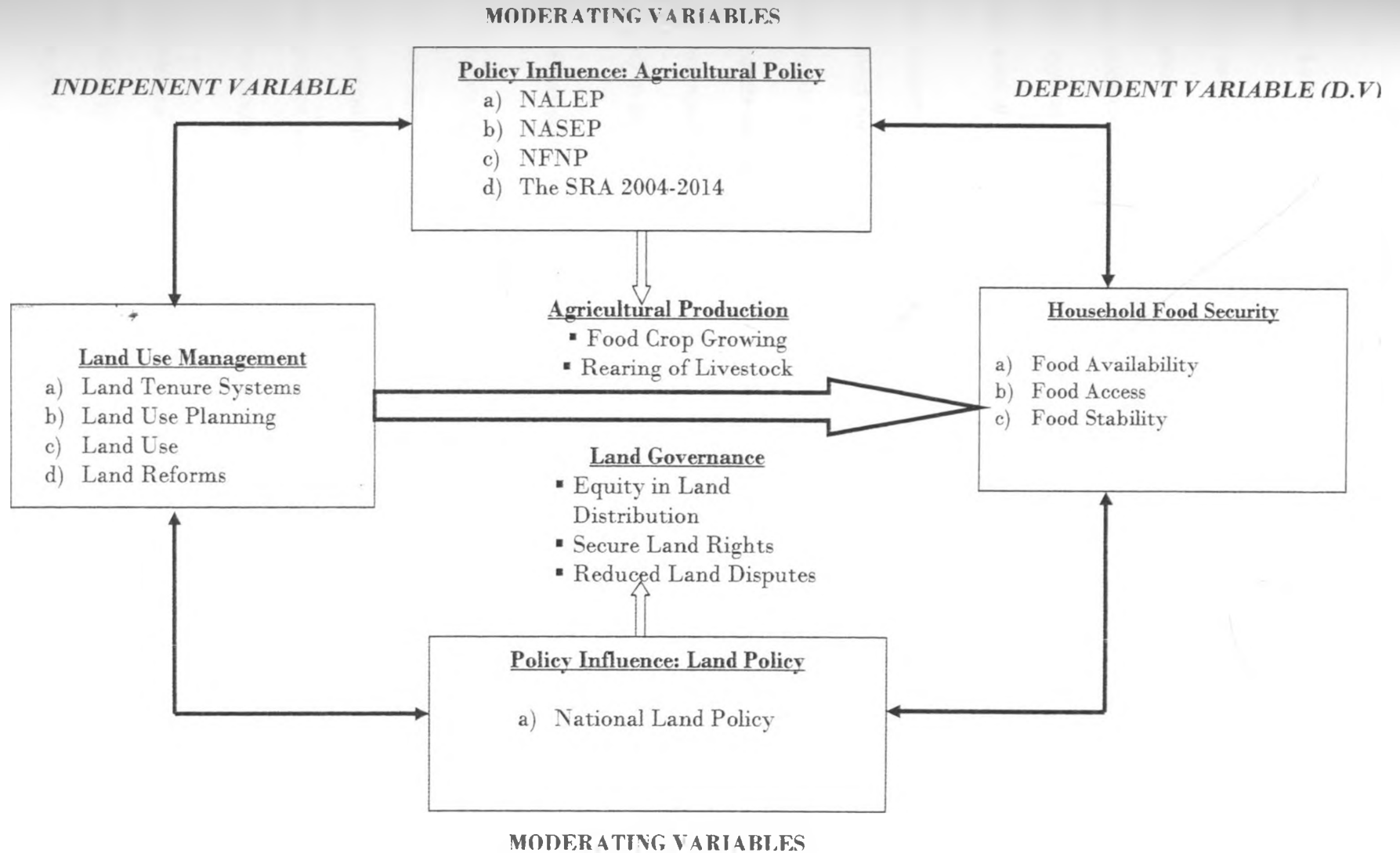
Finally, agricultural production aimed at averting household food insecurity critically depended on suitable climate and soil conditions, as well as direct human management. For this reason and from the findings of the researchers above, the researcher got motivated and convinced to carried out this study on the linkages of land use management and sustainable household food security in Rongo District to add to filling up missing gaps that made the district experience yearly food deficits and enhanced sustainable development. This led to the conceptualization of this research project as analysed in the next section.

2.6 A Conceptual Framework Analysis

From the above document review and literature analysis, this research project started from an idea in the mind of the researcher after a thorough examination and evaluation of previous studies. The idea had come from research done by others and previous reports on land use management and household food security. A cross-sectional overview of this conceptual framework illustrated underlying variable relationships and their terminology as was used in the research.

The linkages between land use management and household food security conceptualised at a general level, depicted in *Figure 1*, as a two-stage relationship where a set of basic causal factors namely; land use management factors may have influenced agricultural productivity with the outcome being sustainable household food security or food insecurity.

Figure 1: A Conceptual Framework Analysis



a) Land Use Management

Land use management factors may be the basic causal factors that influenced changes in household food security. Land use management factors were diverse, but for purposes of this research, the factors on focus were on *land tenure systems, land use planning and land reforms*. In this study, therefore, land use management and its factors were the *independent variable (I.V)* and the sub-variables respectively.

As foreseen, these land use management factors may have had influence on sustainable household food security in terms of enhancing agricultural productivity that resulted in sustainable household food security (*the food availability, food access, food stability, food equity and food quality*). Hence, this motivated the researcher to determine how land use management and its factors influenced changes in sustainable household food security in the study area.

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b) Household Food Security

Sustainable household food security may have been the ultimate outcome of effective and efficient land use management. It may also have been a direct influence on land use management through the necessity for increasing agricultural productivity from better management of land resources. Agricultural productivity was an intermediate effect between land use management and sustainable household food security.

The outcome of effective and efficient land use management was sustainable household food security. This was achieved when enhanced consistency in *food availability, food access, food stability, food equity and food quality* was realised. In this study, sustainable

household food security was the outcome variable. It was the dependent variable (D.V) of which changed in the independent variable (I.V) will affect.

Apparently, the conception of this study was seeking to examine the present state and the linkages of land use management and sustainable household food security in the researcher's view was the best alternative option to generating knowledge and information to inform policy and for decision-making.

e) Policy Influence

A set of influencing or moderating factors, which are, agricultural policy and land policy may play a catalytic role of influencing both land use management and sustainable household food security at the same time as illustrated in the diagram in *Figure 1*. In the last twenty-five years, an identical agricultural policy and law or land policy and law changes and/or their application in land use management and on enhancing sustainable household food security may have led to different outcomes. Therefore, the role and linkages of these moderating factors was also determined, as they were influencing factors of land use management and sustainable household food.

d) Agricultural Production and Land Governance

Land use management factors may not have had direct influence on sustainable household food security. These factors acted as catalysts to influence a series of intermediate indicators; food crop and livestock productions with the intermediate effects of either increased or reduced agricultural productivity, which in turn determines the outcome in terms of changes in sustainable household food security status.

Similarly, improved land governance, which was, equity in land distribution, secure land rights and reduced land disputes may also resulted from effective land laws and land policies as intermediate factors in between land use management and sustainable household food security.

On the other hand, the need for sustainable household food security may trigger policy, legal and legislative formulations linked to improvements on land use management. Hence, there may be a mutual relationship between land use management and sustainable household food security, as they appear to be inter-dependent variables, as shown by the bi-directional arrow in conceptual framework *Figure 1*.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

Chapter Three describes research methodology and plan. It explains the research design used for the study, target population, sampling frame and sample size, methods of data collection and instruments, data processing and analysis, reporting procedures and information dissemination.

3.2 Research Design

The research is a cross-sectional survey study that used mixed mode approach for collecting qualitative and quantitative secondary and primary data from clustered farm households. Data collection instruments included document analysis, face-to-face in-depth FGDs interviews using survey questionnaires, participant observation, field visits and focused group discussions with organised cluster groups. Detailed data collection was through open-ended survey questions that provided direct quotations of survey respondents. The interviewer integrated into the investigation as an active participant.

The selection of this research design had a basis on researchers' long debate on the relative value of qualitative and quantitative inquiry (Patton, 1990). This design was a phenomenological inquiry, which used a naturalistic approach that sought to understand phenomena in context-specific settings. This represented a fundamentally different inquiry paradigm, and researcher actions were based on the underlying assumptions of

the research paradigm. It employed both qualitative and quantitative methods that probed for deeper understanding rather than just examining surface features and facts.

In support also was Strauss and Corbin (1990) claim that qualitative methods used to, better understand any phenomenon about which little was yet known. They helped to gain more in-depth information that may have been difficult to convey quantitatively. Thus, this qualitative method was appropriate in this study where the researcher needed to first identify the variables for quantitative testing, or where the researcher was determined that quantitative measures cannot adequately describe or interpret this situation. Research problems framing were as open-ended questions that supported discovery of new knowledge.

3.3 Target Population

A total population of 3000 farm households' mainly small-scale farmers residing in all the four divisions in Rongo District was represented in the study.

3.4 The Study Area

Rongo District is one of the districts forming Nyanza Province. It borders Homa-Bay District to the North and North West, Kisii South and Gucha South to the East, Transmara to the South East and Migori to the South and South West. The district covers a total land area of 842.0 km² out of which 734.0 km² is arable land. The district consists of 5 main Agro-Ecological Zones -Upper Medium (UM1 -56 km²); Upper Medium (UM2-3 -122 km²); Lower Medium (LM1 -184 km²); Lower Medium (LM2 -258 km²) and Lower Medium (LM3 -114 km²).

It receives an average rainfall of 1200-1800 mm per annum with 60% reliability. Long rains fall in February-May (600-1000 mm), and short rains September-December (350-700 mm), the mean temperature range of 19.9⁰C–22.7⁰C. The altitude ranges from 1450-1700 metres above sea level with an undulating landscape. The soils range from fertile to moderately fertile (Sandy Loams – Clay Loams).

The district is divided into four Administrative Divisions (Oyani, Uriri, Rongo and Awendo Divisions), 17 Locations and 54 Sub-Locations. It has a population of 291771 persons with a percentage growth rate of 2.7% per annum and 51399 households according to 1999 Population and Housing Census. The average farm size is 2.0 hectares. Politically it is represented by two constituencies, namely; Rongo and Uriri constituencies.

The main land use activities included growing of major food crops such as maize, beans, cassava and sweet potatoes. The major cash crops are sugar-cane, tobacco and pineapples. Tea is grown to a small extent. Coffee production collapsed in the early nineteen ninety (1990). Main horticultural crops grown are kales and tomatoes. Sorghum, finger-millet, green-grams are grown to a small extent, however groundnuts a major food and oil crop for household cash income in the district. Livestock activities include rearing of local, zebu and dairy cows as well as goats, sheep and local poultry keeping.

3.5 Sampling Procedure and Sample Size

The study sample size was 300 farm households. Using a farm household as a unit of analysis, the survey took place in 30 randomly selected cluster groups, each represented

by 10 farm households, as representative probability sample from the larger population of 3000 farm households. The purpose of probability sampling was to allow for subsequent generalization of the research findings to the general population.

Following a listing exercise one cluster group comprising of 8-12 farm households were randomly selected in each cluster area with equal probability resulting in a total sample size of 300 farm household survey respondents in the four divisions with an average of 10 survey respondents per cluster group as in the Table below.

Table 3-5-1: Administrative Divisions and Cluster Survey respondents

Administrative Division	Number of Sampled Clusters	Total Clusters Participants
1) Rapogi	8	80
2) Oyani	7	70
3) Awendo	7	70
4) Rongo	8	80
Total	30	300

The research used a two-stage cluster sample design. In the first stage, a representative sample of 30 cluster areas were chosen; in the second stage, a representative sample of 1 cluster FGD of 8-12 survey respondents *within* those cluster areas was selected through systematic sampling of households in each cluster.

Adult farmers aged above 18 years who are permanent residents of the farm households in the sample or any other representative adult (household head) present on the day and time of the survey were eligible to be interviewed in the cluster FGDs to give information.

3.6 Methods of Data Collection

Data collection was mainly in two forms – *Secondary* and *Primary*. *Secondary Data* collection included perusal of documents (document analysis) comprising government records, written reports, administrative documents, formal studies and evaluations, archival records, service records, organizational records, survey data and personal records to generate information. *Primary Data* collection involved key informant face-to-face in-depth FGDs interviews with 30 cluster FGDs, participant observations and field site visits.

