

134 2,500

**AN INVESTIGATION OF RESOURCES WOMEN
FARMERS USE TO ENHANCE HOUSEHOLD FOOD
SECURITY. A CASE STUDY OF EMBU DISTRICT
KENYA**

BY

VIRGINIA W. KAMONJI
E55/8223/97

**A THESIS PRESENTED TO THE FACULTY OF
EDUCATION, KENYATTA UNIVERSITY IN PARTIAL
FULFILMENT OF THE REQUIREMENTS FOR THE
DEGREE OF MASTER OF EDUCATION.**

JULY, 2003.

Kamonji, Virginia W.
*An investigation of
resources women*

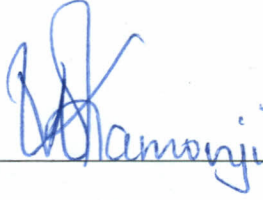


2003/269649

KENYATTA UNIVERSITY LIBRARY

DECLARATION

This thesis is my original work and has not been presented for a degree in any other university.

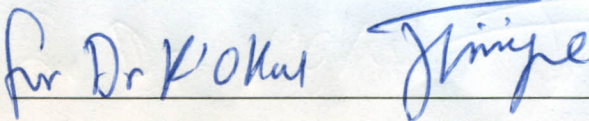


Virginia W. Kamonji

The Thesis has been submitted for examination with our approval as university supervisor.



Dr. Dinah W. Tumuti
Senior Lecturer
Institute of Applied Human Sciences and Technology
Kenyatta University.



Dr. Richard K' Okul
Senior Lecturer
Institute of Applied Human Sciences and Technology
Kenyatta University.



Dr. Frank Place
World Agroforestry Center

DEDICATION

To my parents:

Mummy you are a treasure.

In memory of Daddy

"He, who does not doubt, does not investigate.

He who does not investigate, does not perceive.

He who does not perceive remains in blindness and

In error." Al-Ghazali (1058-1111)

ACKNOWLEDGEMENTS

I would like to express sincere appreciation to all whose contributions made the completion of this thesis possible.

First, I would like to thank the International Centre for Research and Agroforestry for funding my Thesis. Special thanks go to Dr. Frank Place for your patience. I am grateful to the Kenya Agriculture Research Institute – Embu for the logistical support during the data collection stage.

My sincere thanks go to my supervisors Dr. Dinah Tumuti and Dr. Richard K'Okul for their scholarly guidance, assistance, tireless devotion and encouragement.

Special thanks to my mum Jedida, Sisters and brothers: Esther, Maggie, Ann, Agnes, Triza, Sam, John, Patrick and Mutuota for your love, support and encouragement throughout the entire period of study. Thanks to all my friends.

TABLE OF CONTENTS

	Page
CHAPTER ONE:	
1.0 Introduction	1
1.1 Background Information	1
1.2 Statement of the Problem	5
1.3 Purpose of the Study	6
1.4 Objectives	6
1.5 Significance of the Study	6
1.6 Limitations of the Study	7
1.7 Definitions of Terms.	8
1.8 The Farming Systems Approach	10
CHAPTER TWO	
2.0 Review of Related Literature and related Literature	16
2.1 Introduction	16
2.2 Linking Food Security and Nutrition	17
2.3 Women and household Food Security	17
2.4 Seasonality and household Food Availability	20
2.5 Land and household food availability	22
2.6 Role of women in Livestock production	26
2.7 Forests and household food security	27
2.8 Food accessibility and women contribution	29

2.9	Financing the Rural Household to enhance food sufficiency	31
2.10	Appropriate Technology and household food security	33
2.11	Food processing and household food availability	35
2.12	Food storage	37

CHAPTER THREE

3.0	Methodology	39
3.1	Research Design	39
3.2	Description of study area	40
3.3	Target population and sampling procedure	41
3.4	Research instruments	42
3.5	Validation of data collection instruments	43
3.6	Data analysis	43
3.6.1	Quantitative data	43
3.6.2	Qualitative data	44
3.7	Measurement of variables	44

CHAPTER FOUR:

RESULTS AND DISCUSSIONS

4.0	Introduction	46
4.1	Demographic and General characteristics of respondents	47
4.1.1	Age	47
4.1.2	Education	48
4.1.3	Women Participation in Agricultural Training	50
4.1.4	Occupation	53

4.1.5 Household Structure	54
4.2 Food Expenditure	55
4.3 The Food situation in Karurumo, Kianjuki and Nguviu sublocations	57
4.4 Human Resources	65
4.3.1 Labour	65
4.3.2 Control of agricultural activities in the household	66
4.5 Material resources	70
4.5.1 Land	70
4.5.2 Farming Capital	72
4.5.3 Credit facilities	75
4.6 Constraints women face when using resources	77
4.6.1 Coping Mechanisms	79
4.7 Effects of some selected resources on household sufficiency	80
4.8 Enhancement of food sufficiency at the household level	82
CHAPTER FIVE:	
5.0 Summary, conclusions and recommendations	84
5.1 Purpose of the study	84
5.2 Research objectives	84
5.3 Sample Composition	85
5.4 Results of major findings	85
5.4.1 Demographic characteristics of respondents	85

5.4.2 Food availability in Embu District	87
5.4.3 Causes of poor food production	87
5.4.4 Findings and contribution of the study	89
5.4.5 Recommendations	90
5.4.6 Suggestions for further research	92
REFERENCES	94
APPENDIX I: Interview Schedule	100
APPENDIX II: Focus Group Interview Schedules	109
APPENDIX III: Average food requirements for an average male in Kenya	110
APPENDIX IV: Amount of food needed for storage for Karurumo, Kianjuki and Nguvu sub- Locations to ensure food sufficiency per household	111

LIST OF TABLES

	Page
Table 1: Age of Respondents	48
Table 2: Respondents level of education	50
Table 3: Respondents with Agriculture Training	53
Table 4: Occupation of Women	53
Table 5: Household Structure of Respondents	54
Table 6: Household Monthly food expenditure	56
Table 7: Amount of Food Harvested	61
Table 8: Amount of for Food for Household Use	64
Table 9: Household Hiring Labour	66
Table 10: Respondents controlling farming enterprise	67
Table 11: Land under Cash Crops	71
Table 12: Land under Food Crops	72
Table 13: Farm Implements Used by Households	73
Table 14: Farm Inputs used by Households	75
Table 15: Households which Accessed Credit Facilities	77
Table 16: Pearson Product Moment Correlation Results	80
Table A: Average food requirements for an average adult Male in Kenya	110
Table B: Amount of food needed for storage for Karurumo, Kianjuki and Nguviu sub-locations to ensure food Sufficiency per household	111

LIST OF FIGURES

Figure 1: Schematic representation of some Farming System Derterminants	12
Figure 2: Basic components of the Farming System Approach	13
Figure 3: Productive activities in Karurumo, Kianjuki and Nguviu.	68

ABBREVIATIONS

FAO:	Food Agriculture Organisation
GOK:	Government of Kenya
ICRAF:	International Centre for Research and Agro-forestry
IFAD:	International Fund for Agricultural Development
ITDG:	Intermediate Technology Development Group
KARI:	Kenya Agricultural Research Institute
UNICEF:	United Nations Children's Fund
WHO:	World Health Organisation

ABSTRACT

The purpose of the study was to determine the resources women used for household food security in Embu district.

The major objectives of this study were to:

- (i) Determine the demographic characteristics of the respondents
- (ii) Determine the status of food availability in Embu District
- (iii) Determine the human and material resources women used to ensure food sufficiency
- (iv) Determine the constraints women encounter in providing adequate food for their household
- (v) Determine the effects of some selected resources on household food sufficiency
- (vi) To investigate how resources could be used efficiently to enhance household food security.

A descriptive survey design was used in the study. A total of 231 respondents were drawn from three (3) sublocations (Karurumo, Kianjuki, Nguvu). The sublocations were selected randomly from three (3) locations (Nginda, Gaturi North and Karurumo) which had been selected purposively from three divisions (Manyatta, Nembure and Kyeni South). The three divisions were purposively selected according to the climatic conditions that

prevailed. Data collection instruments used during the survey was focus group discussions and interview schedule.

Descriptive statistics such as the Pearson product moment correlation was used to obtain relationships between variables. Frequencies means, percentages were used to summarise data. Results showed that most households in Embu district were food insecure because of various reasons such as inadequate income, unreliable and inadequate rainfall. Farm implements and inputs were too expensive for most farmers to afford. There was lack of extension services from the government and other development agencies to the farmers. The farms were too small and infertile hence they produced very little harvest in terms of food and cash crops. Access to credit facilities from co-operative societies was expensive due to the high interest rates these institutions charged.

To improve household food sufficiency, various suggestions were put forward such as: planting drought resistant crops, reforestation and intensification of extension service.

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background Information

Globally there are 800 million persons who are food insecure, most of them are undernourished. Poverty is one of the causes of food insecurity, and is mostly associated with/or although by no means limited to certain forms of occupations such as smallholder farmers, daily labourers, livestock herders, small-scale fishermen and unskilled unemployed (FAO, 1996).

As a result of under nutrition a large number of people in the world face macro and micro nutrient deficiencies. For example about 1.6 billion people are currently at risk of iodine deficiencies, which cause considerable brain damage, cretinism and goitre. Almost 500 million women suffer from iron deficiencies leading to poor health and low birth weights. Over 200 million children experience inadequate consumption of vitamin A. The latter deficiency is responsible for physical impairment, risk of death from common disease (FAO, 1996).

Lack of access to food is a major contribution to malnutrition; this inhibits growth especially in children, increases their risks of morbidity, affects cognitive development and reduces their subsequent school

performance, and negatively affects their work capacity and labour productivity as adults (FAO, 1990; UNICEF, 1998).

Although the majority of the hungry are to be found in the developing countries, hunger is also found in the most affluent societies. In 1990, thirty million people in the United States were food insecure. In Canada, 2.5 million people were reported hungry; while in Australia about 2 million were reported to suffer from food shortages (FAO, 1996).

In Sub-Saharan Africa, over 200 million (more than 40%) of the region's population is chronically malnourished. This has been attributed to an increase in most nations' poverty, debt and decline in domestic per capita production, high fertility rates and natural disasters (FAO, 1996). Agriculture has long been the dominant sector in this region in terms of output, employment and export earnings. It amounts approximately to twenty one percent of the continent's Gross Domestic Product (FAO 1996). In Sub-Saharan Africa between 1965 and 1990, agriculture production grew at an annual average of 2.8 per cent. In 1994, food imports and food aid represented ten percent of the food consumed in Sub-Saharan. The food gap is projected to increase to more than nine times the present gap in Sub-Saharan Africa by the year 2020 (Saito et. al. 1994).

Women are currently the major food producers in Sub-Saharan Africa. They contribute sixty to eighty percent of the labour in food production

for household consumption and/or sale. Overall they play a major part in sowing, weeding, application of fertilisers and pesticides, harvesting, threshing, food processing, transportation and marketing (FAO 1996; Saito et al 1994, Dankelman and Davidson 1988; Khasiani 1992).

In Kenya, between 1980 and 1990, agriculture production grew at an average rate of 3.5 percent per year. Agriculture growth rate was at 4 per cent per year from 1986 to 1990. Although considerable progress in the expansion of food production was achieved, an increase in population has absorbed the increase in food production therefore preventing improvement in per capita nutritional intake. The rapid population growth and a shortage of arable land in the main high potential areas have created an imbalance supply of and demand for food [GOK (a), 1994].

In addition, there has been a decline in food production and a shift in taste from traditional crops like sorghum, and millet to wheat and rice. In the high potential areas, cash crops have taken a larger share of the farms of the small holders, these has resulted to food shortages in food production rendering households to becoming insecure [GOK (a), 1994; K'Okul, 1994).

Certain parts of the Kenyan population such as Eastern and North Eastern provinces still suffer from food shortages and malnutrition as a result of income inequalities, problem of distribution between

geographical zones, seasonal fluctuations in food supply and lack of nutrition education (GOK (a), 1994).

Embu district, which is part of Eastern province, also suffers from food shortages. Over the years the district has not been producing food to meet its own requirements. Food production fell short by about twelve per cent of self-sufficiency from 1989-1993 (GOK, 1989). This was attributed to a shift from growing food crops to cash crops which farmers considered being more remunerative in the upper zone. In the lower zones inadequate rainfall and under utilisation of land were causes of food insecurity.

According to the third malnutrition survey, 22.3 per cent of children under five years suffered from chronic malnutrition in Embu district. In the densely populated areas, 16.2 per cent of children were underweight (GOK, 1989; Consolata Hospital 1986, 1987). This was attributed to early weaning, which starts two weeks after birth, food shortages especially during dry periods and diseases such as malaria, gastroenteritis and Helminthic diseases.

1.2 Statement of the Problem:

Eighty per cent of the women in Embu district are responsible for food production (ICRAF 1994, 1995). They are endowed with the task of providing their households with food. Most households depend on both food produced from their own farms and also purchase food for their daily nutrients intake.

Lack

and/or inadequate use and availability of resources such as land, income, and farm input such as seeds and fertilisers have resulted to low food production. Small farm sizes (which are reducing due to a high population increase) cannot produce enough food to meet the family needs. Cash crops are competing with food crops in the small farms. Land can no longer be left fallow due to its reduced sizes and demand for food. Soil degradation has been caused by soil erosion, continuous cropping and by little lack of application of manure and fertilisers. Studies have been carried out on soil conservation, agro-forestry (ICRAF 1994, 1995) and on the nutritional status of households in tobacco growing areas of Embu District (Mugo, 1995). There is no study that has looked at the resources women use for household food security in a holistic manner, Hence a need to carry out this study.

1.3 Purpose of Study:

The purpose of the study was to determine the availability and utilisation of farming resources women need to ensure household food security in Embu District.

1.4 Objectives:

1. To determine the demographic characteristics of the respondents.
2. To determine the status of food availability in Embu District.
3. To determine the human and material resources women use to ensure food sufficiency.
4. To determine the constraints women encounter in providing adequate food for their Household.
- × 5. Determine the effects of some selected resources on Household food sufficiency.
6. To investigate how resources could be efficiently to enhance household food security

1.5 Significance of the Study:

1. Identifying the resources women use in making households food sufficient will assist the International Centre for Research & Agroforestry (ICRAF) and The Kenya Agriculture Research Institute (KARI) with an understanding of resource utilisation by households in Embu District. It will also provide data for the on going (World Agro forestry Centre) ICRAF/KARI projects in Agro forestry and Food Security and form a base for future surveys.

2. The study will assist policy makers, non-governmental organisations, and extension workers both in the health and Agriculture sectors to develop sound policies and interventions that would benefit the women and their households in attaining food security.
3. The study will provide a theoretical understanding of the multi-disciplinary approach in food and nutrition studies.
4. The study will provide suggestions of practical solutions to problems underlying food security in rural households in Kenya.