3.7 Data Collection Tools/Instrumentation

Instrumentation describes the theoretical constructs that the survey was attempting to measure and tools used for data collection. The main areas where data collection was focused based on the research objectives and questions are;

- The present state of land use management in the study area.
- The relationship of land use management and household food security.
- The linkages and influences that existed between agricultural policy and agricultural law and land use management.
- The linkages and influences that existed between land policy and land law and land use management.
- Sustainable solutions for changes in land use management, policy and legislative framework are there to improve on household food security.

Data collection methods and instruments for secondary and primary data integrated three different methods included as such;

1) *Document Analysis*

The method involved perusal of documents for secondary data collection comprising government records, written reports, administrative documents, formal studies and evaluations, archival records, service records, organizational records, journals, survey data and personal records to derive information.

2) *Focus Group Discussions (FGDs)*

FGDs using structured questionnaires were used to collect qualitative and quantitative data on specific farm household variables. A cluster sample of 300 adult farmers organised into 30 FGDs of 8-12 survey respondents from a population of 3000 farm households were qualitatively interviewed who were knowledgeable and experienced on land use management and policy issues through open-ended questions that allowed for individual variations. For primary data collection, one survey questionnaire organised into four sections and designed to collect data on farm household demographic characteristics; land use management; household food security and the way forward to offer sustainable solutions for informing policy were be used for primary data collection. The actual survey questionnaire is attached (*Appendix 2: Survey Questionnaire*).

3) *Participant Observation and Field Site Visits*

This method was used to gain holistic understanding of the research community and experience daily village life first-hand. It involved field site visits for personal observations. Participant observation led to deeper understandings than interviews alone, because it provided knowledge of the context in which events occur, and enabled the

researcher to see things that participants themselves were not aware of, or that they were unwilling to discuss. The researcher in this case acted as a full participant in the situation with a known identity.

3.8 Procedure and Time Frame

The field data collection commenced on June 30, 2009 and data collection undertaken for a period of 1 month starting on same date to July 30, 2009. One week prior to the actual survey a letter of transmittal and informed consent and instructions were sent out to prospective participants for briefs and preparations for face-to-face interviews with an attached questionnaire on the objectives of the survey. The data collection process and analysis began as soon as all research formalities were through.

The under listed guidelines was used to determine when to stop the data collection process. As observed by (Guba, 1978), the criteria for stopping data collection included: 1) exhaustion of resources; 2) emergence of regularities; and 3) overextension, or going too far beyond the boundaries of the research. The decision to stop sampling had taken into account the research goals, the need to achieve depth through triangulation of data sources, and the possibility of greater breadth through examination of a variety of sampling sites.

3.9 Problems and Constraints Encountered

The data collection exercise took more time than was anticipated. In some cases it was frustrating. The major difficulties encountered were:

- 1) The survey respondents to be interviewed were unavailable and some consistently claimed they had not received the notification letter and a copy of the questionnaire.
- 2) Interview dates kept on being rescheduled in order to revisit some study sites.
- 3) Some of the survey respondents could not give some information claiming that they lacked authority to divulge confidential information or if they freely volunteered information about the true picture of the situation then development assistance to the area may be reduced or not provided at all.
- 4) Another difficulty encountered was over expectation from the outcome of the research. Many anticipated it was for an immediate project initiation to contribute to solving their problems.
- 5) Other survey respondents tried to seek guidance from the researcher on what information to give to limit chances of presenting negative details that may lead to the area being ignored by development organizations.
- 6) Bureaucracy and political patronage of uncontrolled sub-division of administrative units led to the split of Rongo District in Rongo and Uriri Districts with a respective split of divisions increasing the number of administrative control unit's upto sub-location levels. This challenge was overcome by maintaining research to the greater Rongo District and its former four divisions of Rapogi, Oyani, Awendo and Rongo to maintain consistency with the previously designated geographical research area.
- 7) Finally, limitation of time and other resources available for the survey was experienced.

3.10 Validity

Validity the accuracy or trustworthiness of measurements was ensured through improving both internal and external validity. *Internal validity* - was be tested by the credibility of findings and enhanced through using four types of data triangulation: *methods triangulation*; *data triangulation*, *triangulation through multiple analysts* and *theory triangulation*. *External validity* ensuring involved balancing between internal and external validity. In order to make generalizability statements that were to apply to many contexts, the researcher included only limited aspects of each local context. Generalizability allowed a semblance of prediction and control over situations.

3.11 Reliability

Reliability Since there was no validity without reliability (and thus no credibility without dependability), a demonstration of the former was sufficient to establish the latter. One other measure that enhanced the dependability of this qualitative research was the use of an "inquiry audit," in which reviewers examined both the process and the product of the research for consistency.

3.12 Methods of Data Analysis

The processing of data results began shortly after the field data collection commenced. Completed data collection instruments were edited and data fed into computer. The data collected was entered and analyzed by simple descriptive analysis using statistical package for social scientists (SPSS Version 12) software. The software was chosen because it is the most used package for analyzing survey data. The software had the

following advantages: it was user friendly, could easily be used to analyze multi-response questions, cross section and cross tabulation; (i.e. related two or more sets of variables) and it was also used alongside Microsoft Excel and Word.

All data were entered twice (for 100 percent verification). The concurrent processing of the data enhanced data quality by eliminating potential errors in time. The processing of descriptive statistics for numeric data involved examining/editing, categorizing and cross-tabulations to reveal the relationship between the independent and dependent variables.

As data was analysed, it was tested using Pearson's Chi-square test of independence. The Chi-square test was used because of the categorical nature of data, small sample sizes and its suitability for testing if a relationship exists. The nominal explanatory and response variables were tested for statistical significance determine differences between categories and significant relationships (statistical inference) with decision-making criteria at the critical alpha of 0.05 significance level.

The data reported in a way that transforms a complex issue into one that can be understood, allowing the reader to question and examine the study and reach an understanding independent of the researcher. During the report preparation process, researcher critically examined the document looking for ways the report was incomplete before producing this final copy for dissemination. The study report was compiled in Microsoft Word and Tables formatted in Excel and presented in tables and percentages.

3.13 Operational Definitions of Variables

The operational definitions of variables in described the independent and dependent variables as well as their sub-variables as measurable indicators of the study as shown in Table 1 below. Land use management was the independent variable (I.V) and household food security the dependent variable (D.V) with a set of policy influencing moderating variables being the agricultural policy and the national land policy. Land governance and agricultural production were the intermediate effects of the variables relationship.

Table 3-12-1: Operational Definitions of Variables and Measuring Indicators

VARIABLES	VARIABLE INDICATORS	MEANS OF VERIFICATIONS/MEASURING	SURVEY RESPONDENTS	MEASUREMENT SCALE
<i>INDEPENDENT VARIABLE</i>				
1. Land Use Management	1.1 Land Tenure Systems	<ul style="list-style-type: none"> ▪ Access to and Control over Land Resources and Benefits. ▪ Lack of Access to Land Resources. 	Farm Households	Nominal
	1.2 Land Use Planning	<ul style="list-style-type: none"> ▪ Developed Land Use Plans. ▪ Lack Land Use Plans. 	Farm Households	Nominal
	1.3 Land Use	<ul style="list-style-type: none"> ▪ Food Crop Growing. ▪ Mixed Farming. ▪ Acres under Pasture Land. 	Farm Households	Nominal
	1.4 Land Reform	<ul style="list-style-type: none"> ▪ Land Tenure Changes. ▪ Land Use Changes. ▪ Land Tenure and Land Use Changes. 	Farm Households	Nominal
<i>DEPENDENT VARIABLE</i>				
2. Household Food Security	2.1 Food Availability	<ul style="list-style-type: none"> ▪ Sufficient quantity of food/food supply ▪ Household food production ▪ Food imports ▪ Food aid/assistance 	Farm Households	Nominal
	2.2 Food Access	<ul style="list-style-type: none"> ▪ Household income to purchase food ▪ Household income distribution ▪ Food prices 	Farm Households	Nominal
	2.3 Food Stability	<ul style="list-style-type: none"> ▪ Certainty of food availability ▪ Uncertainty of food availability 	Farm Households	Nominal
<i>MODERATING VARIABLES</i>				
3. Policy Influence	3.1 Agricultural Policy	<ul style="list-style-type: none"> ▪ NALEP; NASEP; NFNP; SRA Documents 	Farm Households	Nominal
	3.2 Land Policy	<ul style="list-style-type: none"> ▪ Draft National Land Policy Document 	Farm Households	Nominal

3.13.1 Land Use Management

Land Use Management means establishing or implementing any measures to regulate the use or a change in the form or function of land, and included land development. It was used in the study as the *Independent Variable (I.V)* whose presence or degree was determined the change in the dependent variable. It had its measuring indicators as follows;

a) Land Tenure Systems

Land tenure system was the “system of access to and control over land and related resources”. It defined the rules and rights which governed the appropriation, cultivation and use of natural resources on a given space or piece of land. It was not land itself that was owned, but rights and duties over it (EU, 2004). It was the right to property granted by custom and/or law, which may have included agricultural land, trees and other plants, animals and water for individual ownership and self-management to subsist.

b) Land Use Planning

Land use planning referred to the systematic assessment of physical, social, cultural and economic factors in such a way as to encourage and assist land users in selecting options that increased their productivity, were sustainable and meet the needs of society. It was necessary because there was bound to be conflict over land use in the absence of proper plans. The demands for arable land, grazing, forestry, wildlife, tourism and urban development was now greater than the land resources available (Ondieki, et al, 2006:4).

c) Land Use

Land use referred to a combination of plant cover and use of the site, for example a home compound, a garden, a water point, a road or path, cropland, fallow land, pasture, woodland or forest (Rocheleau, *et al.*, 1988:228). For this study land use was the way in

which land was used by a particular group of people within a specified area for the purposes agricultural use such as cropland, pasture land, fallow land, etc.

d) Land Reform

Land reform was any organised action designed to improve the structure of land tenure and land use. Examples are improvements of land tenure legislation; tenancy reform; consolidation of fragmented land and redistribution of land (Ngugi, *et al*, 1992:186). For our research land reform, means land tenure and land use changes, which had taken place within the period of the scope of the study (1989-2009).

3.13.2 Household Food Security

Household food security was the access by all people at all times to sufficient food of adequate quality (composition and safety) for an active and a healthy life (Maxwell and Frankenberger, 1992). In our study household food security referred to a condition in which all community residents obtained a safe, culturally acceptable, nutritionally adequate diet through a sustainable food system (food availability, food access, food stability, food equity and food quality) that maximizes community self-reliance and social justice.

Household food security was the Dependent Variable (D.V) for observation in this study whose changes were determined by the presence or degree of one or more independent variables. For food insecure households the aim was to move from gradually enhancing food security to ensuring it on a permanent basis. The measuring parameters or indicators of household food security include;

- a) **Food Availability** - achieved when sufficient quantities of food are consistently available to all individuals within. Such food was supplied through household

production, other domestic output, commercial imports, or food assistance.

- b) *Food Access* - ensured when households and all individuals within them had adequate resources to obtain appropriate foods for a nutritious diet. Access depended on income available to the household, on the distribution of income within the household, and on the price of food.
- c) *Food Stability* - the situation where there was no undue risk of losing food security.