The findings will be disseminated to women groups and government institutions. This will help them in identifying and utilising the resources available to them adequately to improve the status of food availability in their households.

1.6 Limitation of the Study:

The study focused on women in Embu district. Generalisations of the study findings to other districts would be done with caution. Household resources that were determined included, capital, land, labour, technical skills: these findings could not be generalised to all household resources.

1.7 Definition of terms:

Food Security: This is the access by all people at all times to enough food for an active healthy life.

Household: This refers to a temporary or permanent structure occupied by: a man or woman with/without children, family or a group of persons. Usually (but not always) bound together by this kinship sharing a common roof, cooking pot, commonality of life and are answerable to one household head where a husband exists, he is automatically the household head, where dead, or away the wife take over.

Household food security: refers to the state in which households have continuous access to food supplies which can fully satisfy the nutritional and dietary needs of all its members at all times (FAO/WHO 1992).

Food Accessibility: This is the peoples' ability to get economic access to food by purchasing or doing any type of trade such as barter. This could be constrained by income.

Food Availability: is achieved when a household can generate income for small scale production while not depleting the natural resource base,

and the need to get this food into markets for sale at prices consumers can afford (FAO, 1996).

Resources: These are means to satisfy a system's demands. Some are tangible while others are not (FAO, 1996).

Human Resources: This means a need to provide production labour. Households are the source of all human resources.

Material Resource: These are concrete and tangible materials. An individual could own them, by the household or they may be available through some arrangement rented, on loan, or in trust. They include land, money and financial assets, livestock and agricultural assets.

Season: This term will be used to mean a cycle of food production from planting to harvesting of a food crop.

Environmental Resources: These are resources in the physical surrounding that are of use to the household such as land (soil), forests and plants.

The Agro-Ecological zones: These are climatic regions, which are differentiated by mainly moisture supply, soil types, and/or geographical features [Jaetzold and Schmidt, 1983].

The farming system: is the ecology in which food is produced. It comprises of biophysical factors including physical inputs such as chemical and biological agents, socio-economic factors such as community structures, norms, beliefs and means of production.

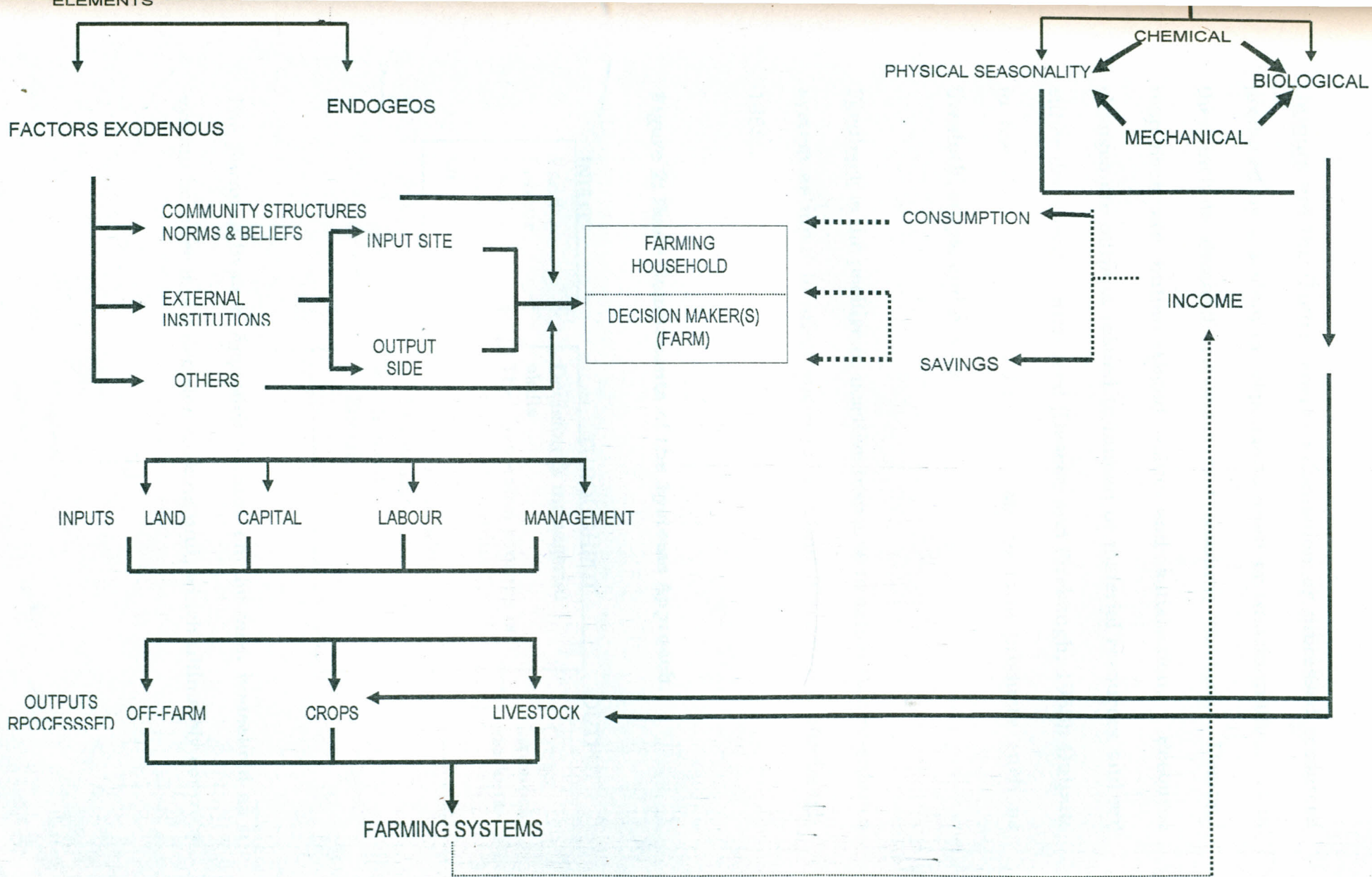
1.8 THE FARMING SYSTEMS APPROACH:

The theoretical framework of the study is based on the Farming System Approach traditionally developed by Food Agriculture Organisation (1995). The Farming Systems Approach emphasises on the need to view the situation (farm household) as a whole and not in separate part. It consists of the totality of the physical biological, social and economic surroundings. The Farming System Approach recognises farming systems operated by small farmers are not only complex but are affected by many factors both internal (resources, people, culture) and external factors (input supplies, credit, market). The boundary of the system, the household (Figure 1.) shows factors that have an influence on the farming system. It recognises interaction of components in the process of transforming inputs to outputs. The operator of the farming system is the farmer or the farming household. The farming system approach stresses a system hierarchy, whereby every system is part of a larger system and consists of subsystem (FAO, 1995).

The Farming System Approach has four basic components:

Inputs: are goals, demands, events, resources or value put into a system and are transformed by throughput process into outputs or outcomes. Goals are valued objectives or anticipated outcomes that give direction and orientation to action. Values are essential meanings related to what is desirable or has worth. Events are expected occurrences that require some action. Demands are either goals or events that require some action. Resources are means capable of meeting demands and may either be material or human. In the farming system inputs are land, labour, capital and objectives (FAO, 1995).

Throughput: is the transformation or conversion of inputs by a system to output. This comprises of planning, deciding implementing and controlling. Decision-making is a process of choosing between alternatives. Planning involves setting standards and sequencing action so as to meet the demands. Implementing is putting plans in effect. Communication is the process of using messages to produce messages in the minds of others. Controlling is checking whether actions conform to plans and making adjustments when necessary (Deacon and Firebaugh 1988; FAO 1995).

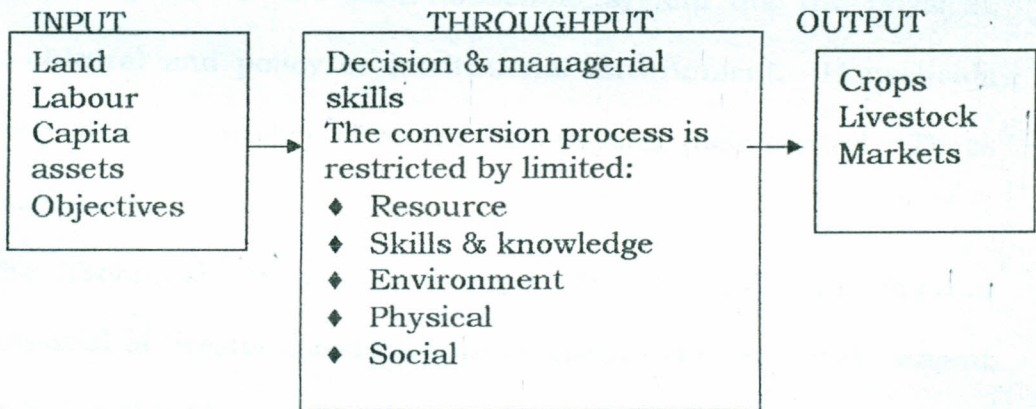


Note: Broken lines represent the results of the farming system
 Source Norman D. E et al (1982)

Outputs are the matter, energy information or processed resources produced by a system in response to input or transformation. Thus they include demand responses and resource changes. Demand responses are output-related value and satisfaction. Resource changes are outputs related to human or material resources and are either decreased or increased (Deacon and Firebaugh, 1988). Outputs in the Farming Systems Approach are to farm products such as livestock, crops, and income.

Feedback is the positive or negative response to action that re-enters a system as input to affect succeeding output (Deacon and Firebaugh, 1988).

Figure 2: Basic Components of the Systems Approach.



The Farming System Approach focuses on the farm household as a system because it is a decision-making unit, which ultimately controls

- ◆ Exogenous factors (social environment) influence what the farming household can do. These factors can be sub-divided into three broad groups:

Community structure, norms and beliefs

- External institutions that include credit and input distribution system and markets on the output side.
- Other influences such as population density, location and infrastructure.

However there are other factors, which the farm household controls such as land, labour and capital.

In this study, the input component of the farming household consisted of resources, which are land, capital and labour. The throughput process is the decision-making (control), knowledge and skills. The outputs are the products obtained from the farm such as crops, livestock, income, off-farm enterprises and markets.

On overall, the Farming System Approach provides a holistic framework for understanding the dynamic resource flows, functional spheres and inter-relationships among inputs, throughputs and outputs. It helped diagnose problems with rural resource use that linked the environment with household food insecurity.

CHAPTER TWO

2.0 REVIEW OF LITERATURE AND RELATED STUDIES.

2.1 INTRODUCTION

This chapter focused on review of related literature, which enabled the researcher to have a deeper understanding of how resources are used to achieve food security in the household. Literature was reviewed under the following sub-headings:

- Linking Food Security and Nutrition
- Women and Household Food Security
- Seasonality and household food availability.
- Land and household food availability.
- Role of women in Livestock Production.
- / Forests and Household food security
- Women's economic contribution and food Accessibility.
- Financing the rural household to enhance food sufficiency.

2.2 Linking Food Security and Nutrition:

The role of women in household food security cannot be ignored. Programs focusing on increasing food production in areas where women play a key role do not always take into account the potential consequences on health and nutrition. Poor nutrition affects growth, health, learning ability, work performance and overall quality of life. In children, poor nutrition is associated with increased risk of morbidity and even death (UNICEF, 1998).

Studies done in the Philippines have estimated that a worldwide economic loss of 8.7 US billion dollars occur annually as a result of stunting due to malnutrition (Yambi, 1996). In Kenya 3 out of 10 children suffered from vitamin A deficiency. In Kilifi district, malnutrition among under fives was related to food insecurity and health problems. Malnutrition seemed to be associated more to food insecurity than morbidity. There was lack of food quality and safety, infectious diseases and inadequate caring capacity (Owuor and Okello, 1995; UNICEF, 1999). Agricultural programs can contribute to better nutrition through improving availability of better nutrition by improving availability of food at the household level and generating income to meet food and non-food needs at the household level.

2.3 Women and Household Food Security:

Women play an important role in food security at the household level. Available data suggests women contribute twenty per cent of the agricultural labour, eleven percent of self employed labour, thirteen percent of wage labour and thirty five percent of unpaid family workers (FAO, 1990, World Bank, 1989).

Women's contribution to food production and food security is of paramount importance. They are the main food producers, income earners and guarding of family health and nutrition. They produce almost all the food consumed by the family. Male migration either to urban areas or to neighbouring countries in search of employment is

increasingly turning responsibility for households over the women. In Kenya, for instance smallholder male farmers spend a considerable amount of their time away from home on non-agricultural trade. In these cases, farming is delegated to wives on a full time basis and it is they who decide what, when and how to do things and who will do them (World Bank, 1989). A study carried out by the World Bank shows that 45.8 per cent of husbands live at the farm but work away leaving farming activities to their wives (Alamgir et. Al., 1992).

With the introduction of cash crops in the early 1960s in Africa, male farmers were more dominant in the cash crop production and eventually migrant workers. The burden of growing food crops to feed the family fell (and still falls) totally on the women. It has increasingly fallen to women to undertake food production, food processing, and food storage and food distribution activities that also ensure the final availability of food at the household level. Women are also a dominant presence in the market. Women distribute indeed the majority of consumer goods in most countries.

Unfortunately their recognition to food security at the household level has not led to concrete removal of constraints women face. Their access to good arable land is limited. Their lack of legal rights to the land they cultivate prevents their membership in farmer organisations and limits their access to inputs, credit since they can offer no

collateral (FAO, 1990; ITDG, 1995). In order to overcome these constraints, what are required are policies favouring them economically and in welfare aspects.

The role of women should be seen in the light of broader development issues such as food, agriculture, import substitution, income distribution and environmental production (FAO, 1990; FAO, 1997; FAO 1998). Therefore measures on behalf of women should target women directly to lighten the drudgery of domestic chores and free women productive activities. Investments in appropriate technology such as in labour saving activities would save on time and energy by the women. Women also need to be provided with the necessary means of production. This implies that institutional reforms need to be carried out especially on land and credit policies. Access to capital would give rise to economic empowerment of women, raise their status and reduce the absolute dependency on their husbands and improve their production especially in providing food for their families (FAO, 1990; FAO, 1997; FAO, 1998; Alamgir et.al, 1991).

Women need material resources to pave way for their own development. These are appropriate technology, extension services sensitive to their particular needs, skills, inputs, marketing outlets and infrastructure (Ibid).

2.4 Seasonality and labour in food production:

Identical climatic conditions can affect households of varied economic levels to different degrees, for example, seasonal shortages in food availability may have limited effect on some families and while in others they may produce famine conditions.