3.13.3 Agricultural Policy

Agricultural policy described a set of laws relating to domestic agriculture and imports of foreign agricultural products. Governments usually implement agricultural policies with the goal of achieving a specific outcome in the domestic agricultural product markets. Outcomes involved, for example, a guaranteed supply level, price stability, product quality, product selection, land use or employment. As used in this study, agricultural policy referred to a set of policies for agriculture consisting of government decisions that influenced the level and stability of input and output prices, public investments affecting agricultural production, costs and revenues and allocation of resources. These policies affected agriculture either directly or indirectly. Such policies in this study included NALEP, NASEP, NFNP and SRA 2004-2014.

a) *National Agriculture And Livestock Extension Policy (NALEP)*

This was the main government extension program implemented by the Ministry of Agriculture that aimed at enhancing the contribution of agriculture and livestock to social and economic development and poverty alleviation by promoting pluralistic, efficient,

effective and demand-driven extension services to farmers and agro-pastoralists. The hypothesis behind this approach was that development agents should not do extension alone, but together with all other stakeholders in the area that could provide valuable inputs to the process in order to gain synergy effects.

b) *National Agricultural Sector Extension Policy (NASEP)*

NASEP was a similar policy that succeeded NALEP. It is regarded as a component of an agricultural policy in this study.

c) *National Food and Nutrition Policy (NFNP)*

NFNP was a government policy document for promoting access to food and improvement of nutrition status. It was aimed at enhancing access to improved food and nutrition security status of all households and to provide guidelines for food management for the socio-economic benefit of the citizens.

d) *The Strategy for Revitalization of Agriculture (SRA) 2004-2014*

The document, the *Strategy for Revitalization of Agriculture*, is a National Policy Document vis-à-vis the agricultural sector in Kenya under the auspices of the Ministry of Agriculture and the Ministry of Livestock and Fisheries Development. As a policy document or statement, it is an expression in words of facts, views and problems showing at the same time the plan of action, aims or objectives, ideals and possible solutions examined and proposed for revitalizing the agriculture sector in Kenya. As a strategy, it shows our true sense of the art of planning operations, managing the activities of all stakeholders as we ensure that human resources capacity and machinery are all placed in

favourable positions for a job we expect inevitably to perform quite well (MOA, SRA 2004-2014).

3.13.4 Land Policy

Land policy issues in this section revolve around land law, national land policy and land use policy as applied in agricultural context. These issues may have direct influence on both independent and dependent variables of this study.

a) National Land Policy

National land policy is a policy contained in texts issued by governments, and is further developed through legislation, decrees, rules and regulations governing the operation of institutions established for the purposes of land administration, the management of land rights, and land use planning (EU, 2004).

3.14 Summary

The research was a cross-sectional survey study that used mixed mode approach. A total population of 3000 farm households residing in all the four divisions in Rongo District, Kenya. The study sample size was 300 farm households. Using a farm household as a unit of analysis, the survey took place in 30 randomly selected cluster groups, each represented by 10 farm households, as representative probability sample from the larger population. *Secondary Data* collection included perusal of documents (document analysis). *Primary Data* collection involved key informant face-to-face in-depth FGDs interviews with 30 cluster FGDs, participant observations and field site visits. The field data collection was undertaken for a period of one month starting from June 30th to July

30th, 2009. Data was analysed and tested using Pearson's Chi-square test of independence with decision-making criteria at the critical alpha of 0.05 significance level. The study report was compiled in Microsoft Word and Tables formatted in Excel and presented in tables and percentages.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND INTERPRETATION

4.1 Introduction

Chapter Four is the detailed information on the characteristics of survey respondents, the descriptive statistical data presentation, analysis and interpretation of the study findings. It contains important descriptive statistics of the sample and the analysis plan as laid out in Chapter Three. It also presents the interpretation of findings of what the results mean. Each research question has been addressed individually.

4.2 Characteristics of Survey Respondents

The characteristics of survey respondents describe the background of the persons interviewed during the study period.

Table 4-1: Number of Survey respondents by Gender

Gender	Number	Percent
Female	110	36.7
Male	190	63.3
Total	300	100.0

The survey was conducted among 300 farm households (110 females and 190 males). The survey respondents were mainly small-scale farmers engaged in food crops growing and livestock rearing in a mixed farming system. Other activities included growing of subsistence crops like cassava, beans, vegetables, sweet potatoes and engaged in small businesses, brick making, social gatherings, cultural ceremonies and religious activities. They also practiced the growing of cash crops for household income such as sugar-cane, tobacco and to a very small extent tea that is usually transported for processing at Ogembo Tea Factory in Gucha. All survey respondents were adult farmers of 18 years and above of age.

4.3 Descriptive Presentation, Analysis and Interpretation of Study Findings

The descriptive presentation, analysis and interpretation of study findings focused on the presentation of data gathered. This involved reviewing the information, checking and crosschecking of information in order to establish the quality or trustworthiness of the findings, identifying the relationships and arranging the facts in order, and presenting data. The orders in which the results were presented are chronological, following the order in which the facts were obtained during investigation.

Interpretation of results contained details on how determination of what the results meant and how significant they were in the specific context to which they belonged was carried out. The interpretation of findings here ideally reflected the comments and suggestions made by members of the study population during the study sessions that were built into the use of investigative and analytical methods/tools. This helped to minimize the biases that could have crept into the interpretation of results, making sure that they were not separated from the context in which information was gathered. The analysis and interpretation concentrated on *land use management* and *household food security* with *agricultural policy* as the moderating/control.

4.3.1 The Present State of Land Use Management

The present land use management status describes the study findings on the status of land use management during the period of the study in terms of common land use management practices adopted and applied by the farm households in the district as tabulated in Table 4-2.

Table 4-2: Status of Land Use Management

Land Use Management Variable Indicators	Means of Measuring	Frequency	Percent	Percent Total
1. Land Tenure Systems	1) Lack of Access to Land Resources	90	30.0	100.0
	2) Access to and Control over Land Resources and Benefits	210	70.0	
2. Land Use Planning	1) Lack Land Use Plans	220	73.3	100.0
	2) Developed Land Use Plans	80	26.7	
3. Land Use	1) Mixed Farming – Crop and Livestock	220	73.3	100.0
	2) Food Crop Growing	80	26.7	
4. Land Reform	1) Land Tenure and Land Use Changes	190	63.3	100.0
	2) Land Use Changes	50	16.7	
	3) Land Tenure Changes	60	20.0	

Land tenure systems, which referred to access and control over land resources and benefits, the study found out that 30% of the survey respondents lacked access to land resources and only 70% had access to and control over land resources and benefits.

On land use planning and land use it was observed that 73.3% of the survey respondents lacked land use plans and 26.7% had developed land use plans while for land use activities 73.3% practiced mixed farming (the combination of food crops growing and livestock rearing) as the remaining 26.7% concentrated on food crops growing alone as their main land use practices for subsistence.

Land reform that involved changes in land use and land tenure, the study revealed that 63.3% of the farm household survey respondents believed both land tenure and land use changes were taking place and influenced by land reform measures, while 16.7% thought land reform influenced land use changes only as 20% supported it facilitated land tenure changes.

4.3.2 Relationship of Land Use Management and Household Food Security

In order to analyze and test the relationship between different land use management practices and household food security, Pearson's Chi-square test of independence were employed. This made it possible for the identification of the underlying pattern of relationship as well as the contribution of each land use management practice to household food security. The crosstabulations of data was appropriate given the number of nominal explanatory and response variables and the distribution of the dependent variables in decision involving land use management practices. The results of the crosstabulations of the four land use management parameters against five household food security variables are shown in *Tables 4-3 to 4-14* below.

Table 4-3(a): Food Availability, Land Tenure System and Agricultural Policy

				Land Tenure System		Total
				Access to and control over land resources and benefits	Lack of access to land resources	
Agricultural Policy						
Awareness and Belief on Agricultural Policy contribution to LUM & HFS	Food Availability	Food imports only	Exp. Count % of Total Std. Residual	12.0 0.0% -3.5	18.0 30.0% 2.8	30.0 30.0%
		Domestic food production and import	Exp. Count % of Total Std. Residual	16.0 40.0% 6.0	24.0 0.0% -4.9	40.0 40.0%
		Domestic food production	Exp. Count % of Total Std. Residual	12.0 0.0% -3.5	18.0 30.0% 2.8	30.0 30.0%
	Total		Exp. Count % of Total	40.0 40.0%	60.0 60.0%	100.0 100.0%
Lack of Awareness and Belief on Agricultural Policy contribution to LUM & HFS	Food Availability	Food imports only	Exp. Count % of Total Std. Residual	34.0 15.0% -0.7	6.0 5.0% 1.6	40.0 20.0%
		Domestic food production and import	Exp. Count % of Total Std. Residual	102.9 60.0% 1.7	18.2 0.5% -4.0	121.0 60.5%
		Domestic food production	Exp. Count % of Total Std. Residual	33.2 10.0% -2.3	5.9 9.5% 5.4	39.0 19.5%
	Total		Exp. Count % of Total	170.0 85.0%	30.0 15.0%	200.0 100.0%

In the *Table 4-3(a)* crosstabulation of *agricultural policy* created a three-way table in which the categories of *food availability* and *land tenure system* were further sub-divided by categories of agricultural policy. Agricultural policy was the moderating/control because it revealed how the relationship between the *food availability* and *land tenure system* changed when the effects were controlled by agricultural policy.

It was found out that the survey respondents who were aware and believed agricultural policy was related to land tenure systems as a land use management practice through enhancing access to and control over land resources and benefits were 40.0% as another 60.0% of the survey respondents confirmed of their lack of access to land resources and benefits. While on the lack of awareness of agricultural policy contribution to land tenure systems, 85.0% of farm households had access to and control over land resources and benefits with 15.0% lacking access to and control of land resources and benefits.

Table 4-3(b): Chi-Square Statistics

Agricultural Policy		Value	df	Asymp. Sig. (2-Sided)
Awareness and Belief on Agricultural Policy contribution to LUM & HFS	Pearson Chi-Square	100.000 ^a	2	.000
	Likelihood Ratio	134.602	2	.000
	Linear-by-Linear Association	.000	1	1.000
	N of Valid Cases	100		
Lack of Awareness and Belief on Agricultural Policy contribution to LUM & HFS	Pearson Chi-Square	56.978 ^b	2	.000
	Likelihood Ratio	58.474	2	.000
	Linear-by-Linear Association	8.271	1	1.000
	N of Valid Cases	200		

In the *Table 4-3(b)* of chi-square statistics, it was observed that in all agricultural policy categories, the apparent relationship between *food availability* and *land tenure system* disappeared, this was because typically, significance values were 0.000 less than 0.05 considered significant. This suggested that the apparent relationship between *food availability* and *land tenure system* was merely an artifact of the underlying relationship

between agricultural policy and land tenure system. Since there was relationship between food availability and land tenure system, the apparent relationship between food availability and land tenure system categories were actually the result of agricultural policy control.

Table 4-4(a): Food Availability, Land Use Planning and Agricultural Policy

Agricultural Policy				Land Use Planning		Total
				Developed Land Use Plans	Lacked Land Use Plans	
Awareness and Belief on Agricultural Policy contribution to LUM & HFS	Food Availability	Food imports only	Exp. Count % of Total Std. Residual	12.0 20.0% 2.3	18.0 10.0% -1.9	30.0 40.0%
		Domestic food production and import	Exp. Count % of Total Std. Residual	16.0 0.0% -4.0	24.0 40.0% 3.3	40.0 40.0%
		Domestic food production	Exp. Count % of Total Std. Residual	12.0 20.0% 2.3	18.0 10.0% -1.9	30.0 40.0%
	Total	Exp. Count % of Total	40.0 40.0%	60.0 60.0%	100.0 100.0%	
Lack of Awareness and Belief on Agricultural Policy contribution to LUM & HFS	Food Availability	Food imports only	Exp. Count % of Total Std. Residual	8.0 10.0% 4.2	32.0 10.0% -2.1	40.0 20.0%
		Domestic food production and import	Exp. Count % of Total Std. Residual	24.2 5.0% -2.9	96.8 55.5% 1.4	121.0 60.5%
		Domestic food production	Exp. Count % of Total Std. Residual	7.8 5.0% 0.8	31.2 14.5% -0.4	39.0 19.5%
	Total	Exp. Count % of Total	40.0 20.0%	160.0 80.0%	200.0 100.0%	

As indicated in *Table 4-4(a)* the crosstabulation of *food availability, land use planning and agricultural policy* as the moderating/control, revealed how the relationship between the *food availability and land use planning* categories changed when the effects were controlled. The 40.0% of survey respondents were aware and believed agricultural policy contributed to land use planning had developed of land use plans and 60.0% had lacked land use plans. Whereas for those who had lacked awareness on agricultural policy contribution to land use planning 20.0% had developed land use plans and 80.0% lacked land use plans for guiding enterprises farm planning and organization.

Table 4-4(b): Chi-Square Statistics

Agricultural Policy		Value	df	Asymp. Sig. (2-Sided)
Awareness and Belief on Agricultural Policy contribution to LUM & HFS	Pearson Chi-Square	44.444 ^a	2	.000
	Likelihood Ratio	58.221	2	.000
	Linear-by-Linear Association	.000	1	1.000
	N of Valid Cases	100		
Lack of Awareness and Belief on Agricultural Policy contribution to LUM & HFS	Pearson Chi-Square	33.691 ^b	2	.000
	Likelihood Ratio	31.292	2	.000
	Linear-by-Linear Association	7.561	1	.006
	N of Valid Cases	200		

The Table 4-4(b) chi-square statistics were 0.000 observed that in all agricultural policy categories, hence the relationship between *food availability* and *land use planning* disappeared because significance values were less than 0.05 considered significant. Therefore, it was exposed that the relationship between *food availability* and *land use planning* was also merely an artifact of the underlying relationship between agricultural policy and land use planning. Given that there was a relationship between food availability and land use planning, the apparent relationship between food availability and land use planning variables were also actually the result of agricultural policy.

Table 4-5(a): Food Availability, Land Use and Agricultural Policy

Agricultural Policy			Land Use		Total	
			Food Crop Growing	Mixed Farming		
Awareness and Belief on Agricultural Policy contribution to LUM & HFS	Food Availability	Food imports only	Exp. Count % of Total Std. Residual	12.0 20.0% 3.7	18.0 10.0% -2.4	30.0 30.0%
		Domestic food production and import	Exp. Count % of Total Std. Residual	12.0 0.0% -3.5	28.0 40.0% 2.3	40.0 40.0%
		Domestic food production	Exp. Count % of Total Std. Residual	9.0 10.0% 0.3	21.0 20.0% -0.2	30.0 30.0%
	Total	Exp. Count % of Total	30.0 30.0%	70.0 70.0%	100.0 100.0%	
Lack of Awareness and Belief on Agricultural Policy contribution to LUM & HFS	Food Availability	Food imports only	Exp. Count % of Total Std. Residual	10.0 10.0% 3.2	30.0 10.0% -1.8	40.0 20.0%
		Domestic food production and import	Exp. Count % of Total Std. Residual	30.3 10.0% -1.9	90.8 55.5% 1.1	121.0 60.5%
		Domestic food production	Exp. Count % of Total Std. Residual	9.8 5.0% 0.1	29.3 14.5% 0.0	39.0 19.5%
	Total	Exp. Count % of Total	50.0 25.0%	150.0 85.0%	200.0 100.0%	

The *Table 4-5(a)* presents a crosstabulation of *food availability, land use* categories – food crop growing and mixed farming involving crop and livestock production with *agricultural policy* as moderating/control. The study observed the association between the *food availability* and *land use* practices changed when the effects were under a agricultural policy control. For the survey respondents who were aware and believed agricultural policy contributed to land use changes, 30.0% were crop growing farm households and 70.0% practiced mixed farming. While for the category that lacked awareness on agricultural policy contribution to land use 25.0% were growing food crops and 75.0% practiced mixed farming.

Table 4-5(b): Chi-Square Statistics

Agricultural Policy		Value	df	Asymp. Sig. (2-Sided)
Awareness and Belief on Agricultural Policy contribution to LUM & HFS	Pearson Chi-Square	36.508 ^a	2	.000
	Likelihood Ratio	45.791	2	.000
	Linear-by-Linear Association	7.857	1	.005
	N of Valid Cases	100		
Lack of Awareness and Belief on Agricultural Policy contribution to LUM & HFS	Pearson Chi-Square	17.973 ^b	2	.000
	Likelihood Ratio	16.582	2	.000
	Linear-by-Linear Association	6.386	1	.012
	N of Valid Cases	200		

The observed chi-square statistics was 0.000 in all agricultural policy categories in *Table 4-5(b)*. This discovered a relationship between *food availability* and *land use* practices where the significance values were less than 0.05 measured significant. It was established that the relationship between *food availability* and *land use* practices was attributed to the causal relationship between agricultural policy and land use practices. Since there was a relationship between food availability and land use, the plain relationship between food availability and land use variables were essentially the consequence of agricultural policy control.

Table 4-6(a): Food Availability, Land Reform and Agricultural Policy

Agricultural Policy				Land Reform			
				Land Tenure Changes	Land Use Changes	Land Tenure and Land Use Changes	Total
Awareness and Belief on Agricultural Policy contribution to LUM & HFS	Food Availability	Food imports only	Exp. Count % of Total Std. Residual	3.0 0.0% -1.7	6.0 10.0% 1.6	21.0 20.0% 0.2	30.0 30.0%
		Domestic food production and import	Exp. Count % of Total Std. Residual	4.0 10.0% 3.0	8.0 0.0% -2.8	28.0 30.0% 0.4	40.0 40.0%
		Domestic food production	Exp. Count % of Total Std. Residual	3.0 0.0% -1.7	6.0 10.0% 1.6	21.0 20.0% -0.2	30.0 30.0%
	Total		Exp. Count % of Total	10.0 10.0%	20.0 20.0%	70.0 70.0%	100.0 100.0%
Lack of Awareness and Belief on Agricultural Policy contribution to LUM & HFS	Food Availability	Food imports only	Exp. Count % of Total Std. Residual	10.0 5.0% 0.0	6.0 0.0% -2.4	24.0 15.0% 1.2	40.0 20.0%
		Domestic food production and import	Exp. Count % of Total Std. Residual	30.3 15.5% 0.1	18.2 15.0% 2.8	72.6 30.0% -1.5	121.0 60.5%
		Domestic food production	Exp. Count % of Total Std. Residual	9.8 4.5% -0.2	5.9 0.0% -2.4	23.4 15.0% 1.4	39.0 19.5%
	Total		Exp. Count % of Total	50.0 25.0%	30.0 15.0%	120.0 60.0%	200.0 100.0%

The Table 4-6(a) crosstabulation of food availability, land reform and agricultural policy, the study found out that there was connection between the food availability and land reform. Land tenure and land use changes altered when the effects were under a control of agricultural policy.

On the awareness and belief on agricultural policy contribution to land reform, survey respondents who believed it was associated through land tenure changes were 10.0% and another 20.0% supported it related through land use changes and 70.0% believed the relations were through both land tenure and land use changes. The survey respondents who lacked awareness on agricultural policy contribution 25.0% it related with land reforms through land tenure changes, 15.0% through land use changes and 60.0% through both land tenure and land use changes.

Table 4-6(b): Chi-Square Statistics

Agricultural Policy		Value	df	Asymp. Sig. (2-Sided)
Awareness and Belief on Agricultural Policy contribution to LUM & HFS	Pearson Chi-Square	28.572 ^a	4	.000
	Likelihood Ratio	38.995	4	.000
	Linear-by-Linear Association	0.000	1	1.000
	N of Valid Cases	100		
Lack of Awareness and Belief on Agricultural Policy contribution to LUM & HFS	Pearson Chi-Square	25.211 ^b	4	.000
	Likelihood Ratio	35.651	4	.000
	Linear-by-Linear Association	0.032	1	.859
	N of Valid Cases	200		

The chi-square test of independence assumed the expected frequencies in the distribution were 0.05 or higher. The Table 4-6(b) of chi-test statistics indicated that 3 frequencies had expected count less than 5 hence the requirement was not satisfied in this case. This answer meant there was an incorrect application of statistics for awareness and belief on agricultural policy contribution to land reform.

The other frequency count supported a relationship between *food availability* and *land reform* for the survey respondents who had lacked awareness on agricultural policy contribution to land reform. The disappearance of land reform categories at significance values less than 0.05 measured the significance. Definitely the relationship between *food availability* and *land reforms* was attributed to the primary relationship between agricultural policy and land reform and there was a connection between food availability and land use, with the natural association between food availability and land reform variables were basically resulted from agricultural policy.

Table 4-7(a): Food Access, Land Tenure System and Agricultural Policy

Agricultural Policy				Land Tenure System		Total
				Access to and control over land resources and benefits	Lack of access to land resources	
Awareness and Belief on Agricultural Policy contribution to LUM & HFS	Food Access	Availability of Food Supplies and Household Income	Exp. Count % of Total Std. Residual	23.6 20.0% -0.7	35.4 39.0% 0.6	59.0 59.0%
		Household Income and Food Purchase	Exp. Count % of Total Std. Residual	8.4 10.0% 0.6	12.6 11.0% -0.5	21.0 21.0%
		Availability of Food Supplies	Exp. Count % of Total Std. Residual	8.0 10.0% 0.7	12.0 10.0% -0.6	20.0 20.0%
	Total		Exp. Count % of Total	40.0 40.0%	60.0 60.0%	100.0 100.0%
	Lack of Awareness and Belief on Agricultural Policy contribution to LUM & HFS	Food Access	Availability of Food Supplies and Household Income	Exp. Count % of Total Std. Residual	51.0 25.0% -0.1	9.0 5.0% 0.3
Household Income and Food Purchase			Exp. Count % of Total Std. Residual	34.0 15.0% -0.7	6.0 5.0% 1.6	40.0 20.0%
Availability of Food Supplies			Exp. Count % of Total Std. Residual	85.0 45.0% 0.5	15.0 5.0% -1.3	100.0 50.0%
Total		Exp. Count % of Total	170.0 85.0%	30.0 15.0%	200.0 100.0%	

The crosstabulation of *food access*, *land tenure system* and *agricultural policy* in the Table 4-7(a), the survey respondents supported there was independence between the *food access* and *land tenure system*. The land tenure system categories changed when controlled with agricultural policy. The survey respondents' aware and believed agricultural policy contributed to land tenure system who had access to and control over land resources and benefits were 40.0% while 60.0% had lacked access to and control over land resources and benefits.

For the category that lacked awareness on agricultural policy contribution, the independence of land tenure systems was supported 85.0% of the survey respondents had access to and control over land resources and benefits and 15.0% who had lacked access to land resources and benefits.

Table 4-7(b): Chi-Square Statistics

Agricultural Policy		Value	df	Asymp. Sig. (2-Sided)
Awareness and Belief on Agricultural Policy contribution to LUM & HFS	Pearson Chi-Square	2.257 ^a	2	.324
	Likelihood Ratio	2.250	2	.325
	Linear-by-Linear Association	2.028	1	.154
	N of Valid Cases	100		
Lack of Awareness and Belief on Agricultural Policy contribution to LUM & HFS	Pearson Chi-Square	5.229 ^b	2	.073
	Likelihood Ratio	5.013	2	.082
	Linear-by-Linear Association	1.848	1	.174
	N of Valid Cases	200		

In the table 4-7(b) of chi-test statistics indicated that the probability of the observed chi-squares were 0.324 and 0.073 higher than 0.05 (1.96) level of significance and observed frequency count greater than expected frequency count. The answer supported independence between *food access* and *land tenure system* for the survey respondents who lacked awareness on agricultural policy contribution to land reform. It was established that there was no relationship between *food access* and *land tenure system*. The reason for no relationship between agricultural policy and land tenure system means there was no connection between food access and land tenure system based on agricultural policy control.

Table 4-8(a): Food Access, Land Use Planning and Agricultural Policy

Agricultural Policy				Land Use Planning		Total
				Developed Land Use Plans	Lack of Land Use Plans	
Awareness and Belief on Agricultural Policy contribution to LUM & HFS	Food Access	Availability of Food Supplies and Household Income	Exp. Count % of Total Std. Residual	23.6 29.0% 1.1	35.4 30.0% -0.9	59.0 59.0%
		Household Income and Food Purchase	Exp. Count % of Total Std. Residual	8.4 11.0% 0.9	12.6 10.0% -0.7	21.0 21.0%
		Availability of Food Supplies	Exp. Count % of Total Std. Residual	8.0 0.0% -2.8	12.0 20.0% 2.3	20.0 20.0%
	Total		Exp. Count % of Total	40.0 40.0%	60.0 60.0%	100.0 100.0%
	Lack of Awareness and Belief on Agricultural Policy contribution to LUM & HFS	Food Access	Availability of Food Supplies and Household Income	Exp. Count % of Total Std. Residual	12.0 0.0% -3.5	48.0 30.0% 1.7
Household Income and Food Purchase			Exp. Count % of Total Std. Residual	8.0 10.0% 4.2	32.0 10.0% -2.1	40.0 20.0%
Availability of Food Supplies			Exp. Count % of Total Std. Residual	20.0 10.0% 0.0	80.0 40.0% 0.0	100.0 50.0%
Total		Exp. Count % of Total	40.0 20.0%	160.0 80.0%	200.0 100.0%	

The crosstabulation of *food access, land use planning and agricultural policy* as indicated in Table 4-8(a), the survey respondents supported there was a relationship between the *food access* and *land use planning* practices. Farm households with developed land use plans and lack of land use plans changed when the effects were controlled with agricultural policy. The survey respondents' who were aware and believed agricultural policy contributed to land use planning who had access to and control over land resources and benefits were 40.0% whereas 60.0% of them had lacked access to and control over land resources.