The influence of seasonal fluctuations in food availability on the energy and nutrient intake affects the nutritional status of household members through a number of intervening variables. The most important of these are; changes in activity patterns, types and level of food supply, and health status. In most agricultural communities, body weight is maximal shortly after the harvest period, while the minimum is achieved during the pre-harvest cultivation, usually in the wet season. The time when food availability is lowest coincides with the period when agricultural work is at its peak during the wet season, when farms have to be prepared, planted, and the crops weeded. When periods of food shortages coincide with periods of heavy physical work, people experience negative energy balance and lose weight (Bleiberg et.al., 1980; Schultink et.al., 1990). People living in regions with bimodal climatic patterns are reported to experience less seasonal food stress than those living in unimodal climate. In bimodal climate two annual harvests are often possible, and thus reduce the time gap between harvests as well as the storage problems often experienced by small farmers. Studies from central, Eastern and Coast provinces found that

even in bimodal climatic conditions food stocks from the long rain harvest were at a minimum level or totally depleted by the end of the long rainy season (Onchere, 1987; Foeken and dew Hartog, 1990). In smallholder areas of Central province of Kenya, less than one-sixth of the households had any food items left in store by the end of the short rains. In Eastern province, the food stocks from the long rain harvest did not last until the harvest from the short rain crop was ready (Onchere 1987).

There are other factors, which determine the degree of which households are exposed to seasonal fluctuations in food availability apart from the climate. These factors in smallholder farming communities may include the size and the nature of the land available for food crop cultivation, the size of the household and the availability of alternative resources such as income from employment outside the farm (Kigutha, 1995).

Poor households especially those with smaller resource base are more vulnerable to food stress than wealthier households. They begin to suffer earlier than the rest of the households when food shortages occur (F.A.O. 1996; Frankenburger and Goldstain 1991; Longhurst 1987; Frankenburger 1992). Similar studies carried out in Ghana indicated that thirty per cent of the households were seasonally food insecure either during pre or post-harvest season satisfying a little more than

sixty per cent energy requirements, while the other thirty per cent were chronically food insecure throughout the year (FAO, 1992).

Children and women are more vulnerable to malnutrition and deficiency diseases during food shortages (Kigutha, 1995). In communities marked by landholding and income of wealth in equalities, household responses to food shortages occur differently along the economic levels to different degrees, for example, seasonal shortages in food availability may have limited effect on some families, while in others they may produce famine conditions. Poor households especially those with smaller land holdings and a weaker resource base are more vulnerable to food stress than wealthier households. Thus begin to suffer earlier than the rest of the households when food shortages occur. (FAO, 1996; Frankenberger and Goldstein 1991; Long Hurst, 1987; Maxwell and Frakenberger, 1992) Children and Women are vulnerable to malnutrition and deficiency diseases during food shortages.

2.5 Land and household food availability:

In Sub-Saharan Africa, women and men farm separate plots of land women farmers have traditionally been responsible for food production. Estimates from the FAO show that African women perform about ninety per cent of the work of processing food crops, providing water and fuel wood, Eighty per cent of the work of food storage and transportation from the farm to the Village, sixty-eight per cent of the work of

harvesting and marketing (FAO, 1992). In Kenya, rural women contribute sixty-eight per cent of their time to producing both food and cash crops. Land is the basis for food production and raw materials. It is in this land cash crop, animals fodder and trees are all grown. It is a source of income, employment, and economic security of most rural people since land is the productive asset; it mainly determines income distribution and thus access to food in the rural areas. It follows that nutrition among rural people is closely related too land tenure status and the size of land holding (Kigutha, 1995).

In most rural areas, farmers diversify the crops they grow food and cash crops. It is believed that crop diversification among smallholder farmers is incompatible with maintaining or improving household food insecurity when cash crops are included. (Lunven, 1982; Flueret A. and Flueret P., 1980). The concern is that food availability of smallholder farm households would be affected by the displacement of food crops. In Kenya, over the last decade, per capita food availability from domestic sources has declined largely as a result of declining food production, a shift in taste from traditional crops like sorghum to wheat and rice. In addition more land has been occupied by cash crops (GOK, 1994; K'Okul 1991). It has been postulated that a household's vulnerability to food insecurity and dietary inadequacy may increase, particularly when household food availability does not change much in response to higher household income. This is often higher for production of cash crops

than for the basic food crops; thus the household's daily energy requirements particularly those of women and children may be raised (Immiek and Alarcon, 1992). Increased female employment may lead to reduced childcare.

However inspite of higher economic returns to household resources (Land, labour) from cash crops compared with basic crops, a number of risks for smallholder farmers are associated with increased commercialisation. These include; income loss from crop failure, market price variation overtime and higher input requirements and higher input requirements thus greater need for credit and extension services both of which are lacking for farmers with little land (FAO, 1992).

Traditionally, women had the right to inter crop their own crop with their husbands. Sometimes they had their own additional plots. They controlled the proceeds from the farm harvests, although their husbands got a share even of their personal crops (Bryson, 1981). Currently, women farm in their husband's plots. Fragmentation of land as result of population increase has resulted to most farmers cultivating one plot of farm.

To ensure household food availability is to significantly increase yields in food crops, which will offset the reduction in land allocated for the production of these crops. In Guatemala, farmers producing multiple

crops raised yields by using additional labour and increased fertiliser application (Von Braun, 1989). Even if yields increased offset the reduction in land allocation, the total household availability of own produced food declined when the share of the total production that the household set aside for its own consumption decreased. Not unless the effect on income for food purchases became strong enough to compensate for the reduced availability of own-produced food (Immink et. al. 1992). Studies have evidenced that the availability of purchased food has fairly been unresponsive to income changes (Bouis and Haddad, 1990). Thus consumption of own produced foods by the household would remain a critical element of household food security even when income levels rose substantially.

Women experience numerous structural and cultural constraints. Women subsistence farmers who are engaged in food production fall under land reform laws, they are generally limited to user (usufruct) rights to land. Women have limited access to credit; most financial institutions accept collateral property, which in most time is usually held by men. This limits the women from expanding in food and cash crop production (Saito et. al., 1994; Dey 1985; Webb B., 1989). Lack of incentives to boost crop production and income generating activity could result to a decline in harvest threatening household food security.

2.6 Role of women in livestock production:

Animals play an important role in agriculture. Mixed farming utilises the full range of animal products and outputs many of, which are returned as essential inputs to the overall farm. Livestock is an important component of food. It provides income and employment. Cash can be generated from sales of live animals, meat, wool, eggs and milk. In mixed farming systems livestock offers many advantages, such as manure, traction and transportation (Carangal and Club 1986; FAO, 1997). In harsh environments, livestock contributes to food security. Its products are an important part of healthy diets providing calories and protein. Livestock can be used to help alleviate seasonal food variability, small stock can be slaughtered as need arises for food and income.

Although animals are of value to the farm, their performance and productivity are generally poor because of the limited farm area. Low quality and quantity of animal feed (Topark Ngarm et. al., 1989). The situation becomes serious during the dry season. Under rain fed conditions, when almost all crops cannot be grown and natural pastures, grasses become unproductive, farmers travel long distances to gather green grasses or fodder. Fodder shrubs and trees such as *Leucaena Leucophata*, *Calliandra Calothyris* incorporated into the farm would help eliminate the problem of feed shortages during the dry spells. Fodder trees provide fuel wood and green manure the farm, some fix nitrogen in the soil for instance *Calliandra Calothyris* (MacDirKen, 1988) therefore improving the soils.

Women have been considered on the context of the farm and not just in isolated areas of livestock production (Martin C., 1990), often men are responsible for large animals such as cattle, camels, while women are responsible for small animals such as sheep, goats and poultry. However women may also have to feed large animals and maybe called for assistance in health related issues. Planting of fodder shrubs and trees would help women save on time, which would otherwise be spent looking for feed (Chavangi and Hanseen, 1983). Apart from increasing the family's food security, animals provide women with prestige, and they are meant to fulfil religious and ceremonial obligations. However the more valuable an animal, the less influence the women have on decisions concerning purchase and sale. The nomadic Maasai women in Kenya process and sell milk products but give the proceeds to their husbands unlike the Fulani women who use the proceeds to buy food for their families. Although poultry production is very important to women, it has a very low status (Chavangi and Hansen 1983). Men could be encouraged to allow women to manage some animal proceeds in order to improve the household food security.

2.7 Forests and household food security:

In many rural areas forests and farms trees provide critical support to agriculture production. They provide food, fodder, fuel and a means of obtaining cash income. In terms of household food security, forests and

farm tree resources serve to supplement existing resources and income (Falconer and Arnold, 1991). Forest food adds variety to diets; improve palatability essential vitamins, minerals, Proteins and calories. The quantities consumed may not be great in comparison to the main food staples, but they often form an essential part of otherwise bland and nutritional poor diets (Falconer and Arnold, 1988). There are many different kinds of food gathered from forests ranging from termite larvae to wild leaves and mushrooms. The most common supplementary food are wild leaves and roots both of which are generally added to sauces and soups, both of which accompany staple foods (Berker, 1983).

Forests and farm tree products are available throughout the year as snack food. Forest fruits and nuts are the most common snack especially for children. They are commonly eaten on the job while working in the fields, herding and gathering fuel wood (Ogle and Girivetti, 1985). Women dominate most of the forest gathering activities both for household products and income. Forests contribute to household food security indirectly. Wickens (1986) estimates that seventy-five per cent of the tree species of tropical Africa are used as browse. The fodder from the tree helps to maintain a supply of milk and meat.

In most rural homes fuel wood is obtained from forests. It is the main energy source. All cooking and most food processing are dependent on fuel wood. Fuel wood supply may influence the amount of food cooked.

Fuel wood shortages may offset the quantity of food consumed as well as the quality. If women cooked for less time, the consumption of uncooked and reheated food may increase which could cause a serious increase in disease incidence (Cecelski, 1985). In Peru, an average of five hours was spent daily on cooking and fuel wood gathering. As the amount of time spent gathering fuel wood increased from ten per cent to thirty five per cent, the amount of time spent cooking was reduced from ninety to sixty-seven. In the Sudan, Hammer (1982) found that food was cooked once a day instead of the customary three times because of fuel shortages. The reduction in cooked meals could have a negative effect on children's nutrition status. Forests conserve the environment and hence afford better climatic and soil conditions. Thus less time is required to collect firewood and hence more time devoted to income generating activities and food production.

2.8 Food accessibility and women's contribution:

Food accessibility is the people's ability to get economic access to food. Accessibility could be form; income, credit facilities, aid, gifts and savings.

On a global basis forty-two per cent of women over the age of fifteen are in the labour forces they comprise over one-third of the total labour. A significant portion of women's high workload relates to unpaid households production (Goldschmidt, 1982; Boserup E., 1989). Women portions range from ten to fifty-eight per cent of full household income.

Full income includes cash income, income in kind, and the value labour devoted to unpaid activities carried on, by and for its members who might be replaced by market goods or paid services (Goldschmidt, 1982). Women's households' production is worth twenty to forty per cent of the world's gross national product. Women in relation to men, tend to spend their income disproportionately on food for the family. Women's incomes are more strongly associated with improvement in children's health and nutritional status than are men's incomes (Haddad, 1992). Women typically spend a high proportion of their income on food and health care for children as well as other goods for general household consumption. In contrast, men retain discretionary control over a higher proportion of their own incomes for personal expenditures (Garcia, 1991; Haddad and Haddinott, 1992).

Several studies indicate that women's income has a greater effect on household food security and pre-schoolers than men's income. In the sugarcane belt of southwestern (Nyanza) Kenya, for a given woman's income share a positive and significant effect on household calorie consumption was realised while the men's income had a negative effect (Kennedy 1989). A study carried out in Brazil on the welfare effects of male and female income showed that the positive effect on the Probability that a child would survive in urban Brazil was almost twenty times greater when certain income sources were accrued to women rather than men (Thomas, 1990). This implies that the more women get

involved in income generating activities, the more their households tend to be more food sufficient.

2.9 Financing rural households to enhance food sufficiency:

Food security includes a temporary shortfall of adequate food for a proper diet as well as long-term food shortage. Rural Households cope with transitory food insecurity by trying to diversify their income sources, by selling assets or by resorting to informal or formal credit, savings and insurance markets (Teklu et.al., 1991). If the rural poor have to cope with transitory food insecurity, the income and productive base tends to become depleted. Zeller (1997), argues that policy instruments at the government level should aim to ensure households acquire food at low prices and improve the households' access to inter temporal markets such as Credits, Savings or Insurance products that require a transfer of resources over time.

In Kenya, Credit facilities for farmers are extended for agricultural input and livestock management, both for short and long-term periods. Credit due to seasonal fluctuations in crop production was also to be taken into consideration (GOK (a), 1994). Some of the policies though sound, have not been implemented like the seasonal crop credit scheme. Savings in form of cash, food and other assets for food insecure households are an important means of self-insurance against anticipated or unexpected times of food insecurity. Many poor

households face the risk of transitory food insecurity even if their incomes, on average, provide sustainable, adequate standards of living (Zeller et.al., 1997). In Kenya, different households in various parts of the country have been food insecure due poverty, tribal clashes, and natural disasters such as floods and famines. The Structural Adjustment Programmes (SAPs) being undertaken have also had important repercussions on household security (GOK (a), 1994).

Financing rural households should not concentrate on agricultural production and off-farm enterprises, but also should include other demands for financial services, such as financing food consumption and health care (Zeller, et.al., 1997). Financing services on nutrition, income, and wealth of household may depend on which household member has access to financial services. Several studies have indicated that increases in women's income significantly raise expenditures that lead to improvement of the nutritional status of children (Haddad L. et.al., 1996). If the levels of welfare or the distribution among household members can be improved by enhancing the access of particular household members, notably women to financial services, targeted credit programs should be called upon to economically empower women.

To credit or the capacity to save is mostly determined by ownership or control of assets including human capital. Assets held by households

could be owned by the household or by its individual members (Wilk, 1989). The creating of village banks in Cameroon, Madagascar and Bangladesh has made the rural poor particularly for women to be able to access consumption loan. This consumption loan for food, health and clothing has enabled the rural poor to meet their consumption need and maintain their family labour force over complete production cycle (Von Braun and Webb, 1989; Heidhues, 1992; Zeller et.al, 1994; IFAD, 1988; World Bank, 1990). Financial Security of the families is then synonymous with food security. If families were able to buy the required food all the time, food security would be achieved. Most of the times, food sufficiency at the household level is not achieved because the household lacks money to access food.

2.10 Appropriate Technology to enhance improvement of Food Security by women:

In most African countries women particularly in rural areas are expected to feed their families not only cooking but also growing a part of the food to be consumed. They are responsible for the processing, storage and marketing of food products. Women undertake many non-farm activities both inside and outside their homes. They provide usually the families with fuel; water supplies and transportation (Sandu and Sandler, 1986).

The rural people have utilised local knowledge in food production,

processing and marketing. Indigenous knowledge is transferred from one generation to another in form of beliefs and common practices. Women own most of the indigenous knowledge about food. This knowledge enables women to feed the population despite deteriorating agro-ecological conditions and their lack of improved technologies (Ilkkaracan and Appletion, 1995).