The category of survey respondents with lack of awareness on agricultural policy contribution to land use planning had 20.0% of the survey respondents who had access to and control over land resources and benefits and 85.0% of them had lacked access to land resources and benefits.

Table 4-8(b): Chi-Square Statistics

Agricultural Policy		Value	df	Asymp. Sig. (2-Sided)
Awareness and Belief on Agricultural Policy contribution to LUM & HFS	Pearson Chi-Square	16.734 ^a	2	.000
	Likelihood Ratio	23.763	2	.000
	Linear-by-Linear Association	11.611	1	.001
	N of Valid Cases	100		
Lack of Awareness and Belief on Agricultural Policy contribution to LUM & HFS	Pearson Chi-Square	37.500 ^b	2	.000
	Likelihood Ratio	44.629	2	.000
	Linear-by-Linear Association	5.891	1	.015
	N of Valid Cases	200		

The table 4-8(b) of chi-test statistics showed that the probability of the observed chi-squares were 0.000 in all agricultural policy less than 0.05 level of significance. This answer supported and established there was a relationship between *food access* and *land use planning* practices. The reason for the relationship between agricultural policy and land use planning means there was association between food access and land use planning with regard to agricultural policy control.

Table 4-9(a): Food Access, Land Use and Agricultural Policy

Agricultural Policy				Land Use		Total
				Food Crop Growing	Mixed Farming	
Awareness and Belief on Agricultural Policy contribution to LUM & HFS	Food Access	Availability of Food Supplies and Household Income	Exp. Count	17.7	41.3	59.0
			% of Total	10.0%	49.0%	59.0%
			Std. Residual	1.8	1.2	
	Household Income and Food Purchase	Exp. Count	6.3	14.7	21.0	
		% of Total	10.0%	11.0%	21.0%	
		Std. Residual	1.5	-1.0		
	Availability of Food Supplies	Exp. Count	6.0	14.0	20.0	
		% of Total	10.0%	10.0%	20.0%	
		Std. Residual	1.6	-1.1		
Total			Exp. Count	30.0	70.0	100.0
			% of Total	30.0%	70.0%	100.0%
Lack of Awareness and Belief on Agricultural Policy contribution to LUM & HFS	Food Access	Availability of Food Supplies and Household Income	Exp. Count	15.0	45.0	60.0
			% of Total	10.0%	20.0%	30.0%
			Std. Residual	1.3	-0.7	
	Household Income and Food Purchase	Exp. Count	10.0	30.0	40.0	
		% of Total	5.0%	15.0%	20.0%	
		Std. Residual	0.0	0.0		
	Availability of Food Supplies	Exp. Count	25.0	75.0	100.0	
		% of Total	10.0%	40.0%	50.0%	
		Std. Residual	-1.0	0.6		
Total			Exp. Count	50.0	150.0	200.0
			% of Total	25.0%	75.0%	100.0%

In the crosstab of *food access, land use* and *agricultural policy* as indicated in *Table 4-9(a)*, there were survey respondents who supported there was relationship between the *food access* and *land use* practices. The land use practices: food crops growing and mixed farming changed when the effects were controlled with agricultural policy. The number of survey respondents who were aware and believed agricultural policy contributed to land use changes and who had access to and control over land resources and benefits were 30.0% had supported relationship with crop growing while 70.0% supported association with mixed farming as land use practices.

In the category of survey respondents who had lacked awareness on agricultural policy contribution to land use, there were 25.0% survey respondents who had access to and control over land resources and benefits and another 75.0% had lacked access to land resources reported that crop growing and mixed farming were independent of agricultural policy.

Table 4-9(b): Chi-Square Statistics

Agricultural Policy		Value	df	Asymp. Sig. (2-Sided)
Awareness and Belief on Agricultural Policy contribution to LUM & HFS	Pearson Chi-Square	11.699 ^a	2	.003
	Likelihood Ratio	11.683	2	.003
	Linear-by-Linear Association	0.000	1	1.000
	N of Valid Cases	100		
Lack of Awareness and Belief on Agricultural Policy contribution to LUM & HFS	Pearson Chi-Square	3.556 ^b	2	.169
	Likelihood Ratio	3.485	2	.175
	Linear-by-Linear Association	3.491	1	.062
	N of Valid Cases	200		

In *Table 4-9(b)* chi-test statistics affirmed that the probability of 0.003 in first agricultural policy had less than 0.05 level of significance and 0.169 in the second category greater than 0.05 significance level. The first category supported the relationship between *food access* and *land use* practices and established that there was relationship. The reason for the relationship between agricultural policy and land use practices indicated there was

connection between food access and land use with regard to the first agricultural policy category.

However, in the second agricultural policy it indicated there was independence because 0.169 was greater than 0.05 significance level. It supported independence between *food access* and *land use*, hence there was no relationship. The reason for the relationship between agricultural policy and land use indicated in the first category of agricultural policy proved there was a connection between food access and land use with regard to agricultural policy whereas in the second category of agricultural policy there was no relationship at all observed.

Table 4-10(a): Food Access, Land Reform and Agricultural Policy

Agricultural Policy				Land Reform			
				Land Tenure Changes	Land Use Changes	Land Tenure and Land Use Changes	Total
Awareness and Belief on Agricultural Policy contribution to LUM & HFS	Food Access	Availability of Food Supplies and Household Income	Exp. Count % of Total Std. Residual	5.9 0.0% -2.4	11.8 10.0% -0.5	41.3 49.0% 1.2	59.0 59.0%
		Household Income and Food Purchase	Exp. Count % of Total Std. Residual	2.1 10.0% 5.5	4.2 10.0% 2.8	14.7 1.0% 3.6	21.0 21.0%
		Availability of Food Supplies	Exp. Count % of Total Std. Residual	2.0 0.0% -1.4	4.0 0.0% -2.0	14.0 20.0% 1.6	20.0 20.0%
	Total		Exp. Count % of Total	10.0 10.0%	20.0 20.0%	70.0 70.0%	100.0 100.0%
Lack of Awareness and Belief on Agricultural Policy contribution to LUM & HFS	Food Access	Availability of Food Supplies and Household Income	Exp. Count % of Total Std. Residual	15.0 5.0% -1.3	9.0 0.0% -3.0	36.0 25.0% 2.3	60.0 30.0%
		Household Income and Food Purchase	Exp. Count % of Total Std. Residual	10.0 10.0% 3.2	6.0 0.0% -2.4	24.0 10.0% -0.8	40.0 20.0%
		Availability of Food Supplies	Exp. Count % of Total Std. Residual	30.0 10.0% -1.0	15.0 15.0% 3.9	60.0 25.0% -1.3	100.0 50.0%
	Total		Exp. Count % of Total	50.0 25.0%	30.0 15.0%	120.0 60.0%	200.0 100.0%

In the *Table 4-10(a)* crosstabulation of *food access, land reform and agricultural policy*, the study found out that there was relationship between the *food access* and *land reform*. The land reform variables changed when the effects were controlled by agricultural policy.

In the first category on the awareness and belief on agricultural policy contribution to land reforms 10.0% of the survey respondents believed land reform facilitated land tenure changes, 20.0% supported it influenced land use changes and the remaining 70.0% supported both land tenure and land use changes had relationship with agricultural policy.

The second category of survey respondents who had lacked awareness on agricultural policy contribution 25.0% supported there were relations with land reforms through land tenure changes, 15.0% supported association through land use changes and 60.0% through both land tenure and land use changes.

Table 4-10(b): Chi-Square Statistics

Agricultural Policy		Value	df	Asymp. Sig. (2-Sided)
Awareness and Belief on Agricultural Policy contribution to LUM & HFS	Pearson Chi-Square	66.678 ^a	4	.000
	Likelihood Ratio	70.898	4	.000
	Linear-by-Linear Association	1.106	1	.293
	N of Valid Cases	100		
Lack of Awareness and Belief on Agricultural Policy contribution to LUM & HFS	Pearson Chi-Square	50.444 ^b	4	.000
	Likelihood Ratio	59.605	4	.000
	Linear-by-Linear Association	5.183	1	.023
	N of Valid Cases	200		

In *Table 4-10(b)* chi-test statistics confirmed that the probabilities were 0.000 in all agricultural policy categories less than 0.05 level of significance, this supported the relationship between *food access* and *land reform* and established that relationship. The relationship between agricultural policy and land reform indicated there was link between food access and land reform with regard to agricultural policy in all categories.

Table 4-11(a): Food Stability, Land Tenure System and Agricultural Policy

Agricultural Policy				Land Tenure System			
				Access to and control over land resources and benefits	Lack of access to land resources	Total	
Awareness and Belief on Agricultural Policy contribution to LUM & HFS	Food Stability	Uncertainty of Food Availability	Exp. Count % of Total Std. Residual	24.0 20.0% -0.8	36.0 40.0% -0.7	60.0 60.0%	
		Moderate Certainty of Food Availability	Exp. Count % of Total Std. Residual	4.0 0.0% -2.0	6.0 10.0% 1.6	10.0 10.0%	
		Certainty of Food Availability	Exp. Count % of Total Std. Residual	12.0 20.0% 2.3	18.0 10.0% -1.9	30.0 30.0%	
	Total		Exp. Count % of Total	40.0 40.0%	60.0 60.0%	100.0 100.0%	
	Lack of Awareness and Belief on Agricultural Policy contribution to LUM & HFS	Food Stability	Uncertainty of Food Availability	Exp. Count % of Total Std. Residual	101.1 49.5% -0.2	17.8 10.0% 0.5	119.0 59.5%
			Moderate Certainty of Food Availability	Exp. Count % of Total Std. Residual	43.4 20.5% -0.4	7.7 5.0% 0.8	51.0 25.5%
			Certainty of Food Availability	Exp. Count % of Total Std. Residual	25.5 15.0% 0.9	4.5 0.0% -2.1	30.0 15.0%
Total		Exp. Count % of Total	170.0 85.0%	30.0 15.0%	200.0 100.0%		

The crosstabulation of *food stability*, *land tenure system* and *agricultural policy* in the Table 4-11(a), the survey respondents supported relationship between the *food access* and *land tenure system*. Land tenure system variables change took place when the effects were controlled with agricultural policy. The survey respondents who were aware and believed agricultural policy contributed to land tenure system changes and who had access to and control over land resources and benefits were 40.0% while 60.0% had lacked access to and control over land resources and benefits.

The survey respondents who had lack of awareness on agricultural policy contribution's independent relations with land tenure systems, 85.0% had access to and control over land resources and benefits and 15.0% had lacked access to land resources and benefits.

Table 4-11(b): Chi-Square Statistics

Agricultural Policy		Value	df	Asymp. Sig. (2-Sided)
Awareness and Belief on Agricultural Policy contribution to LUM & HFS	Pearson Chi-Square	16.667 ^a	2	.000
	Likelihood Ratio	20.030	2	.000
	Linear-by-Linear Association	7.333	1	.007
	N of Valid Cases	100		
Lack of Awareness and Belief on Agricultural Policy contribution to LUM & HFS	Pearson Chi-Square	6.448 ^b	2	.040
	Likelihood Ratio	10.834	2	.004
	Linear-by-Linear Association	3.155	1	.076
	N of Valid Cases	200		

In the Table 4-11(b) of chi-test statistics affirmed that the probabilities of the observed chi-squares were 0.000 and 0.040 less than 0.05 level of significance and the observed frequency count in each agricultural policy row had expected count less than 5. The minimum counts were 4.00 and 4.50. The minimum frequency requirement was not satisfied. This was incorrect application of statistics.