In deciding new technologies, the main consideration should be the needs of women such as income, effect of the technology on time management and the cultural habits. A study done in southern Tanzania showed that well over half of women's annual load carrying (in terms of tonnage) consisted of fuel wood and water as an integral part of their food preparation work. Men spent only about twenty-five percent of the time women did in transport. They performed approximately eleven percent of the time women did in load carrying. Heavy labour could be reduced through the extension of portable water, efficient cooking stoves. Such improvements would optimise the women's time and effort by freeing them for child-care and more economically productive activities (Sandhu and Sandler, 1986).

In Kenya, the promotion of tree planting by the Green Belt Movement in the central parts has aided women in soil conservation and land reclamation. It has helped in the increase of fuel wood in rural areas and created income through the rearing of the tree seedlings (Sandhu and Sandler, 1986). The introduction of improved cooking stoves (jikos)

made of an inner lining of ceramic has helped reduce the amount of time spent on fetching fuel wood. This in turn helps in saving time and conservation of forest, which are a source of fuel wood and charcoal (Krishna et.al., 1990). The effect of improved stoves in the rural areas is yet to be realised in Kenya. In order to gain access and control of technology, women must organise themselves in a way that put more emphasis on planning and co-ordination with local industries, research institutions as well as extension services.

2.11 Food Processing and Household Food Availability:

Small-scale food processing in developing countries has increased dramatically. Traditionally most small scale food processing need a lot time and are drugging. Food processing is done for several reasons such as; to preserve food for use in times of shortage. Preservation serves to extend the availability of foods beyond the season of food production, thus increasing food security at the household level. Food processing permits great diet diversity; it develops flavours, changes appearance and improves palatability. It gives access to a wide choice of product and a better range of vitamins and minerals than the household members would consume in addition. Foods are prevented from deterioration by controlling the availability of water to organisms causing spoilage and or by lowering the pH level of the food. Lastly, food processing is done to allow digestibility this is done by cooking.

Food processing especially food preservation has been practised by families in traditional societies. The most common preservation technique practices at the household level are sun drying, smoking, salting and fermentation.

Sun drying is commonly done to grains such as maize, legumes to remove excess moisture. Drying is also often used to preserve meat, fruits, roots and tubers and leafy vegetation. This is common practice in Kenya where there is a lot of sunshine. Fermentation is the process of making something change chemically through the action of organic substances. Traditionally, vegetables, bananas, cassava, were fermented then dried. Among the Luhya community in Kenya fermentation of vegetables is a common practice. Milk is fermented among the Kalenjin, Maasai communities. Smoking is a method used to preserve fish and meats. It is done to prolong the storage life and also to improve its flavour. Raw maize was also smoked to protect it from attack by weevils (Mulhoff and Heren, 1997).

In Kenya, new technologies have been introduced to improve food processing. Between the period 1979 and 1981 an indirect solar dryer was introduced to women groups in Western and Nyanza provinces, the aim was to reduce post-harvest losses by improving food preservation technology. The dryer helped in preserving vegetables (Sandhu and Sandler 1986). UNICEF-Kenya has been promoting the use of a Sheller to shell maize, though its acceptability is yet to be realised. In

Swaziland, though the Sheller was recognised to be suitable for small-scale farmers, it was found to be too expensive many farmers could not afford it (Sandhu and Sandler, 1986).

2.12 Food Storage:

The dependence of food production on climatic fluctuation means that variability in food output can never be completely avoided. Adequate on-farm storage is therefore crucial not only to enable storage of surplus food items but also primarily to provide farmers with a food supply beyond the harvest period, to ensure year-round availability of needed food for family consumption.

Estimates of post-harvest loss amount between twenty-five to thirty percent of total crop yield or output. This has been attributed to insect and rodent pests, damp and unclean storage conditions (FAO, 1997). Improperly stored food has been associated with a variety of public health problems such as food poisoning. Where post harvest losses are high, farmers must often cultivate the land more intensively to obtain the same yield, placing additional stress on the environment (FAO1997).

In rural households legumes and cereals are stored in ventilated grain cribs. Losses of legumes and cereals range between three to ten percent of the total grain stored in these cribs (granaries). Mould, rats and insects cause these losses. In order to minimise loss; the cribs could be improved to secure against rats and vermin. Insecticides could be

applied. Metal baffles fitted on the crib stands could protect against rodents by hindering their access to grain (FAO, 1997). Ash could be substantial for insecticides during storage.

Roots, tubers, bananas and plantains accounts for some forty percent of the total food supplies for about one half of the population of sub-Saharan Africa (FAO, 1997). Most families adjust their production of perishable products such as roots and tubers to minimise post harvest risks. Most tubers such as cassava, sweet potatoes are left in the ground until the tubers are required for immediate consumption (FAO, 1997)

The reduction of post-harvest losses of food grains roots and tubers can make major contribution to food security by improving the stability of food supply in households. Rural household would benefit by improving storage and methods of processing food. Since women are held with the task of processing, preservation and preparation of food, the success of introducing new technology would depend entirely on the women's acceptance method that relate to their time and labour.

CHAPTER THREE

3.0 METHODOLOGY

This chapter gives description of procedures that were used in carrying out the study. It covers research design, study area, target population, sampling procedures, research instruments and data collecting procedures, data analysis techniques and operational definitions.

3.1 Research Design:

A descriptive household survey was carried out. The researcher identified resources women utilised to ensure household food sufficiency. A descriptive household survey is a present oriented research that seeks to accurately to determine "What is" and to analyse the facts obtained under study or to their significance (Hott and Notter, 1988, Borg and Gall, 1996). In this study, the relationship between resources utilised in the household and food sufficiency was sort.

Information gathered was used to describe the characteristics of the sample of the target population and to describe the food situation in Embu District. This was done making observations under natural conditions; measurements were taken on what already existed (Borg and Gall, 1996).

3.2 Description of the Study Area

Embu district is in the Eastern province of Kenya. It occupies a total area of 808 square kilometres. It consists of five administrative divisions; Manyatta, Runyenjes, Nembure, Kyeni and Central. Embu district has varied climatic patterns ranging from the cold and wet to the hot and dry zones. The rainfall pattern is bimodal. The long rains (1700mm) fall between March and June while the short rains (750mm) are experienced from October through December. Most people in Embu practice agriculture. Crops are grown in Embu District according to the agro-ecological condition in the region. The high and middle potential areas support crops which need high rainfall for example maize, beans, tea, arrowroots, whereas the lower part of Embu which covers the low potential and range lands support crops that are relatively drought tolerant such as sorghum, millet and cassava.

In the past, the main food crops of the Embu people were sorghum, millet, beans, sweet potatoes, Cowpeas, yams, green grams and pigeon peas. Today, maize, beans, Irish potatoes and Cowpeas are the staple food crops grown. Sorghum and Cowpeas are grown in the lower regions. Green grams have increasingly become a cash crop. Inter cropping is practised in the higher parts of Embu. This is done among food crops but not within cash crops such as tea and coffee.

3.3 Target Population and Sampling Procedures

The target population in this study was rural women. Eighty per cent of women in Embu District are responsible for food production (ICRAF, 1996; G.O.K (b), 1994).

Three (3) divisions (Manyatta, Nembure and Kyeni South) followed by three locations (Nginda, Gaturi North and Karurumo) were purposively selected. The criteria of selecting the divisions and locations were based on the unique climatic conditions each exhibited such as rainfall, temperature, and vegetation cover. In addition, the areas selected fell under the International Centre for Research and agro-forestry (ICRAF) research zones. This enabled to ease any infrastructure problems. Three sub-locations were randomly selected from the three locations. The sampling frame was drawn from the total number of households in the three sub-locations. The total numbers of households in Nguviu, Kianjuki and Karurumo sub-locations were 851, 696, 627 respectively (GOK, 1989).

Ten percent of the total households constituted the sample, this was considered the minimum (Gay, 1981). The total sample that was obtained from Nguviu, Kianjuki and Karurumo sub-locations were ninety (90), Seventy-one (71), and seventy (70) summing up to 231. In order to get respondents; the researcher obtained a list of households in each sub-location from the sub-chief. The respondents were

systematically picked from a list by taking every Kth household in each stratum respectively. In order to get the Kth, the researcher got the total population in a sub-location (Nguviu), and 851 divided by the number representing the sample in a sub-location that is 85. This resulted to ten. Selection of respondents involved selecting every tenth household. This procedure applied to other sub-locations.

3.4 Research Instruments:

Interview schedules and focus group discussion were used to collect information. These methods allowed for more probing when answers to questions were not clearly understood. Three Focus Group Discussions were used to provide an insight on the food situation in Embu district. Each group consisted of eight women who were obtained from the sample population and had not been selected for the interviews.

Interviews were arranged with each respondent selected for the sample. All interviews took place in the respondent's home. This enabled the interviewer to make observations on the available resources used. Focus group discussions were organised by the researcher. Free discussions were conducted whereby the respondents gave opinions, attitudes and beliefs on how they ensured food was adequate in their households.

3.5 Validation of data collection instruments

The researcher pre-tested the instruments to check on the validity and reliability of the instrument. Content validity was measured by ensuring that most of the indicators of food security were included in the research instruments. Pre-testing the instruments verified the clarity of the questions that were to be asked and their consistency. In addition the researcher had an opportunity to familiarise with the study area. A similar but small sample (ten percent of the total sample) was drawn from the study areas (subjects did not participate in the main research) part of the pre-test. The researcher revised the instruments after pre-testing the instruments based on the responses obtained by the researcher.

3.6 DATA ANALYSIS

3.6.1 Quantitative Data Analysis

Descriptive statistics such as Frequencies, percentages and means were used to summarise data on socio-demographic variables. Data was presented in tables.

The Product Moment Correlation was used to analyse relationships between resources utilised for household food sufficiency, The average number of people in a household measured household food sufficiency. The Pearson correlation method was used to determine the magnitude of relationship between two variables such as food produced and household size (Gall and Borg, 1996).

3.6.2 Qualitative Data:

The following procedures were used to analyse the qualitative data.

- Verbatim Transcription: The interview tapes and the questionnaires were transcribed verbatim on hard paper by use of a pen.
- Pattern codes were isolated to reduce large amounts of data into simpler themes to make them self-explanatory for deducing inferences.
- Memos were used to put different parts of data into recognisable cluster. The objectives of the study were used to identify and isolate variables that depicted a general concept.
- Drawing and verifying conclusion: It involved drawing meaning from a particular set of data by noting patterns, themes, making contrasts and reaching conclusion.

3.7 MEASUREMENT OF VARIABLES

Dependent Variable

Food Availability: Amount of food stored by the Household and checked whether it was enough to last until the next harvest.

Independent Variables

Education: This was the highest level of schooling a respondent had attained. Technical skills the respondent could have attained, through training were also included.

Household Resources: Respondents were asked to indicate the resources they had:

(a) Land size:

Respondents indicated the amount of land they had, the respondents explained how they utilised their land.

(b) Capital:

The respondents indicated the amount of capital they had. Capital was in terms of farm equipment and farm inputs.

(c) Food Expenditure:

The respondents were asked to indicate the amount of income they spent on food per month.

(d) Credit facilities:

The respondents were asked to indicate the institutions they got credit from, the purposes of credit and mode of payment.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.0 INTRODUCTION

The purpose of this study was to determine the resources women use for household food security. The study arrived at filling the gap in knowledge on resource utilisation as concern food security in Embu district; Embu is an agricultural area. To achieve this goal, the following research objectives of the study were addressed:

1. Determine the demographic characteristics of the respondents
2. Determine the status of food availability in Embu district
3. Determine the human and material resources women use to ensure food sufficiency.
4. Determine constraints women encounter in providing adequate foods for their households.
5. Determine the effects of some selected resources on household food sufficiency.
6. To investigate how resources could be used efficiently to enhance household food security.

Descriptive measures such as frequencies, percentage and means were used for objectives 1-5. Statistical methods such as the Pearson Product Moment Correlation was used to test the objective 5. Qualitative analysis was done on the open-ended questions and used

audio taped cassettes. The results were presented under the following sub-topics:

1. Demographic and General characteristics of the respondents
2. The food status in Karurumo, Kianjuki and Nguvu sub-locations.
3. Human resources
4. Material resources
5. Problems women face when using resources
6. Household effects of some selected resource on food security
7. Enhancement of food sufficiency at the household level.

4.1 DEMOGRAPHIC AND GENERAL CHARACTERISTICS OF RESPONDENTS

4.1.1 Age

The respondents interviewed were aged between 20 and 60 years old. The most represented age category in Karurumo was that of between 40-49 years old with 28 respondents (40%). In Kianjuki and Nguvu the most represented age category was that of between 30-39 years old respectively. The least presented age category in Karurumo was between 20 and 29 years and 60 and above. In Kianjuki the least represented age category by respondents was between 20-29 years old while in Nguvu was 60 and above years old as shown in Table 1.

Table 1 Age of Respondents

Age	Karurumo		Kianjuki		Nguvu		Total	
	N	%	N	%	N	%	N	%
20-29	6	8.6	6	8.5	23	25.6	35	15.2
30-39	15	21.4	30	42.3	28	31.1	73	31.6
40-49	28	40.0	17	23.9	21	23.3	66	28.6
50-59	15	21.4	11	11.0	11	12.2	37	16.0
60 ABOVE	6	8.6	7	9.0	7	7.8	20	8.7
Total	70	100.0	71	100.0	90	100.0	231	100.0

4.1.2 Education

On formal education, the respondents had reached different levels. The primary school category represented most of the respondents from the three sub-locations. Karurumo had 30 respondents (42.9%); Kianjuki had 26 respondents (36.6%) as shown in table 2. The least represented category in education was the tertiary level. In Karurumo 3 respondents (4.3%) had attended college, in Kianjuki 4 respondents (5.6%) while in Nguvu 3 respondents (3.3%) had reached the tertiary level, the respondents had managed to obtain either college or university education.

Various reasons were given for not attending or reaching the primary school level attained. They were:

(a) Lack of school fees:

Most parents could not pay fees for their children because they were poor. Alcohol addiction by most family heads resulted to most respondents dropping from school.

(b) Early Marriages:

Some respondents opted to drop out of school prematurely into early marriage after lack of school fees. This was best explained by one of the respondents:

"Due to lack of school fees I was forced out of school and could not continue with education, I look for green pastures elsewhere and I opted to marry a man who was my friend since childhood".

(c) Boys were given more preference to education than girls.

Boys were seen as heirs and would help their parents when their parents grew old unlike the girls who were married off. Some parents believed that if they sent their girls to school they would become prostitutes in the village or in the nearing markets.

Table 2: Respondents Level of Education

Level of Education	Karurumo		Kianjuki		Nguvuu		Total	
	N	%	N	%	N	%	N	%
None	28	40.0	17	23.9	13	14.4	58	25.1
Primary	30	42.9	26	36.6	56	62.2	112	48.4
Post-Primary	2	2.8	2	2.8	1	1.1	5	2.2
Secondary	7	10	22	30.9	17	18.8	46	19.9
Tertiary (college)	3	4.3	4	5.6	3	3.3	10	4.3
Total	70	100.0	71	100.0	90	100.0	231	100.0

4.1.3 Women Participation in Agricultural Training

A total of 73 respondents (31.6%) had received agriculture training as shown in table 3. Agricultural training was done in form of field days and seminars by various organisations. These included: The government agriculture extension workers, Catholic Development Agency (CDA), the Anglican Church of Kenya and by Research Organisations such as the International Centre for Research and Agroforestry (ICRAF) and the Kenya Agriculture Research Institute (KARI).

Various subjects were covered during training in the three sub-locations such were:

- Soil conservation
- Management of coffee and tea: These included spraying of coffee, pruning, and removal of suckers.
- Establishing kitchen gardens and keeping small livestock such as rabbits.

- General hygienic and different cookery methods
- Planting of trees.

Agriculture training had not been received by 158 respondents (68.4%). Various reasons given to include:

Trainings that were organised dealt mostly with issues concerning coffee, tea and livestock; therefore men preferred attending them while women performed the household chores.

Some training for instance like establishing kitchen gardens, general hygiene of the household was done by the Maternal Health Care Program under the Bamako Initiative. Only women who were attending the antenatal and postnatal clinics were trained. Women groups that were recognised by the extension staff were provided with this kind of knowledge only.

The KARI and ICRAF staff selected very few farmers (contact farmers) for their research work. These farmers benefited from the knowledge of the researchers. There was poor dissemination of information between the contact farmers and the rest of the farmers in the communities. A proper information network should be established among farmers and agricultural staff in general. Farmers from the ICRAF/KARI project seemed to produce more food than those who were not in the project. This was because the institutions scientists

ensured that the farmers planted the crops in a correct manner. The farmers had exchange programmes with other farmers from various countries. This venture was an incentive to them. It also exposed them to various farming systems.

The government extension workers were few; two extension workers who were attached to Nguviu sub-location. One dealt with crops while the other with livestock. They were not able to cover the whole sub-location extensively. Lack transport hampered the mobility of these workers. The extension staff needed to have knowledge of both crops and livestock so that they would assist each other in case one of them was absent.

There was lack of continuity in the follow-up trainings. Various topics were repeated in the three sub-locations; Karurumo, Kianjuki and Nguviu. This resulted to most women not taking the training's seriously. This was best explained by one of the respondents:

"The first time I received training from the agriculture extension was sometime in July 1993. They taught me how to spray coffee. The second training session was in August 1998, and they trained me on how to spray coffee and use of the maendeleo Jiko. Since then I have had no training".

The Catholic Development Agency and the Anglican Church had limited funds that were channelled to projects within their denominations therefore they could not reach many people.

Table 3: Respondents with Agriculture Training

Level of Agricultural Training	Karurumo		Kianjuki		Nguviu		Total	
	N	%	N	%	N	%	N	%
Respondents with Agriculture Training	19	27.1	36	50.4	18	20.0	73	31.6
Respondents with no Agriculture training.	51	72.9	35	49.3	72	80.0	158	68.4
Total	70	100.0	71	100.0	90	100.0	231	100.0

4.1.4 Occupation

Table 4: Occupation of Women

Occupation Age	Karurumo		Kianjuki		Nguviu		Total	
	N	%	N	%	N	%	N	%
Farmer	67	95.8	59	83.1	87	96.7	213	92.2
Nutritionist	1	1.4	2	2.8	0	0.0	3	1.3
Business person	1	1.4	4	5.6	3	3.3	8	3.4
Teacher	1	1.4	4	5.6	0	0.0	5	2.2
Clerk	0	0.0	2	2.8	0	0.0	2	0.9
Total	70	100.0	71	100.0	90	100.0	231	100.0

A total of 213 respondents (92.2%) were farmers, Most of the women could have reverted to farming as an occupation of choice due to low literacy level as majority of them did not go beyond primary school as indicated in Table 2.

4.1.5 Household Structure

In Karurumo, Kianjuki and Nguviu, most households were male-headed as shown in Table 5. The female-headed households were few. In the three sub-locations, most households had between 5-9 people. This represented 38 respondents (54.3%) in Karurumo, 34 respondents (47.9%) in Kianjuki and 52 respondents (57.8%) in Nguviu respectively. In Karurumo the average number of persons living in a household were 6 while in Kianjuki and Nguviu they were 7 persons.

Table 5: Household Structure of Respondents

Type of Household (HH)	Karurumo		Kianjuki		Nguviu		Total	
	N	%	N	%	N	%	N	%
Male headed HH	59	84.3	61	85.9	82	91.1	202	87.4
Female headed HH	11	15.7	10	14.1	8	8.9	29	12.6
Total	70	100.0	71	100.0	90	100.0	231	100.0
No. of people living in a household	Karurumo		Kianjuki		Nguviu		Total	
	N	%	N	%	N	%	N	%
1-4	28	40.0	19	26.8	25	27.8	72	31.2
5-9	38	54.3	34	47.9	52	57.8	124	53.7
10-13	3	4.3	13	18.3	9	10.0	25	10.8
14 and above	1	1.4	5	7.0	4	4.4	10	4.3
Total	70	100.0	71	100.0	90	100.0	231	100.0
Mean	x = 6		x = 7		x = 7			

4.2 FOOD EXPENDITURE:

An analysis of the monthly household food expenditure was done for the three sub-locations. This is an indirect measure of household food security. The amount of food varied from one location to the other, table 6 shows 52 respondents (74.2%) in Karurumo between Ksh1000 and Ksh. 2500 per month on food. In Kianjuki 25 respondents (35.2%) spent between Ksh.2501-Ksh.5000 on food, while in Nguviu 47 respondents (52.2%) spent between Ksh.2501-Ksh.5000 on food.

In Kianjuki 10 respondents (14.1%) spent above Ksh.10, 000 on food. This could be attributed to the fact that the respondents had a higher income from cash crops. Most of the food crops grown were consumed when still green, families undergoing a period of food stress consumed these crops as way of reducing hunger in the households. Unlike Nguviu and Kianjuki the low expenditure on food in Karurumo can be attributed to lack of additional source of income from cash crops. They heavily depended on food produced in their farms as a source of income. The money spent on food as shown could not sustain most households in case of crop failure.

Welfare Monitoring Surveys (GOK 1992; GOK 1994) and Participatory Poverty Assessment (GOK 1994; GOK 1997) provide the minimum amount of money required to satisfy a daily 2250 calories requirement in Kenya at Ksh.927 per person. In Kianjuki, Karurumo, and Nguviu a

great percentage of respondents spent below Ksh.5000 on food per month. There were six persons per household on average in Karurumo. In Kianjuki and Nguviu, households had an average of 7 persons as shown in table 5. The money spent was not enough to cater for average number of persons in these households.

In case of price fluctuations of food in the market, households that spent less on food, suffered from food shortages earlier than those that spent above Ksh.10, 000.

Table 6: Household Monthly Food Expenditure

Monthly expenditure (Ksh)	Karurumo		Kianjuki		Nguviu		Total	
	N	%	N	%	N	%	N	%
Below 1000	26	37.1	7	9.9	8	8.9	41	17.7
1001 – 2500	26	37.1	21	29.6	26	28.9	73	31.6
2501 – 5000	7	10.0	25	35.2	47	52.2	79	34.2
5001 – 10000	9	12.9	8	11.3	6	6.7	23	10.0
Above 10,000	2	2.9	10	14.1	3	3.3	15	6.5
Total	70	100.0	71	100.0	90	100.0	231	100.0

4.3 THE FOOD SITUATION IN KARURUMO, KIANJUKI AND NGUVIU SUB-LOCATIONS:

Embu district has different agro-ecological zones. Karurumo sub-location fell under the marginal coffee zone. It had an annual average rainfall of between 1000 to 1250mm. Food crops grown were maize, beans, bananas and sweet potatoes. Kianjuki sub-location was under the coffee zone. The average annual rainfall received per year was between 1200-1500mm while Nguviu, which fell under the Tea zone, received average rainfall of between 1400-1800mm per year.

Food crops grown in Kianjuki and Nguviu sub-locations were maize, beans, bananas, cassava, sweet potatoes and cowpeas. Pigeon peas, millet and sorghum were grown sparingly in the three sub-locations. The reason could be that respondent's most preferred planting hybrid varieties of maize because they yielded more than millet and sorghum. In addition birds attacked the millet leaving very little to be harvested. Maize and its products could be used in more than one dish unlike millet and sorghum. This phenomenon was also observed by K'Okul, (1994).

In order to check the amount of food respondents had in the household, the respondents were asked to recall the amount of food they harvested, donated, sold and stored for household use for the short rainy season year 1999. The short rainy season was

experienced from months of October through to December. Table 7 shows the amount of food crops that were harvested.

In the three sub-locations, a greater percentage of the respondents harvested maize between 0-5 debes. In Karurumo there were 26 respondents (37.1%), in Kianjuki there were 28 respondents (39.4%) and in Nguvu 61 respondents (67.8%). Most respondents harvested between 0-5 debes of maize because of inadequate rainfall, which was a result of the *El Nino* rains of early 1998. In addition members of households ate the maize while green leaving very little to be harvested when dry. This phenomenon was most common in Nguvu. In Kianjuki 11 respondents (15.5%) harvested an average of 8, 13 and 21 and above debes of maize respectively.

In Karurumo 18 respondents (25.7%) harvested more than eleven debes of beans. In Kianjuki and Nguvu 27 respondents (38.0%) and 44 respondents (48.9%) harvested between 0-1 debes of beans. In Karurumo, beans were seen as a cash crop and the climate was more suitable (warmer) than Nguvu and Kianjuki. 50 respondents (70.4%) in Kianjuki and 68 respondents (75.6%) in Nguvu harvested between 0-4 debes of potatoes. In Karurumo 29 respondents (41.4%) harvested between 5-10 debes of Irish potatoes. The respondents planted little amounts of Irish potatoes in their farms because the chemicals used to spray against diseases and pests were too expensive. In Nguvu and Kianjuki most farmers preferred buying food in bulk after Tea and

coffee payments respectively. The reason was that the amount of land allocated to food crops was not enough for their family needs. In Nguviu, most respondents had kitchen gardens for planting vegetables for their families and surplus for sale. In addition farmers from Nguviu suffered from wildlife destroying their crops. Sweet potatoes, cassava were not harvested in bulk because they could not keep for long. Respondents only harvested them for immediate consumption.

During the months of September 1999 to May 2000, the rains fell short of the farmers' expectations resulting to poor harvests. The rains were inadequate and unreliable. Farm inputs such as fertilisers and manures were too expensive. Farmers especially in Nguviu and Kianjuki preferred to manure their cash crops (tea and coffee). Lack of money resulted to farmers planting seeds from the previous season (second-generation seeds) instead of using certified quality seeds. The farmers in the three sub-locations depended only on the rainfall in order to sow their seeds.

Although most farmers had poor harvests, they were forced to sell their produce. Various reasons were given such as:

- (a) Pay for school fees and medical bills.
- (b) Avoid wastage during storage: lack of pesticides to apply during storage contributed to selling of food. The farmers tried to avoid pests from attacking food.
- (c) Fetch a better price: lack of proper storage technique resulted to maize losing its weight. This resulted to it fetching poor price.
- (d) Pay off the casual or hired labour in the farms instead of paying them money.
- (e) Allow the women to buy other foodstuffs such as rice, wheat, flour that they did not grow.
- (f) Most farmers lacked enough space to store their produce after harvest. The women did not have granaries they stored their foodstuffs in sacks, which were apportioned space in the house.

Most of the food harvested usually lasted in the household not more than two months. Before the start of long rains households with little food in storage started to experience hunger earlier than those with more food.

Table 7: Amount of Food Harvested

Crop Check	Amount of food harvested in Debes	Karurumo		Kianjuki		Nguviu		Total	
		N	%	N	%	N	%	N	%
Maize	0-5	26	37.1	28	39.4	61	67.8	115	49.8
	6-10	9	12.9	11	15.5	13	14.4	33	14.3
	11-15	13	18.6	11	15.5	5	5.6	29	12.6
	16-20	7	10.0	10	14.1	7	7.8	24	10.4
	21 and above	15	21.4	11	15.5	5	4.4	30	13.0
Total Mean		70	100.0	71	100.0	90	100.0	213	100.0
		x=15 debes = 3 bags		x = 13 debes = 2 ³ / ₅ bags		x = 7 debes = 1 ² / ₅ bags			
Beans	0-1	4	5.7	27	38.0	44	48.9	75	32.5
	2-3	11	15.7	24	33.8	20	22.2	55	23.8
	4-5	22	31.4	8	11.3	11	12.2	41	17.7
	6-10	15	21.4	7	9.9	10	11.1	32	13.9
	11 and above	18	25.7	5	7.0	5	5.6	28	12.1
Total Mean		70	100.0	71	100.0	90	100.0	213	100.0
		x = 8 debes = 1 ³ / ₄ bags		X = 2 debes = ² / ₅ bags		x = 2 debes = ² / ₅ bags			
Irish potatoes	0-4	26	37.1	50	70.7	68	75.6	146	63.2
	5-10	29	41.4	12	16.9	15	16.7	55	23.8
	11-15	8	11.4	4	5.6	4	4.4	14	6.1
	16-20	2	2.9	4	5.6	2	2.2	9	3.9
	over 21 debes	5	7.1	1	1.4	1	1.1	7	3.0
Total Mean		70	100.0	71	100.0	90	100.0	213	100.0
		X = 8 debes = 1 ³ / ₅ bags		X = 4 debes = ⁴ / ₅ bags		x = 3 debes = ³ / ₅ bags			

Table 8 shows the amount of food that was in storage by March 2000. Crops such as maize, beans and Irish potatoes were harvested between December and January.

In Karurumo and Kianjuki most farmers had stored between two and five debes of maize. In Nguvui, 40 respondents (44.4%) had between 0-1 debe of maize. In Karurumo sub-location 39 respondents (55.7%) had between two and five debes of beans, while in Kianjuki and Nguvui a greater percentage of the respondents had stored beans between 0-1 debes. On average per household, the amounts of beans stored in Karurumo were six debes, while in Kianjuki and Nguvui beans stored on average were two debes per household respectively.

In Kianjuki and Nguvui most of the respondents had stored between 0-1 debe of Irish potatoes. In Karurumo 28 respondents (40.0%) had stored between 2-5 debes of potatoes. Households in Kianjuki and Nguvui, households had an average of three and four debes of beans respectively.

Appendix III (Table A) shows the average food requirements for an average adult male in Kenya. Using the Table A in Appendix III, the researcher calculated the amount of food that was needed by households in Karurumo, Kianjuki and Nguvui for them to be food sufficient as shown in Appendix IV (Table B).