Table 4-12(a): Food Stability, Land Use Planning and Agricultural Policy

Agricultural Policy				Land Use Planning		
				Developed Land Use Plans	Lack of Land Use Plans	Total
Awareness and Belief on Agricultural Policy contribution to LUM & HFS	Food Stability	Uncertainty of Food Availability	Exp. Count % of Total Std. Residual	24.0 20.0% -0.8	36.0 40.0% 0.7	60.0 60.0%
		Moderate Certainty of Food Availability	Exp. Count % of Total Std. Residual	4.0 10.0% 3.0	6.0 0.0% -2.4	10.0 10.0%
		Certainty of Food Availability	Exp. Count % of Total Std. Residual	12.0 10.0% -0.6	18.0 20.0% 0.5	30.0 30.0%
	Total		Exp. Count % of Total	40.0 40.0%	60.0 60.0%	100.0 100.0%
Lack of Awareness and Belief on Agricultural Policy contribution to LUM & HFS	Food Stability	Uncertainty of Food Availability	Exp. Count % of Total Std. Residual	23.8 14.5% 1.1	95.2 45.0% -0.5	119.0 59.5%
		Moderate Certainty of Food Availability	Exp. Count % of Total Std. Residual	10.2 5.5% 0.3	40.8 20.0% -0.1	51.0 25.5%
		Certainty of Food Availability	Exp. Count % of Total Std. Residual	6.0 0.0% -2.4	24.0 15.0% 1.2	30.0 15.0%
	Total		Exp. Count % of Total	40.0 20.0%	160.0 80.0%	200.0 100.0%

The crosstabulation in *Table 4-12(a)* of *food stability, land use planning and agricultural policy* presented the relationship between the *food stability* and *land use planning*. Land use planning variables changed when the effects were controlled. The 40.0% of survey respondents who were aware and believed agricultural policy contributed to land use planning had developed of land use plans and the remaining 60.0% had lacked land use plans. The second category of survey respondents who had lacked awareness on agricultural policy contribution to land use planning 20.0% had developed land use plans and 80.0% lacked land use plans.

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Table 4-12(b): Chi-Square Statistics

Agricultural Policy		Value	df	Asymp. Sig. (2-Sided)
Awareness and Belief on Agricultural Policy contribution to LUM & HFS	Pearson Chi-Square	16.667 ^a	2	.000
	Likelihood Ratio	20.030	2	.000
	Linear-by-Linear Association	0.204	1	.652
	N of Valid Cases	100		
Lack of Awareness and Belief on Agricultural Policy contribution to LUM & HFS	Pearson Chi-Square	8.999 ^b	2	.011
	Likelihood Ratio	14.816	2	.001
	Linear-by-Linear Association	7.131	1	.008
	N of Valid Cases	200		

The *Table 4-12(b)* chi-square statistics was 0.000 and 0.011 observed in all agricultural policy categories. The minimum expected frequency requirement was not satisfied in one first category because it had expected count less than 5. The minimum expected count was 4.00 therefore it was inappropriate statistics.

In the second category, the minimum frequency requirement was satisfied. The survey respondents in this category supported there was relationship between *food stability* and *land use planning*. Land use planning variables disappeared on crosstabulation because significance values were less than 0.05 measured significant. This revealed that the relationship between *food stability* and *land use planning* was the result of underlying

relationship between agricultural policy and land use planning. Since there was a relationship between food stability and land use planning, the apparent relationship between food availability and land use planning variables were also actually the result of agricultural policy control.

Table 4-13(a): Food Stability, Land Use and Agricultural Policy

Agricultural Policy				Land Use		
				Food Crops Growing	Mixed Farming	Total
Awareness and Belief on Agricultural Policy contribution to LUM & HFS	Food Stability	Uncertainty of Food Availability	Exp. Count % of Total Std. Residual	18.0 30.0% 2.8	42.0 30.0% -1.9	60.0 60.0%
		Moderate Certainty of Food Availability	Exp. Count % of Total Std. Residual	3.0 0.0% -1.7	7.0 10.0% 1.1	10.0 10.0%
		Certainty of Food Availability	Exp. Count % of Total Std. Residual	9.0 0.0% -3.0	21.0 30.0% 2.0	30.0 30.0%
	Total	Exp. Count % of Total	30.0 30.0%	70.0 70.0%	100.0 100.0%	
Lack of Awareness and Belief on Agricultural Policy contribution to LUM & HFS	Food Stability	Uncertainty of Food Availability	Exp. Count % of Total Std. Residual	29.8 14.5% -0.1	89.3 45.0% 0.1	119.0 59.5%
		Moderate Certainty of Food Availability	Exp. Count % of Total Std. Residual	12.8 10.5% 2.3	38.3 15.0% -1.3	51.0 25.5%
		Certainty of Food Availability	Exp. Count % of Total Std. Residual	7.5 0.0% -2.7	22.5 15.0% 1.6	30.0 15.0%
	Total	Exp. Count % of Total	40.0 20.0%	160.0 80.0%	200.0 100.0%	

The Table 4-13(a) crosstabulation of food stability, land use categories - crop growing and mixed crop and livestock production farming systems with agricultural policy as the moderating/control. The study observed there was a relationship between the food stability and land use practices. The land use practices variables changed when the effects were under control of the agricultural policy. The survey respondents who were aware and believed agricultural policy contributed to land use were 30.0% in support of relationship with food crops growing farm households and 70.0% practiced mixed

farming involving crop and livestock productions. The category of survey respondents who had lacked awareness on agricultural policy contribution to land use 25.0% were growing crops and 75.0% practiced mixed farming.

Table 4-13(b): Chi-Square Statistics

Agricultural Policy		Value	df	Asymp. Sig. (2-Sided)
Awareness and Belief on Agricultural Policy contribution to LUM & HFS	Pearson Chi-Square	28.571 ^a	2	.000
	Likelihood Ratio	38.995	2	.000
	Linear-by-Linear Association	25.667	1	.000
	N of Valid Cases	100		
Lack of Awareness and Belief on Agricultural Policy contribution to LUM & HFS	Pearson Chi-Square	17.143 ^b	2	.000
	Likelihood Ratio	23.667	2	.000
	Linear-by-Linear Association	2.210	1	.137
	N of Valid Cases	200		

The observed chi-square statistics was 0.000 in all agricultural policy categories in *Table 4-13(a)*. The first agricultural policy category had expected count less than 5. The minimum expected count was 3.00. The minimum requirements were not satisfied. Hence it was inappropriate statistics.

The survey respondents in the second agricultural policy category supported there was a relationship between *food stability* and *land use* practices. The variables of land use practices significance values were less than 0.05 measured significant. Therefore, the relationship between *food stability* and *land use* was attributed to the relationship between agricultural policy and land use practices. It was concluded that there was a relationship between food stability and land use practices. The plain relationship between food availability and other land use variables were essentially the result of agricultural policy moderation.

Table 4-14(a): Food Stability, Land Reform and Agricultural Policy

Agricultural Policy				Land Reform			
				Land Tenure Changes	Land Use Changes	Land Tenure and Land Use Changes	Total
Awareness and Belief on Agricultural Policy contribution to LUM & HFS	Food Stability	Uncertainty of Food Availability	Exp. Count % of Total Std. Residual	6.0 10.0% 1.6	12.0 10.0% -0.6	42.0 40.0% -0.3	60.0 60.0%
		Moderate Certainty of Food Availability	Exp. Count % of Total Std. Residual	1.0 0.0% -1.0	2.0 0.0% -1.4	7.0 10.0% 1.1	10.0 10.0%
		Certainty of Food Availability	Exp. Count % of Total Std. Residual	3.0 0.0% -1.7	6.0 10.0% 1.6	21.0 20.0% -0.2	30.0 30.0%
	Total	Exp. Count % of Total	10.0 10.0%	20.0 20.0%	70.0 70.0%	100.0 100.0%	
Lack of Awareness and Belief on Agricultural Policy contribution to LUM & HFS	Food Stability	Uncertainty of Food Availability	Exp. Count % of Total Std. Residual	29.8 5.0% -3.6	17.8 5.0% -1.9	71.4 49.5% 3.3	119.0 59.5%
		Moderate Certainty of Food Availability	Exp. Count % of Total Std. Residual	12.8 15.0% 4.8	7.7 5.0% 0.8	30.6 5.5% -3.5	51.0 25.5%
		Certainty of Food Availability	Exp. Count % of Total Std. Residual	7.5 5.0% 0.9	4.5 5.0% 2.6	18.0 5.0% -1.9	30.0 15.0%
	Total	Exp. Count % of Total	50.0 25.0%	30.0 15.0%	120.0 60.0%	200.0 100.0%	

In the Table 4-14(a) crosstabulation of food stability, land reform and agricultural policy, the study found out that there was relationship between the food stability and land reform. The land reform variables changed when the effects were controlled by agricultural policy.

In the first category on awareness and belief on agricultural policy contribution to land reforms 10.0% of the survey respondents believed it facilitated land tenure changes, 20.0% supported it influenced land use changes and the remaining 70.0% supported both land tenure and land use changes had a relationship with agricultural policy. The second category of survey respondents who lacked awareness on agricultural policy contribution 25.0% supported relations with land reforms through land tenure changes, 15.0% through land use changes and 60.0% through both land tenure and land use changes.

Table 4-14(b): Chi-Square Statistics

Agricultural Policy		Value	df	Asymp. Sig. (2-Sided)
Awareness and Belief on Agricultural Policy contribution to LUM & HFS	Pearson Chi-Square	13.095 ^a	4	.011
	Likelihood Ratio	18.065	4	.001
	Linear-by-Linear Association	1.778	1	.182
	N of Valid Cases	100		
Lack of Awareness and Belief on Agricultural Policy contribution to LUM & HFS	Pearson Chi-Square	74.958 ^b	4	.000
	Likelihood Ratio	75.475	4	.000
	Linear-by-Linear Association	41.841	1	.000
	N of Valid Cases	200		

In Table 4-14(a) chi-test statistics stated that the probabilities were 0.000 in all agricultural policy cells less than 0.05 level of significance, there were 3 frequency counts in the first row that had expected count less than 5. The minimum expected frequency count was 1.00 and frequency count in the second row had expected count less than 5. The minimum count was 4.00. The minimum frequency requirements were not satisfied. The answer to this was inappropriate statistics.

4.3.3 Policy Influence on Land Use Management and Household Food Security

This section presents the description on policy influences on land use management and household food security. The policy influences involved two policy contexts: the agricultural policy and national land policy as control variables.

Agricultural Policy

The findings of agricultural policy influences have been analysed and integrated on the presentation and analysis in sub-section 4-2-2 on the relationship of land use management and household food security above as it was used as a moderating of control variable in all the analyses.

National Land Policy

The National Land Policy was not subjected to statistical tests as it is still under formulation the process. But a qualitative description of the impact of the presence or absence of the National Land policy is what the researcher presented based on the study findings.

In the process of data collection using document analysis, it was observed that land is a key resource for the people of Kenya. It is both the basis of livelihoods for the majority of rural Kenyans and the foundations of economic development for the country (KLA, 2007:8).

Kenya has not developed and operationalised a National Land Policy or a Land Use Policy since independence for land governance and land use management. It is in the year 2004 that that the formulation process of National Land Policy was initiated and the Draft National Land Policy is still awaiting government approval prior to its implementation.

The process of formulating a National Land Policy was formally launched in early 2004, but it actually dated back to November 1999 when the Presidential Commission of Inquiry into the Land Law System of Kenya was established. The process of was also part of the on-going reforms in governance within the framework of the constitutional review process, as the people of Kenya had clearly indicated their desire to see reforms in the way land is managed as an integral part of those reforms (KLA, 2007:8).

The aim of this National Land Policy was to promote efficiency, sustainability and equity in the use of land to achieve prosperity while ensuring that it was protected for the benefit of future generations. The policy was envisaged to introduce positive reforms in the land sector that established accountable and transparent institutions for land administration

and management. Specifically, the policy was to offer a framework of policies and laws that will provide:

- a) All citizens with the opportunity to access and beneficially occupy and use land.
- b) An economically, socially equitable and environmentally sustainable allocation and use of land.
- c) The efficient and effective utilization of land and land-based resources; and
- d) Efficient and transparent land disputes resolution mechanisms.

This vital document is not yet ready for use in regulating national land use for sustainability of land resources.

These were the findings of the researcher based on the document analysis of land policy and land use management. For *land policy* and *land use management* the absence of a comprehensive National Land Policy means lack land governance systems and procedures that can facilitate effective and efficient land use management for socio-economic self-reliance. This has subjected the area to unsustainable use of land leading to declining agricultural production and productivity, hence consistent food insecurity in the district year in year out.