Households in Kianjuki, Nguvu and Karurumo were not food sufficient. Stored food was too little to take most households up to August when maize, beans and potatoes were harvested. In addition, monthly food expenditure was too little for the average number of persons in the households in the three sub-locations. Very few households planted drought resistant crops like cassava, sweet potatoes, millet, and sorghum. Although bananas were grown in plenty in Kianjuki and Nguvu, they were used to trade for other foodstuffs such as rice and pay for hired or casual labour. Inadequate and unreliable rains resulted to poor harvest. Food shortages in Karurumo, Kianjuki and Nguvu started being experienced from late March to early July. These months were among the busiest months of the years. Food shortage and excess body energy expenditure could affect negatively not only on the women's health and also on the children in the households.

Table 8: Amount of Food for Household Use.

Crop Check	Amount of Debes	Karurumo		Kianjuki		Nguviu		Total	
		N	%	N	%	N	%	N	%
Maize	Below 1 debe	19	27.1	10	14.1	40	44.4	59	25.5
	2-5	28	40.1	19	26.8	29	32.2	75	32.4
	6-10	11	15.7	13	12.7	9	10.0	37	16.0
	11-15	4	11.4	9	12.7	5	5.6	22	9.5
	Above 16	0	5.7	12	16.9	7	7.8	30	12.9
	Did not have	0	0.0	8	11.3	0	0.0	8	3.5
	Total	70	100.0	71	100.0	90	100.0	231	100.0
		x = 8.0		x = 10.0		x = 4.0			
Beans	Below 1 debe	6	8.6	29	40.8	58	64.4	93	40.3
	2-5	39	55.7	31	43.7	23	25.6	93	40.3
	6-10	14	20.0	4	5.6	5	5.6	23	9.9
	11-15	8	11.4	0	0.0	4	4.4	12	5.2
	Above 16	3	4.3	0	0.0	0	0.0	3	1.3
	Did not have	0	0.0	7	9.9	0	0.0	7	3.0
	Total	70	100.0	71	100.0	90	100.0	231	100.0
		x = 6.0		x = 2.00		x = 2.00			
Irish potatoes	0-1	19	27.1	34	47.9	68	75.6	121	52.4
	2-5	28	40.0	24	33.8	15	16.7	67	29.0
	6-10	11	15.7	6	8.5	4	4.4	21	9.1
	11-15	8	11.4	4	5.6	2	2.2	14	6.1
	Above 16	4	5.7	2	2.8	1	1.1	7	3.1
	Did not have	0	0.0	1	1.4	0	0.0	1	0.4
		70	100.0	71	100.0	90	100.0	231	100.0
	Means	x = 8.0		x = 3.00		x = 2.00			

4.4 HUMAN RESOURCES:

4.4.1 Labour:

Members of the household, sometimes casual and helping labour, provided Labour in the farms. The need for labour was dependent on the time of the year and amount of money available. Figure 3.0 shows the activity calendars for Karurumo, Kianjuki and Nguviu sub-locations. The labour was much needed during planting, weeding and harvesting tea and coffee. The household members performed different tasks. Women performed most farm activities with some assistance from other household members.

Men in Kianjuki, Karurumo and Nguviu helped in field preparation, control of pests especially in coffee and harvesting. These tasks needed a lot of energy use and were difficult. Children helped with farm activities during the weekends and school holidays. Hired labour supplemented household labour when it was in shortage. In Karurumo, Kianjuki and Nguviu 137 respondents (59.3%) hired labour. The busiest periods of the year were between April and December. Tasks such as weeding, harvesting of coffee and tea and spraying coffee were performed, 94 respondents (40.7%) did not hire Labour. Their land was small family members could cope with the farm tasks. Respondents did not have enough money or food to exchange for labour.

Table 9: Households Hiring Labour

Sub-location	Karurumo		Kianjuki		Nguviu		Total	
	N	%	N	%	N	%	N	%
Respondents hiring labour	40	57.1	35	49.3	62	69.7	137	59.3
Respondents who do not hire labour	30	42.9	36	50.7	28	31.1	94	40.7
Total	70	100.0	71	100.0	90	100.0	231	100.0

4.4.2 Control of Agricultural Activities in the Household

Table 10 shows the persons responsible for making decisions on different crops in their farms.

In Karurumo, Kianjuki and Nguviu, most respondents made decisions on how to manage food crops as shown below. The men made decisions on cash crops and trees. This could be because the crops grown e.g. tea and coffee were more money oriented. Cash crops were used as collateral to obtain farm inputs from co-operatives. They were a major source of income to households. Women took decisions on how and where to plant food crops such as maize, beans and vegetables. Major decisions such as selling of land and livestock were done mostly by men alone or together with their spouses. In Karurumo food crops were also used as cash crops, 36 respondents (51.4%) made decisions together with the male spouses especially if they had to sell food in bulk as one respondent explains.

“... When I sell less than two debes of maize and beans, I do not need to consult my husband, if I have to sell more than four debes then I need to consult him or alert him if he was not near.”

Table 10: Respondents Controlling Farming Enterprise

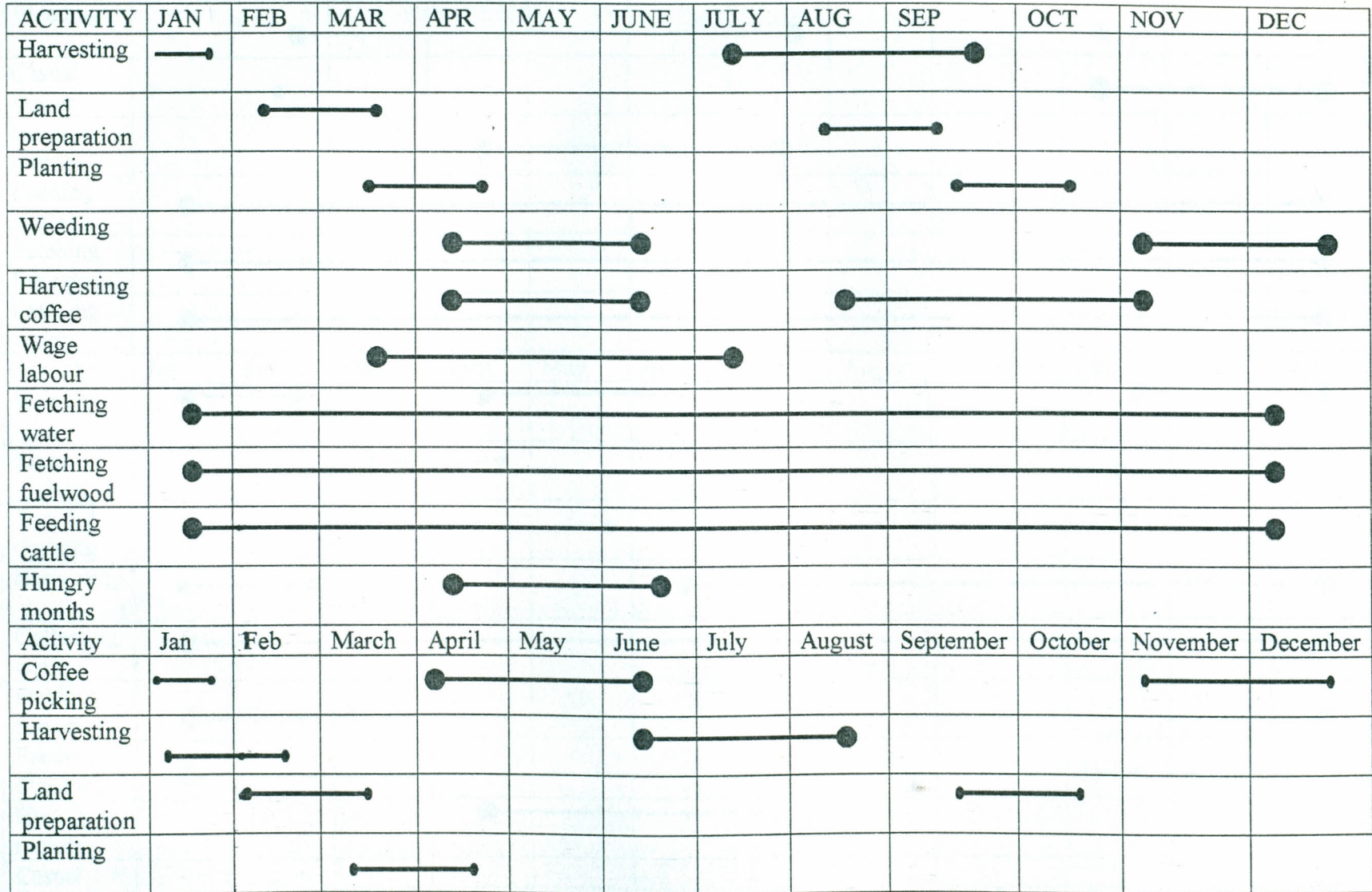
Enterprise	Karurumo						Kianjuki						Nguvu					
	HH		H&W		W		HH		H&W		W		HH		H&W		W	
Food crops	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%	No	%
Maize	8	11.4	36	51.4	21	30	16	22.9	6	8.6	38	42.2	10	11.1	33	36.7	57	63
Irish potatoes	8	11.4	32	45.7	15	21.4	8	11.4	6	8.6	29	32.2	0	0.0	10	11.1	35	38
Vegetables	1	1.4	3	4.3	8	11.4	0	0.0	5	7.1	30	33.3	0	0.0	6	6.7	29	32
Beans	0	0.0	18	25.7	43	61.4	0	0.0	3	4.3	49	54.4	0	0.0	0	0.0	42	46
Cash crops																		
Tress/fruit tress	31	44.3	17	24.3	17	24.3	35	50	8	11.4	6	6.7	51	56.7	7	7.8	8	8.9
Tea	0	0.0	0	0.0	0	0.0	23	32.9	6	8.6	3	3.3	72	5.6	5	5.6	11	12.2
Coffee	37	52.8	17	24.3	7	10.0	57	81.4	4	5.7	9	10.3	31	53.3	48	53.3	10	11.1
Live-stock	4	5.7	18	25.7	26	37.1	9	12.9	21	30.0	27	30.0	4	4.4	18	20.0	37	41.1

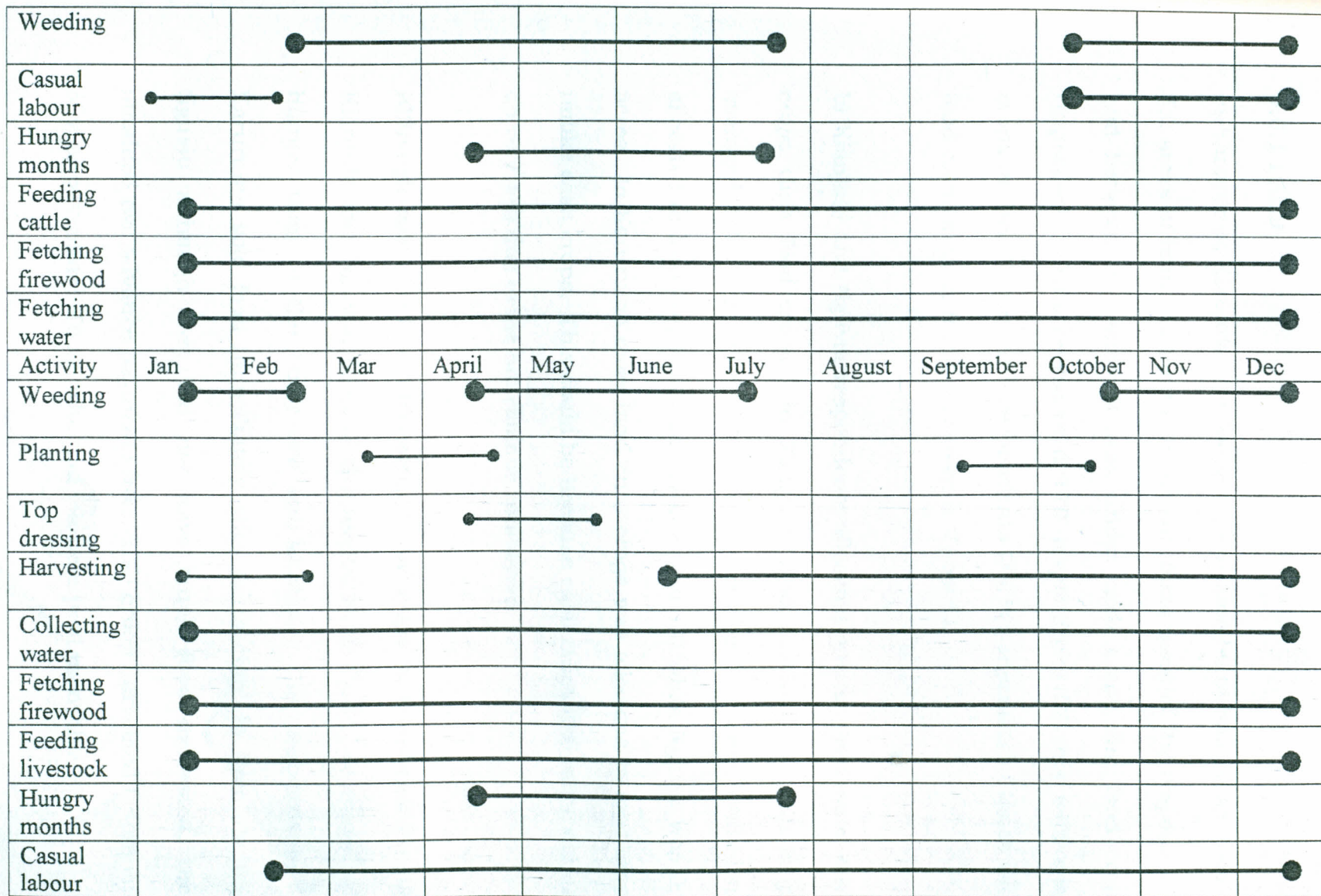
Key

- HH - Household head
- H&W - Husband and wife
- W - Wife

Figure 3: Productive activities in Karurumo, Kianjuki and Nguviu sub-locations

Calendar A: Productive activities in Karurumo





4.5 MATERIAL RESOURCES

4.5.1 LAND

In Karurumo, Kianjuki and Nguvu the respondents had an average of 3.0 acres of land. In the three sub-locations most of the respondents had between 0-1 acres of land under cash crops and food crops respectively. This represented 170 respondents (73.6%) with cash crops in their farms. 169 respondents (73.1%) represented those with food crops in their farms as shown in Table 11.

In Kianjuki and Nguvu respondents allocated greater portions of cash crops than food crops. In Kianjuki, land allocated to cash crops averaged 1.4 acres while in Nguvu it averaged 1.8 acres, while land allocated to food crops in Kianjuki averaged 1.0 while Nguvu was 0.9 acres. In Karurumo more land on average was allocated to food crops unlike cash crops. This could be because cash crops like coffee did not do very well due to the hot climatic conditions.

Although more land was allocated to food crops in Karurumo than in Kianjuki and Nguvu, Most of the respondents tended to experience hunger than in the other two sub-locations. The respondents in Karurumo sold food immediately after harvesting. In Kianjuki and Nguvu although they did not have much food harvested, they obtained two advance payments from cash crops harvested before end of year payments. Those who had tea were paid monthly.

According to Kigutha (1995), households with a weaker resource base such as small sized land, lack of alternative source of income, insufficient food stored tended to experience food stress than the wealthier households.

Respondents in Kianjuki, Nguviu and Karurumo had live fences of trees as the *Grevillea* SPP, *Eucalyptus* SPP and *Sesbania*. The trees were used to indicate the boundaries of the farms. Trees planted were used mainly for firewood and timber.

Table 11: Land under Cash Crops

Average	Karurumo		Kianjuki		Nguviu		Total	
	N	%	N	%	N	%	N	%
0 - 1	56	80.0	54	76.1	60	66.7	170	73.6
>1 - 2	10	14.3	11	15.5	17	18.9	38	16.5
>2 - 3	2	2.9	5	7.0	8	8.9	15	6.5
>3 - 4	2	2.9	0	0.0	2	2.2	4	1.7
Above 4 acres	0	0.0	1	1.4	3	3.3	4	1.7
Total	70	100	71	100.0	90	100.0	231	100.0
	x = 0.9		x = 1.4		x = 1.8			

Table 12: Land under Food Crops

Average	Karurumo		Kianjuki		Nguvuu		Total	
	N	%	N	%	N	%	N	%
0 -1	39	55.7	55	77.5	76	84.4	170	73.6
>1 - 2	15	21.4	14	19.7	9	10.0	38	16.5
>2 - 3	7	10.0	1	1.4	5	5.6	13	5.6
>3 - 4	2	2.9	0	0.0	0	0.0	2	0.9
Above 4 acres	7	10.0	1	1.4	0	0.0	8	3.5
Total Mean	70	100	71	100.0	90	100.0	231	100.0
Acreage	X = 1.2		X = 1.0		X = 0.9		X = 1	

4.5.2 Farming Capital:

Respondents in Karurumo, Kianjuki and Nguvuu sub-locations did not have adequate and suitable equipment for the different tasks in the farms. Households on average had 3 acres of land in the three sub-locations. The commonly used farming equipment in the households were panga, fork, hoes (jembe), wheelbarrows and ox-carts as shown below in Table 13. Farm machineries like tractors were not used because the farms were small. Few farmers used farm equipment such as the wheelbarrows and ox-carts. The farmers did not have money to buy wheelbarrows. Oxen were found to be expensive to maintain in terms of amount of forage they needed, there was lack of grazing land.

Table 13: Farm Implements Used by Households

Adequacy of Farm equipment	Purpose	Karurumo		Kianjuki		Nguviu	
		N	%	N	%	N	%
Wheelbarrow	-Carrying manure	23	13.1	36	18.7	43	19.0
	-Transporting farm produce						
Fork jembe	-Digging	65	37.1	68	35.2	84	37.2
Panga	-Weeding -Clearing bushes -Cutting trees	68	38.8	70	36.3	89	39.4
Ox-cart	-Transporting farm produce and manure	19	10.9	19	9.8	10	4.4

*The table shows respondents who had the above equipment only.

The most commonly used farm inputs were seeds and fertilisers. The farmers planted the right seed varieties, although most of the seeds were not certified. In Karurumo the maize varieties planted were 512 and *Katumani*, while for beans was *Mwitemania*. In Kianjuki and Nguviu the 612, 613 and 623 maize varieties were planted. Certified maize and bean seeds were bought when money was available at the beginning of a rainy season. Lack of enough money resulted to most farmers planting seeds stored from the previous harvest. Sometimes farmers consumed all the seeds, they were forced to leave part of the land bare. This phenomenon could result to a drop in harvests and hunger in the households.

Fertilisers were used by the respondents for planting and top-dressing. The farmers preferred to use compound fertilisers, which had more than one nutrient component. In Nguviu and Kianjuki, respondents used fertiliser on coffee and tea bushes. The reason could be these plants were a source of income for them. In these sub-locations farmers obtained fertilisers in form of credit, they later paid to their respective co-operative societies after the harvests. In Karurumo, use of fertilisers was limited to the amount of money a farmer had in hand. Although coffee was planted in this area, it did not perform well in terms of harvests because of the hot climatic conditions. Table 14 shows the households that had adequate farm inputs.

In Karurumo farmers to used fertilisers to plant food crops. Fertilisers were expensive and most farmers could not afford. Manure from livestock was used during the planting stage. 173 respondents (74.9%) from the three sub-locations did not have adequate manure. The reason could be it was expensive and its production was slow compared to its demand. A total of 176 respondents (76.2%) did not have adequate pesticides due to its high cost. They used traditional methods to control pests. A mixture of Ash and soil controlled *stalker borer* in maize.

Table 14: Farm Inputs Used by Households

Farm inputs	Adequacy of farm inputs	Karurumo		Kianjuki		Nguviu		Total	
		N	%	N	%	N	%	N	%
Fertilisers	Not adequate	63	90	63	58.7	57	63.3	183	79.22
	Adequate	7	10	8	11.3	33	36.7	48	20.7
		70	100	71	100	90	100	231	100.0
Manure (animal wastes, chicken drops)	Not adequate	62	88.6	56	78.9	55	61.1	173	74.9
	Adequate	8	11.4	15	21.1	35	38.9	58	25.1
		70	100	71	100	90	100	231	100.0
Pesticides/ Insecticides	Not adequate	68	97.1	43	60.6	65	72.2	176	76.2
	Adequate	2	2.9	28	39.4	25	27.8	55	23.8
		70	100	71	100	90	100	231	100.0

4.5.3 Credit facilities:

In Karurumo, Kianjuki and Nguviu sub-locations, credit facilities were not obtained directly by the women in the household. The men who were members of various farmers' co-operatives obtained these loans. They had collateral in terms of land title deeds. In Karurumo, Kianjuki and Nguviu, a total of 96 households had access to credit facilities as shown in table 15. Households took credit facilities from the co-operatives in order to meet their daily needs such as; payment of school fees, paying of farm inputs such as fertilisers, pesticides. A total of 135 (58.4%) households did not obtain credit from Nguviu, Kianjuki and Karurumo sub-locations. The co-operatives charged

high interest rates. The produce the farmers sold to the tea and coffee co-operatives gained very little money as compared to the loan accumulated from the high interest rates. Those with little harvests preferred not to access credit facilities. The farmers who had not paid their loans were not advanced any farm inputs or school fees. Farmers who did not have access to credit facilities were more prone to attaining poor crop harvests as a result of lack of farm inputs such as fertilisers, which assisted in increasing yields.

In order to satisfy food needs, women obtained credit facilities from retail shops. They paid for foodstuffs every end of month. Duration of payment of loans obtained from co-operatives depended on the amount of money an individual farmer had obtained and the terms of the co-operative society gave for payment.

For households to be food secure, resources such as land, labour, income, rainfall/irrigation and farm inputs need to be available to a household. According to the Farming System Approach, components interact in the process of transforming inputs to outputs (Household Food Sufficiency). Lack of/or inadequate use of a resource, lack of proper decision-making skills could result to inadequate food in a household as shown in the previous discussions.

Table 15 Households which accessed credit facilities

Credit Facility	Karurumo		Kianjuki		Nguviu		Total	
	N	%	N	%	N	%	N	%
With credit Facility	23	32.9	27	38.0	46	51.1	96	41.6
Without credit Facility	47	67.1	44	62.0	44	48.9	135	58.4
Total	70	100.0	71	100.0	90	100.0	231	100.0

4.6 CONSTRAINTS WOMEN FACE WHEN USING RESOURCES:

In Nguviu, Karurumo and Kianjuki women were faced with various obstacles that limited food availability in their households. These were:

(i) Changing Weather Pattern

The farmers depended on the natural rains to plant their crops. Unreliable and inadequate rainfall resulted to crops in the farms drying. Poor harvests were experienced with dry spells and in case there were heavy rains. Households then started to experience hunger when crops they stored got depleted. Kigutha (1995) observed this phenomenon.

(ii) Inadequate Farm Inputs

Due to the high cost of fertilisers and certified seeds, farmers resulted to planting seeds saved from the previous harvest. Seeds planted without fertilisers produced little harvests because most of the soils were infertile. Sometimes the respondents consumed all the seeds and they were left with no seeds to plant. Most of the land was left fallow.

(iii) Lack of Employment

Employment in the rural farm households was seasonal. Respondents apart from working on their farms had to be casual labours in their neighbours' farms and the Nyayo tea zones. Availability of casual labour depended on the amount of rainfall. The higher the rains, the more tea was picked and weeding was done. Casual labour was not well paying.

(iv) Late Payments of Cash Crops:

The coffee and tea co-operatives did not pay farmers on time for their produce. Farmers depended on this money to buy food and meet other obligations like school fees. Delayed payments resulted to households reducing their food intake. This helped to stretch the food available to more days.

(v) Lack of Motivation

The farmers were not motivated to work hard on their farms. They were not well paid for their produce by the societies. The respondents' husbands did not give them money after harvests as explained by one of the respondents.

"My husband after harvesting sells all food harvested and after coffee payments he spends all the money. He uses it to drink beer which makes me loose hope in farming".

4.6.1 Coping mechanisms:

Although farmers were faced with various constraints, they had developed various coping mechanisms to provide food for their households such as:

- **Casual Labour**

Although casual labour was not readily available, the respondents tried to look for jobs. The money obtained was used to buy foodstuffs.

- **Women Groups**

The women formed groups amongst themselves. The women contributed money weekly and gave it to a different person until each member had benefited. The money obtained was used to either buy foodstuffs, crockery or to offset school fees balance.

- **Reducing the Number of Meals Taken Daily**

During lean periods most households were forced to take one solid meal in the evening. In the afternoon the households either took porridge or stayed without anything. Periods of food shortage coincided with busy planting times in the agriculture calendar as shown in figure 2.

4.7 Effects of Some Selected Resources on Household Food

Sufficiency

Table 16: Pearson Product-moment Correlation Results

Resources for Household Use	Resources for Household Use								
	1	2	3	4	5	6	7	8	9
1. Beans harvested	1								
2. Beans stored	0.770**	1							
3. Land under cash crop (coffee, tea)	0.070	0.061	1						
4. Land under food crops (maize, beans)	0.440	0.299**	.299**	1					
5. Irish potatoes stored	0.447**	0.488**	-.016	0.381**	1				
6. Irish potatoes harvested	0.413**	0.367**	0.023	0.415**	0.826**	1			
7. Maize harvested	0.610**	0.494**	0.044	0.426**	0.462**	0.445**	1		
8. Maize stored	0.525**	0.501**	0.134	0.475**	0.492**	0.425**	0.766**	1	
9. Number of people in the household	0.101	0.025	0.323	0.237**	0.144	0.144*	0.176**	0.144**	1

* $\leq .05$

** $\leq .001$

- To find out the relationships among resources used to enhance Household Food Security the Pearson Product Moment correlation was used as indicated in Table 16. The Pearson

Product Moment Correlation Coefficient was considered significant at alpha level $P \leq 0.05$.

The correlation results show that:

There were very high correlations between:

- Beans stored and beans harvested $\{r = 0.770; P \leq .001\}$;
- Maize stored and maize harvested $\{r = 0.766, P \leq .001\}$.

Maize and beans are commonly used food items in the household. Hence the farmers could have had high yields because they properly managed the crops in the farms by early planting, proper spacing on the onset of rains, timely weeding and application of fertilizers and manure.

There were very low positive correlations between:

The number of people in a household and the amount of food stored for the following food items;

- Beans stored ($r = 0.025, P = 0.711$)
- Maize stored ($r = 0.144, P = 0.031$)
- Irish potatoes stored ($r = 0.144, P = 0.029$).

This means that the number of people in a household determined the amount of food to be stored for household use, other household needs such as, payment of school fees; hospital bills could result to food being sold to offset these expenses.

There was a negative correlation between:

- Potatoes stored and land under cash crops.

This could have been attributed to the fact that land used under cash crops was intensely farmed in order to produce high yields; in turn the farmers would get cash from the sale of these crops. Therefore more preference was given to cash crops than potatoes, which could not be stored for along time because they are easily perishable

4.8 Enhancement of Food Sufficiency at the Household Level

In order to ensure food is available in the households the women put various recommendations forward:

(i) Planting Drought Resistant Crops:

Farmers did not plant drought resistant crops like millet, sorghum. The women would prefer to plant these crops in order to alleviate hunger in the households.

(ii) Intensification of Extension Service

The government should intensify extension services in order to impart farmers with knowledge and skills on farm management. Transport and extension persons should be made more available.

(iii) Reforestation:

Women recommended planting of trees in their farms. These trees would be used as firewood and for timber. Time used to fetch firewood could be channelled to other activities/rest.

(iv) Income Generating Activities:

The women needed to obtain knowledge on how to start small business enterprises. In addition they needed to get loans to start these businesses such as posho mills, packaging foodstuffs like mangoes.

CHAPTER FIVE

5.0 SUMMARY, CONCLUSION & RECOMMENDATIONS

5.1. Purpose of the Study

The purpose of this study was to determine the availability and utilisation of farming resources women need to ensure household food security in Embu District. Possible causes of food insecurity in Embu district were investigated in order to recommend ways of making households food secure.

5.2 Research Objectives

The study sought to achieve the following objectives.

1. To determine the demographic characteristics of the respondents
2. To determine the status of food availability in Embu District.
3. To determine the human and material resources women use to ensure food sufficiency.
4. To determine the constraints women encounter in providing adequate food for their Household.
5. Determine the effects of some selected resources on Household food sufficiency.
6. To investigate how resources could be used efficiently to enhance household food security.

5.3 Sample Composition

The study had a total sample of 231 respondents. The sample consisted of women only who were drawn from different Agro-ecological zones in three sub-locations (Nguvu, Kianjuki and Karurumo) respectively. In order to obtain the number of respondents to be interviewed, the researcher obtained a ratio from the population of the three sub-locations, 10% of the population was considered minimum (Gay, 1981). Respondents were systematically selected by taking every Kth household in each stratum respectively.

The study, using a sample of 231 households, was conducted in Embu district starting April 2000 to June 2000. Interview Schedules and focus group discussions, were used to elicit information pertaining research objectives. The data were analysed by the use of frequencies, percentages, mean scores and Pearson Product Moment correlation coefficients.

5.4 Results of Major Findings

5.4.1 Demographic Characteristics of Respondents

The age categories that had a higher representation were that of between 30 years and 49 years old. 25.5% of respondents from Karurumo, Kianjuki and Nguvu sublocations had not attended school, while 49.8% had attained primary education, 1.7% of

respondents from the three sub-locations; the reasons were that most of the respondents lacked school fees.

- They were forced to marry early
 - Boys were given more preference to education than girls in relation to agricultural training, which was in form of seminars, field days.
- 68.4% of women had received any training.