4.3.4 Sustainable Solutions for Changes in Land Use Management and Policy

The suggested solutions in relation to the research question four – *search for sustainable solutions for changes in land use management and policy for improvement of household food security* have been suggested under the recommendations as was observed during the study because most of them were more of recommendations for improvement on land use management, household food security and policy.

4.3.5 Emerging Issues Related to Land Use Management and Household Food Security

In the course of the study a number of issues emerged that the researcher took note of as explained herein. It was observed that widows and orphaned children were denied their property rights specially land resources and other household basics upon passing away of their spouses and parents respectively. Such cases were noted though were very minimal.

Survey respondents raised a concern over too many research studies being carried out in their area by NGOs, research institutions and other organizations but the results hardly trickle back for their benefits neither did they get any feedback of the findings.

The general view of residents on relationship of sugar cane and food crops productions cited was that the relatively wealthy persons were exploiting the poor and vulnerable farm households by persuasion to lease out land for sugar cane growing at the expense of food crops production or own cash crop farming for the general livelihood and subsistence of such households. This situation was serious but had remained a silent issue in the society. The practice contributed considerably to poverty increase in the area given that it rendered many vulnerable households agriculturally unproductive regardless of owning average parcels of land for farming.

Similarly, cash crop and food crop productions were not regulated by any policy or guidelines that provided or emphasized integration of farm enterprises leading to uncontrolled land use practices that biased food crops production for cash crops such as sugar cane and tobacco. This situation had contributed to diminished land parcels previously set aside for food crops thereby facilitating food insecurity.

Demand-driven government policy of providing agricultural extension services had proved to be a social and economic burden to resource poor small-scale farmers because of the requirement by government extension service personnel to be compensated for the transport fuel and subsistence in the course of their field work. Many farmers found it hard to cope with that obligation leading to avoidance of government extensions services at the expense of necessary skills for improved land use and agricultural production.

Issues pertaining to high cost of agricultural inputs and withdrawal of agricultural extension services featured prominently as having had direct relationship with land use management. High cost of farm inputs reduced agricultural land use as the lack of agricultural extension services had denied farmers access to technical backstopping services leading to low adoption of modern farming techniques with the result of increasing food insecurity.

It also emerged that farmers had limited knowledge on government policy and by extension laws related to land and agricultural development. This indicated that most of the government policies and laws were at the possession of implementing staffs and hardly trickles down at the farm level for farmers' direct application unless there was a dispute that forced an implementation of a particular law or policy in the presence of the involved farmer. It was at such occasions that some farmers could get to know what a particular government policy or law stipulated.

Declining soil fertility and deforestation were also observed as severe threats to land use activities and sustainability of production. High population pressure on land accelerated indiscriminate land clearing for agricultural use and settlement compromising organised sustainable land use management practices.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

Chapter Five the final had information on detailed summary of findings of what was done and found out, conclusions, recommendations and suggested areas of further research. Conclusions key findings and recommendations are the actions researcher put forward to policy makers, planners, researchers and other development stakeholders based upon the data findings.

5.2 Summary of Findings

This study was seeking to examine the present state and the relationship of land use management and household food security in Rongo District. This was to provide insights into sustainable land use management in addition to influencing policy issues with a view to improving household food security and contributing to restoring the district lost status of being a vibrant food surplus area

The present state of land use management the researcher found out that for land tenure systems: there were 30% of the residents who lacked access to land resources and while 70% had access to and control over land resources and benefits. For the land use planning at the farm level, 73.3% of the farm holding lacked land use plans and only 26.7% had developed land use plans for agricultural development. Study revealed that on land use 73.3% of the farm households in the district practiced mixed farming involving the growing of food crops and rearing of livestock and the remaining 26.7% concentrated on food crop growing alone as their main land use practice.

Land reform for accounted for by 63.3% of the farm household survey respondents who believed both land tenure and land use changes were influenced by land reforms, while 16.7% believed it influenced land use changes only as another 20% of the residents observed land tenure changes as being caused by land reforms taking place.

Agricultural policy on crosstabulation created a three-way table in which categories of *household food security* and *land use management* were further sub-divided by categories of agricultural policy. Agricultural policy was the moderating/control variable because it revealed how the relationship between the *household food security* and *land use management* variables changed when the effects were controlled by it in this case.

For *land policy* and *land use management* the absence of a comprehensive National Land Policy was found to mean lack of land governance systems and procedures that could facilitate effective and efficient land use management for socio-economic self-reliance. This has subjected the area to unsustainable use of land leading to declining agricultural production and productivity, hence consistent food insecurity in the district year in year out. It is not until the land policy will be approved that its benefits will be realised.

This section of the summary of findings is followed by the discussion of results on what was found out in the study and the reasons of the findings.

5.3 Discussion of Results

The discussion presents the reasons for what was found out on land use management practices and to what extent they influenced household food security. Wider issues concerning the understanding of the links between land use management and household food security were explored. From the findings of the study land use management in the

district existed in a haphazard manner that had limited chances of guaranteeing household food security as discussed in the following sub-sections.

Land Tenure Systems and Household Food Security

The forms of land tenure systems in the study area included leasehold, hire and estate/plantations. The ordinary farm holdings were private land owned by individuals. Farmers with extra land parcels leased out sections of their farm holdings to other individuals who did not own land for agricultural use. The estate as was found in the study is the land parcels repossessed by the government in 1979 for the establishment of the Nucleus Estate for seed cane production by the South Nyanza Sugar Company Ltd. It is land parcels measuring over 3000 Ha.

The number of 30% of the survey respondents without access to land resources included widowed women denied property rights by close relatives and family members. This revealed that women rights and equality were violated in project area and there was inappropriate representation of women on land use and land resources. Land succession problems further compounded the problem of access to land resources as a result of complications and bureaucracy of transferring land ownership from one person to another. Therefore, enhancing gender equality and equity could be a very necessary measure of ensuring access to and control over land resources and benefits.

Land issues in the district are of crucial importance to economic and social development, growth, poverty reduction, and governance. Access to land is the basis of economic and social life in such rural areas. Land tenure is a complex problem comprising political, economic, technical, legal and institutional factors. Land tenure closely binds together issues of wealth, power and meaning. Control over land forms a significant part of the

identity and maintenance of rural society and livelihood.

The land rights were not limited to private ownership in the strict sense, but were a very diverse balance between individual rights and duties, and collective regulations, at different levels (different levels of family organisation, communities, local governments or state), private or family ownership being one possible case. The rights and duties that individuals or a family hold are themselves embedded in a set of rules and norms, defined and enforced by authorities and institutions which may be those of rural communities and/or of the state. No system of land tenure can work without a body with the power and authority to define and enforce the rules, and provide arbitration in case of conflict. Therefore, a land tenure system should be made up of rules, authorities, institutions and rights.

Comparatively land tenure system in Kenya is at the heart of a number of rural development issues. Access to land and control over land resources and benefits are linked to some basic economic and social human rights, such as the right to food. Land tenure system has strong linkages to poverty reduction and food security, land use management, economic development, public administration and local government administration.

Land Use Planning and Household Food Security

Formal land use planning and management in Kenya is at dismal levels. This explains why land use planning at the farm level was the least implemented land use management practice in Rongo District with over 70% of the farmers without formalized land use plans. This was attributed to the withdrawal of government supported agricultural extension services that had facilitated farmers' access to technical knowledge and skills

for farm development. To reverse the current trend on land use planning it would be important to re-introduce targeted farmers trainings for skill building and the provision agricultural extension services to boost farming operations to increase access to food production technologies and services for improved agricultural production and productivity.

Proper land use planning and controls would need major ways in which farmers may have to shape their pattern of land use. Any improvements on land use planning are public capital investment and legal controls over the use of privately owned property. In this context, public capital investment creates specific facilities which make up part of the total land use pattern; while land use control embraces sub-division regulations which essentially control the manner in which new land is sub-divided, transferred and developed. Other land use control measures would include land sites planning review, physical planning review and historical preservation.

In Kenya, land use planning is achieved through regional and local physical development plans and local farm management systems. Spatial planning involves the systematic and comprehensive consideration of the fundamental organization of both natural and human resources. The Physical Planning Act (Cap 286) provides for the preparation of a Regional Physical Development Plan (Section 16) and a Local Physical Development Plan (Section 24) respectively.

Land Use and Household Food Security

The common main land use activities were food crop growing and rearing of livestock mostly in mixed farming systems. The minor land use practices involved brick-making, vegetables production, settlement and all forms of agricultural use.

The growing problems of land use and the design of effective and efficient land use management systems to combat crisis and degradation accompanying uncontrolled and unguided use of land has attracted international, national and local attentions. The most serious problems presently confronting rural and urban areas and their inhabitants include improper land use and insecure land tenure systems among others. For example, brick-making as a land use practice was found to provide conducive breeding grounds for mosquitoes that transmit malaria disease at the old sites that were usually filled up with stagnant water. According to the resident this contributed to the high prevalence of malaria in the district.

Land is as a function of virtually all forms of production. It is required for various uses in both the urban and rural areas of all society. As communities grow in size and rural areas become urban centres and urban centres become large metropolitan areas, there is always increased competition as well as demand for land for different purposes. This requires adequate land use planning and control to ensure harmonious development and functional effectiveness and efficiency of land use.

In the researcher's view the perspective of land uses and land accessibility essentially comprise four elements of land availability, affordability, security of tenure and ease of transactions. These four elements are therefore essential in the determination of land owners' accessibility to land and land use management for sustainability.

Land Reform and Household Food Security

Land reform in Kenya is an essential aspect of the policy and institutional reforms required to empower the resource poor farm households and promote equitable and sustainable development; it should be seen as an essential means of securing the broader

objectives of social justice and economic development through land and other natural resources.

Agricultural Policy and Household Food Security

The agricultural policy describes a set of laws relating to domestic agriculture and imports of foreign agricultural products. Government usually implements agricultural policies with the goal of achieving a specific outcome in the domestic agricultural product markets. Such outcomes involve, for example, a guaranteed supply level, price stability, product quality, product selection, land use management, food security or employment creation.

In considering the role of agricultural policy, it is useful to keep in mind two perspectives. The first pertains to private incentives those that motivate and shape the behaviour of farmers, transporters, processors, and wholesalers of a particular commodity. Agricultural policies in Kenya are fragmented and exist in a manner that could not facilitate an effective management of agricultural land resources for improved production and productivity.

Farm or undeveloped land composes the majority of land. Policies may encourage some land uses rather than others in the interest of protecting the environment and production. For instance, subsidies may be given for particular farming methods, forestation, land clearance, or pollution abatement. Subsidizing farming may encourage people to remain on the land and obtain some income. This might be relevant to many peasant farmers, but it may also be a consideration to the general farming community.

National Land Policy and Household Food Security

National Land Policy determines who has legal rights of access and/or ownership to land resources and under what conditions, and therefore how these productive assets are

distributed among diverse stakeholders. Land policy therefore expresses, implicitly or explicitly, the political choices made concerning the distribution of power between the state, its citizens, and local systems of authority. The multiple dimensions to land issues require a careful and well implemented approach which places current land issues within the broader historical, political economic and social context.

The absence of a national land policy in Kenya had created a big loop hole in the regulation and management of land resources for the benefits of the citizenry in the district. A National Land Policy, therefore, should aim at achieving certain land use management objectives relating to the security and distribution of land rights, land use and land management, and access to land, including the forms of tenure under which it is held. It should define the principles and rules governing property rights over land and the natural resources it bears as well as the legal methods of access and use, and validation and transfer of these rights.

It should provide details of the conditions under which land use management and development can take place, its administration, i.e. how the rules and procedures are defined and put into practice, the means by which these rights are ratified and administered, and how information about land holdings will be managed. It should also specify the structures in charge of implementing legislation, land use management and arbitration of land conflicts and disputes.

The distribution of property rights between people has a tremendous impact on both equity and productivity of land resources. Inequitable land distribution, land tenure problems and weak land administration can lead to severe injustice and untold social conflicts. Changes to legislation, the distribution of property rights, and administrative

structures are likely to have long-term consequences, positive or negative, for political, economic and social development. Similarly land policy is also crucial for environmental sustainability as it can create incentives for sustainable land-use and environmental management.

Currently what is used to represent national land policy in Kenya are contained in texts issued by the government, and is further developed through legislation, decrees, rules and regulations governing the operation of institutions established for the purposes of land administration, the management of land rights, and land use planning. To be effective, the national land policy must propose a practical and coherent set of rules, institutions, and tools, which are considered both legitimate and legal, and are appropriate for different contexts and interest groups who usually use land.

5.4 Conclusions

The major objective of this study was seeking to examine the present state and the linkages of land use management and household food security in Rongo District, to provide insights into sustainable land use management, in addition to influencing policy issues with a view to improving household food security while contributing to restoring the district's lost status of being a vibrant food surplus area.

Although it was evident from the survey respondents interviewed that some form of land use management took place in the forms of *land tenure systems, land use planning, land use* and *land reforms*, information gathered from various sources was reliable and adequate, the need for improving land use management in order to boost the dwindling household food security received an overwhelming acceptance. The researcher hereunder made the following conclusions:

Land is one of the most critical economic assets for the poor in district, serving as the main source of food security, and social security for many families. Yet women frequently lacked access to and control over land as well as other critical assets. Most women continued to depend heavily on men to access and control economic resources, especially land. For the majority of the people in Rongo District, access to land is mediated through customary tenure institutions, which typically provide for women to access land through men. Under most customary systems, a woman is expected to marry and give up land previously accessed from her father or brother in her natal village to acquire user rights to land owned by her husband in his village. Women therefore rarely inherit land from their fathers, while the primary rights to the land they access when they are married remain in the hands of their husbands. Men decide what land women are given and how much, and often times control the proceeds that women earn from working their land.

Having discussed land use planning and their effects on household food security in Rongo District, it is concluded that land use planning in the district is lacking in scope, content and coordination. Multi-disciplinary approach is required to reduce existing inefficiencies in land use. It is also evident that formal land use planning, the accompanying policies, available extension services and farmers experience have not been used to effectively and efficiently promote and enhance improved people's access to land use planning for farm enterprises substitutions and combinations for maximum productivity that can reverse the ever increasing household food insecurity. A number of factors may be responsible for this state of inadequate land use planning and management in the district. But unearthing of these land use planning constraints have been reserved and suggested for an in-depth investigation at another level.

This research report shows that land use management and control tools are either not available or weakly implemented in the district. Besides, the paper found land use activities are disjointed and uncoordinated since several farm enterprises at the farm level, organizations and agencies involved in land use are without an integrated approach to land use. Each agency is for its own business only. The expected coordinating Ministries of Agriculture; Land and Settlement and Environment and Mineral Resources too lacked coordinated approach and policies for overall land use planning within which effective land use management can be undertaken to guarantee sustainable food security.

The researcher concludes this section that for land use management to be effective and contribute to improving household food security, there is the need for an integrated land use approach. The present approach of disjointed and uncoordinated land use practices cannot be expected to provide the desired outcome of sustainable household food security. Thus, for land use management to flourish and more importantly to create convenient and conducive environment for present and future generations, there is the need for a more fundamental rethinking of land use control mechanism, policy and action. Land use management in the district should be decentralized and new legislation that would reflect current thinking and approach to more humane and environmental friendly approach of sustainable development need to be embraced and instituted in the management of land resources.

A major policy challenge in Kenya now is to adopt policy reforms that could induce technical change in agriculture and land use management. Policies adopted should solve the broader problems relating to the generation, dissemination and adoption of new technologies and thus stimulate changes in crop mixes towards the production of high

value crops. Policies are the instruments of action that governments employ to effect change. The principal categories of policies are used to bring about change in agriculture while little is done on land use management.

5.5 Recommendations

This section presents the researcher's recommendations for action to be taken on the basis of the analysis, interpretation, discussion and conclusion of study findings. The recommendations highlighted the implications of the findings for this particular research project; for other projects that may be interested to learn from these findings; for national development; for any other interested parties, such as researchers, policy makers, planners and made practical and feasible suggestions on what should be done by this study outcomes and other stakeholders. The researcher hereunder made the following recommendations:

Training of Farmers: In order to improve farmers knowledge and skills well designed targeted land use management practices and agricultural productivity trainings, farmers experience sharing, exchange visits and tours be put in place and implemented as knowledge and skill building to support the farmers improve on agricultural production and productivity alongside improvements on land use.

Provision of Agricultural Extension Services: Provision of agricultural extension services is given a second thought geared towards revitalizing the dwindling agricultural land use and production. The core of agricultural production is the available technical support. Presence or absence of these vital services determines how best land is used and managed to produce food for human subsistence.

Soil Fertility Improvement: Agricultural land use is determined by the levels of soil fertility. This study had pointed out a consistent decline in soil fertility due to continuous cropping and other forms of land use. In order to reverse the trend and revive vibrant land use, concerted efforts should be directed to the improvement of soil fertility by implementing practices aimed at improving soil structure, texture and organic matter content.

Reforestation and Afforestation: Human activities continued to decimate forest cover and deplete other natural resources. It is for that reason it is recommended that intensive and extensive massive reforestation and afforestation be designed and implemented to restore nature and curb factors facilitating land degradation and declines in food production.

Introduction of Alternative Cash Crops: It hereby recommended that introduction of alternative cash crops with shorter maturity periods would cushion farmers from the uncontrolled growing of sugar cane that is vulnerable to delayed harvesting, low gross margins, high production costs and unfavourable competition with food crops and livestock on agricultural land use affecting general domestic subsistence of other land use activities. It is also a heavy consumer of soil macro and micro-nutrients depriving farm lands of the remaining limited soil fertility. Hence other crops rarely perform better after a sugar cane crop harvest. Such alternative crops may include horticultural crops farming that have unlimited market potential and shortest maturity periods in agriculture.

Reduction of Hectares under Sugar Cane Production: The research finding indicated that sugar cane production had marginalized food crops growing and livestock rearing, the researcher as a result recommends the reduction of hectares under cane production to

be in tandem with the needs of other land use practices for sustainability of land use, agricultural production and productivity.

Imposition of Controls on Land Sales and Sub-Divisions: The rate at which land sales took place was alarming and proved to be a constraint to effective and efficient land use management. Participants in this regard recommended an imposition on minimum hectares of land per household and restriction of uncontrolled sale of land parcels that was fast accelerating prevalence of uneconomical pieces of land that were unviable and expensive to manage for sustainable production of land resources.

National Land Policy: Efforts to provide Kenya with a National Land Policy to be completed to make available this important document to provide guidance on the rules, customs and regulations guiding the use, allocation, distribution, planning and management of land resources as well as repossession of grabbed land in Kenya.

Land Use Policy: That a Land Use Policy be formulated alongside the National Land Policy that is currently awaiting government approval to harmonize and integrate the different land use based activities such as agriculture, pastoralism, forestry, conservation, industrial development, human settlement, tourism and urban development in a manner that gives strong emphasis to promotion of sustainable household food security.

Public Education: That a public education programme to be initiated and implemented to enlighten the general public on government policies and laws to fill the gap of limited public knowledge on legal, legislative and policy framework as it was found out in the study.

5.6 Suggestions for Further Research

It is suggested that the following areas should be investigated further to generate knowledge and information as they were beyond the scope of this research but featured prominently during data collection;

Integration of Cash and Food Crops Production: Research efforts should seek for better ways of integrating cash and food crops productions and other farming systems in a manner that guarantees effective and efficient land use for maximum productivity of the of the land and farming enterprises. This study had observed that uncoordinated enterprises relationships and substitutions are detrimental to proper land use and the much needed sustainable household food security and income in this farming zone and may be elsewhere.

Land Use and Malaria Control: According to the study findings, land use practices such as brick-processing sites provided breeding grounds for mosquitoes. Research efforts should be put in place to address brick making and malaria control. It was observed that malaria prevalence was ever on the increase in the district due to the prevailing and booming business of brick-making that consequently provided suitable breeding grounds for mosquitoes, the vector parasites transmitting malaria.

An Investigation on Constraints to Land Use Planning: In the conclusion it is indicated there may be a number of factors responsible for inadequate land use planning and management. Since it was a matter beyond the scope of this research, it is put forward as a suggestion for further research aimed at unearthing of the land use planning and management constraints in the use of land resources.

Public Education: That a public education programme would be feasible to be initiated and implemented to enlighten the general public on government policies and laws to fill up the gap of limited public knowledge on legal, legislative and policy framework. Hence this was another area recommended for further research to determine how best to implement such a public education programme.

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APPENDIX 1: LETTER OF TRANSMITTAL AND CONSENT

Bernard Obonyo Okech,
University of Nairobi,
P.O. Box 30197-00100, GPO, Nairobi
Cell Phone: +254 908 220
E-Mail: benokech2005@yahoo.com
June 30th 2009

Dear Sir/Madam,

RE: TO WHOM IT MAY CONCERN

I am Bernard Obonyo Okech, a student researcher from the University of Nairobi carrying out a survey to examine the relationship of land use management and household food security in Rongo District.

In my schedule, I would be visiting your cluster focus group discussion (FGID) for a face-to-face interview with your group members who been sampled for this purpose to represent your area. The date, time of arrival and departure will be communicated to your group over cell phone. Kindly ensure information is circulated to all members for maximum participation.

I would appreciate if you would give me your views on land use management and household food security as will be guided by a questionnaire. The answers you give will be treated in confidence and your identity will not be revealed to anyone.

Looking forward to your maximum cooperation in this regard,

Yours Faithfully,

Bernard Obonyo Okech

L50/70915/2007

APPENDIX 2: SURVEY QUESTIONNAIRE

1.0 GENERAL SURVEY RESPONDENTS INFORMATION

INSTRUCTIONS: It is essential that every question be answered completely, accurately and in details.

Serial Number:..... Interview Date:

Division: Location:

Sub-Location: Village:

Starting Time: Ending Time:

Name of Respondent Group

Group Survey respondents by Gender:

Male.....Female.....Total.....

Name of Interviewer:

Eligibility: 18 Years and Above

1.0 SECTION 2: LAND USE MANAGEMENT

1.1 How would you describe the present state of land use management in your area?

.....
.....

1.2 What are the factors of that influence land use management?

.....
.....

1.3 What relationship do you think exist between land use management and household food security?

.....
.....

2.0 SECTION 3: HOUSEHOLD FOOD SECURITY

2.1 What is the food security situation in your area?

.....
.....
.....

- 2.2 What measures are you taking to ensure your farm household have consistent,
- a) Food Availability – sufficient quantities of food from one harvest to another?
.....
.....
 - b) Food Access – adequate resources to obtain food e.g household income?
.....
.....
 - c) Food Stability – the situation of no risk of loosing food security?
.....
.....
- 2.3 What coping mechanisms do you use during periods of food shortage?
.....
.....
- 2.4 What influences could household food security have on land use management?
.....
.....
- 2.5 What influences could household food security have on agricultural policy? Land policy?
.....
.....
- 2.6 What influences could household food security have any on legal frameworks (especially agricultural laws? Land laws?)
.....
.....

3.0 SECTION 4: AGRICULTURAL POLICY AND LAND USE MANAGEMENT

- 3.1 What are the linkages and influences that exist between agricultural policy and land use management? *
-
-

4.0 SECTION 5: LAND POLICY AND LAND USE MANAGEMENT

4.1 What are the linkages and influences that exist between land policy and land use management?

.....
.....

4.2 What sustainable solutions for changes in land use management, policy and legislative framework are there to improve on household food security?

.....
.....

4.3 What other relevant issues in relation to land use management and household food security do you think you can add?

.....
.....

4.4 Do you have any additional comments you would like to share?

.....
.....

Now we have come to the end, you may ask any questions that you may have pertaining to this survey (*Researcher to responds*).

Thank you very much for your kind collaboration.

Your answers will be very useful to the University of Nairobi in examining land use management and sustainable household food security in Rongo District.

Thank you once again

APPENDIX 3: INTERVIEWER'S OBSERVATIONS FORM

To Be Filled In by Researcher after Completing Interview

Comments about Survey respondents

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.....
.....

Comments on Specific Questions

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.....
.....
.....

Any other Comments

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.....
.....
.....

Data Editor's Observations

.....
.....
.....
.....

Name of Data Editor:.....Date:.....

END