Various reasons were provided for this trend

- The training organised concerned livestock rearing, coffee and tea management. Men preferred attending the sessions while women performed household chore.
- The workers were few; they were not able to serve the community properly.
- There was lack of continuity in the follow-up trainings; hence women lacked motivation to attend.
- There was poor information network/link among the researchers, contact farmers and the rest of the community.
- Church organisations were constrained by lack of funding hence preference was given to their faithful.

92.2% of the respondents' occupation was farmers. This could be because most of them reached primary level of education. Households in Kianjuki and Nguviu had an average of seven members in a household while in Karurumo the average number in a household were six. In Kianjuki, Karurumo and Nguviu respondents spent less

than Ksh. 5, 000 per month on food. This was not enough to feed an average of persons in the household.

5.4.2 Food Availability in Embu District

Cash crops are grown both for food and cash crops. The most common grown food crops are maize, beans, potatoes, while tea and coffee are grown in Nguvuu and Kianjuki. In Karurumo, cash crops like coffee and tea are not grown because the climate conditions do not suit them. Cash crops are grown as a source of income. Money obtained from this enterprise used to mainly buy food and pay school fees and hospital bills.

Animal Husbandry

Zero grazing is practised in Nguvuu, Karurumo and Kianjuki. Farmers have an average of 3 acres of land, which is too little to accommodate cash crops, food crops and any other animal husbandry practice part from zero grazing.

5.4.3 Causes of low Food Production

Farmers experienced low food production due to the following factors:

- Lack of farm inputs such as seeds and fertilisers inadequate.
- Poor and unreliable rainfall
- Land size was too small to accommodate all foods
- Lack of training on proper farm management.

A statistical analysis using frequencies, percentages and means showed that most households in rural Embu Kenya were food insecure because of the following reasons: -

- The physical climate: The rains during the past one-year were poor and unreliable.
- Soils were infertile.
- Farm inputs such as fertilisers and seeds were too expensive.
- Credit Institutions provided loans at high interest rates; therefore most farmers did not have access to this facility.
- There was poor information networking between farmers and the extension services of the Ministry of Agriculture.
- Farmers were not paid on time for their cash crops.
- The women lacked motivation for farming because they seemed not to benefit much in monetary and management terms of the household.
- The farmers sold most of their crops after harvest because they needed the money for other obligations and also they lacked proper knowledge on how to store their grains to avoid attack by pests.
- The farmers lacked an alternative source of obtaining income apart from casual labour.
- A greater percentage of farmers did not grow foods that were drought resistant.

The Pearson Product-Moment Correlation Coefficient analysis showed some positive relationship between the household size and the amount of food stored for household use.

5.4.4 Findings and Contributions of the Study

Findings of this thesis are considered to serve as contributions of this study to the area of foods and nutrition in Home Economics education and general Home Economics Agriculture especially the food security aspect and the general knowledge in the following aspects:

1. The theoretical understanding of the multidisciplinary approach in food and nutrition studies.
2. Knowledge of aspects of resource utilisation and food security in households in Embu Kenya.
3. Suggestions of practical solutions to problems underlying food security in households in rural households in Kenya.
4. Respondents' opinion regarding alleviating food insecurity in the farming households in rural Kenya.
5. A base for further research in the area of foods and nutrition.

Theoretically this research contributes to the understanding and use of the multi-disciplinary approach used in various foods and nutrition studies through a conceptual framework model (chapter one). The researcher adapted ideas from the schematic representation in order to identify resources that are used by the rural household so as to

ensure food security. The theoretical framework shows the relationships between physical and human resources.

The study also contributes to the knowledge of resource utilisation and food security in rural Kenya (Embu). The research identified, human and material resources used for household food sufficiency. In addition, bottlenecks encountered in providing food sufficiency were identified and views to curb these bottlenecks were provided.

5.4.5 Recommendations

Based on the findings of this study, the following recommendations are made:

1. There is need to introduce water-harvesting technique to rural households. This would allow for small-scale irrigation to take place.
2. Planting of drought-resistant crops should be encouraged.
3. A proper communication network could be established among the researchers, extension workers and farmers. This would allow more farmers to gain more knowledge on improved farming methods.
4. Credit institutions should be encouraged to give credit to farmers with low interests or none at all especially during "Hungry months"

This move would ensure that most rural household are food sufficient.

5. Awareness should be created on methods of food storage. This would avoid wastage during storage and farmers selling their crops.
6. Income-generating activities should be encouraged among women groups in the rural areas such as in lower areas millet, sorghum, coffee packaging and fruits.
7. Organic farming practices should be encouraged among farmers. This would help in the farmers to use manure.
8. At the community level, individuals should be encouraged to create village silos to store food crops, which would then be sold during lean periods at a much cheaper price as compared to the market value.
9. Households in the rural areas should be encouraged to have kitchen gardens and small livestock such as rabbits, chicken. These enterprises would assist them to when they are deficient of food, at the same time act as a source of income.
10. The government should provide more agriculture extension staff to the rural communities.

5.4.6 Suggestions for further research:

It is recommended from the findings of this study that further research could be carried out as follows: -

1. Further research should be carried out on the same topic of this study using larger samples in different districts in Kenya.
2. A study should be carried out on relationships between food storage methods and household food security.
3. A study should be carried out on the nutrition security of households in Embu District.
4. A study should be carried out on how other variables such as Household Expenditures affect Household Food Security.
5. A study should be carried out to find out whether there is any significant difference in resource utilization between different geographic locations and food security.

REFERENCES

- Almgir et.al (1991). Providing Food Security for All. London: International Fund for Agricultural Development.
- Alamgir M. and Jaizarr Idriss (1992). The State of World Poverty. Rome: International Fund for Agricultural Development.
- Becker, R. (1983). The Contribution of Wild Plants to Human Nutrition in the Ferlo, Northern Senegal Agroforestry Systems pg.257-267.
- Bleiberg, F. Brum, A., Goihman (1980). Duration of activities and Energy Expenditure of Female Farmers in Dry and Rainy Seasons in Upper Volta. British Journal of Nutrition 43 pg. 71-82.
- Borg W.R., Gall A.N. and Gall P.G. (1996). Educational Research: An Introduction. USA: Longman.
- Boserup E., (1989). Woman's Role in Economic Development. New York: St.Martin's Press
- Bouis and Haddad J. (1990), Effects of Agricultural Commercialisation on land Tenure, Household Resource Allocation in the Philippines. Washington D.C.: International Food Research Institute No. 79.
- Bryson J. (1981), Women and Agriculture in Sub-Saharan Africa: Implications for Development: An Explanatory Study. Journal of Development Studies (17) 3: 29-46.
- Carangal V.R. and Club, (1986). Crop Residues and Fodder Crops in Rice Based Farming Systems in Dixon R.M. (Eds). Proceedings of the Australian-Asia Fibrouse Agricultural Residue Research Network Workshop, University of the Philippines, Los Banos, Philippines, Cambana Australia pg. 3-23.
- Cecelski E. (1985). The Rural Energy Crisis: Women's Work and Basic Needs: Respective and Approaches for Action. Geneva: International Labour Office.
- Chavangi, N.A. and Hansen (1983). Women in Livestock Production with Particular Reference to Dairying Prepared for Expert Consultation on Women in Food Production. Rome: FAO.
- Consolata Hospital (1986), Annual Report. Nyeri: Catholic Printers

- _____ (1987), Annual Report. Nyeri: Catholic Printers.
- Dankelman and Davidson (1980), Women and Environment in the Third world, Alliance for the future. London: EarthScan Publications Ltd.
- Deacon and Firebaugh (1988), Family Resource Management. London: Allyn and Bacon, Inc.
- Dey J. (1985). Women in Africa Rice Farming Systems. Women in Rice Farming Proceedings of a Conference on Women in Rice Farming Systems. USA: Brookfield pg. 419-444.
- FAO (1990). Gender Issues in Rural Food Security in Developing Countries. Paper Prepared for 15th Session on the committee on Food Security. Rome 26th - 30th March.
- FAO (1995). The Farming System Approach to Development and Appropriate Technology Generation. Rome: FAO.
- FAO (1996). Food Security and Nutrition. World Food Summit Technical Background Documents Vol.1 Rome: FAO.
- FAO (1997). Gender, Key to Sustainability and Food Security. Rome: FAO.
- FAO (1998). Women- Users Preservers and Managers of Agro-Biodiversity. Rome: FAO.
- Falconer, J. and Arnold J.E.M. (1988). Forests, trees and Household Food Security. Overseas Development Authority, Social Forestry Network Paper 7a 24pp.
- Falconer J. and Arnold (1991) Agroforestry and household Food Security (1991). Agroforestry for Sustainable Production: Economic Implication (Princeley, R.T. ed) pp. 215-239.
- Fleuret and Fleuret (1980). Nutrition. Consumption and Agricultural Change. Human Organisation 39(3): 250-260.
- Frankenbeger and Goldstein (1991). Linking Household Food Security with Environmental Sustainability. Through Analysis of Coping Strategies (Eds). New York: Kumarian Press.
- Gay L.R. (1981), Educational Research U.S.A.: Ball and Howell Company.

Garcia M., (1991). Impact of Female Sources of Income on Food Demand Among Rural Households in the Philippine. *Journal of International Agriculture* 30(2) pp.109-124.

GOK, (1992) Welfare Monitoring Survey II, Basic Report Nairobi: Central Bureau of Statistics.

GOK (1994) Welfare Monitoring Survey I, Basic Report Nairobi: Central Bureau Statistics.

GOK (b) (1994) Embu District Development Plan Nairobi: Government Printer.

GOK (1997). The Second Participatory Poverty Assessment Study-Kenya Vol.1. Nairobi: Government Printers.

GOK (2000) Second Report on Poverty in Kenya Poverty and social Indicators Vol. II Nairobi: Central Bureau of Statistics.

GOK (2000) Second Report on Poverty in Kenya Poverty and Social Indicators. Vol. II Nairobi: Central Bureau of Statistics and GTZ.

GOK (2000) Second Report on Poverty in Kenya Incidence and Depth of Poverty Vol. I. Incidence and Depth of Poverty.

GOK (1989): Kenya Population Census. Nairobi: Central Bureau of Statistics.

GOK/world Bank 1995, A Participatory Poverty Assessment Study Kenya.

GOK (a) (1994). Sessional Paper No. 2. On National Food Policy.

GOK (1992) Nutrition Manual, Agricultural Extension Service Division of Home Economies.

GoldSchimdt-Clermont L.(1982).Unpaid work in the Household. Geneva: International Labour Office

Haddad L. (1992). The Impact of Women's Employment Status on Household Food Security at Different Income Levels in Ghana. *Foods and Nutrition Bulletin*, No. 4 pp. 341-344.

Haddad and Hoddinott J. (1996). Household Resource Allocation in Cote d'Ivoire: Inference from Expenditure Data In: Llyoyd T.A. and Marrissey W.O. (Eds). London: Macmillan.

Haddad, L. (1997), *Achieving Food Security in Southern Africa: New Challenges and Opportunities* U.S.A: International Food Policy Research Institute.

Hammer, T. (1982), *Reforestation and Community Development in Sudan*. Washington D.C.

Heidhues, F. (1992), *Consumption Credit in Rural Market Development*. Paper Presented at the Seminar of Financial Landscapes. Reconstruction at Wageningen. The Netherlands. November 17-19.

ICRAF (1994). National Agroforestry Project. KARI-Regional Research Centre-Embu. Annual Report: March 1993-March 1994 Report No. 81.

ICRAF (1995), *Linking Actors in the Agricultural Knowledge System in Embu District*. Nairobi: ICRAF. Report No. 103.

ICRAF (1996) National Agroforestry Research Project. KARI- Regional Research Centre-Embu Annual Report: March 1995-March 1996. Report No.108.

IFAD (1988) *Credit for the Rural Poor: A Review of IFAD'S Experience 1978-1987*. Rome: IFAD.

Ilikkaracan I. and Appleton (1995), *Women's role in Technological Innovation*. Britain: United Nations Development Fund for Women.

Immink, M. and Alarcon, J.A. (1992). *Household Income, Food Availability and Commercial Crop Production by Smallholder farmers in the Western Highlands of Guatemala*. Economic, Development and Cultural Change (In press).

ITDG (1995). *Food Security Progress 1993-1995* United Kingdom: Intermediate Technology Development Group.

Jaetzold R. and Schmidt H.(1983). *Farm Management Hand Book of Kenya*. Nairobi: Ministry of Agriculture and German Agricultural Team

Kennedy, E. (1989). *The Effects of Sugarcane Production on Food Security, Health and Nutrition Analysis*. Washington D.C.: International Food Policy Research Institute Report No.78.

Khasiani A. (1992). *Ground Work: African Women as Environmental Managers*. Nairobi: African Centre for Technology Studies

Onchere S.R. (1987). Agricultural and Economic Characteristics in Van Ginnenkin J.K., Muller (Eds). Maternal and Child Health in Kenya: An Epidemiological Study. London: Croom Helm.

Owuor O., and Okello (1995). Food and Nutrition Surveillance and Planning in Kilifi District Kenya. A Model for District Multi-Sectoral Policy Formulation and Planning. Nairobi: Ministry of Planning and national development and African Studies centre leiden

Saito, Spurling and Mekonnen (1994). Raising the Productivity of Women Farmers in Sub-Saharan Africa. Washington D.C. World Bank. Africa Technical Department Series No. 230.

Sandhu and Sandler (1986). The Technology and Tools Book: A Guide to Technologies Women Use World-wide. Britain: Intermediate Technology.

Schultink J., Klawer W., Wijk H., Hautvast (1990). Body Weight Changes and Basal Metabolic Rates of Rural Business Women during Seasons with Different Energy Intakes European Journal of Clinical Nutrition (44(1): 31-40).

Teklu, T., Von Braun and Laki A., (1991). Drought and Famine Relationships in Sudan: Policy Implications. Washington D.C. Institute of Food Policy Research Institute Report No. 88.

Thomas D., (1990). Intra-household Resource Allocation: An Inferential Report. Journal of Human Resource 25(4): pp.635-655.

Topark-Ngarm A., Gutleridge R.C., (1989). Fodder productivity of Perennial Sesbania Species. In Proceedings of Perennial Sesbania Species in Agroforestry Systems Workshop Held in Nairobi at the International Centre for Nairobi Kenya.

UNICEF (1998). The State of the World's Children Focus on Nutrition. New York: Oxford University Press.

UNICEF (1999). Challenges for Children and Women in the 1990s. Eastern and Southern Africa in Profile. New York: Oxford University Press.

Von Braun and Webb (1989). The Impact of New Crop Technology on the Agricultural Division of Labour in a West African Setting. Economic Development and Cultural change. 1(3): pp513-534.

Webb B., (1989). IntraHousehold Decision-making and Resource Control: The Effects of Commercialisation and nutrition. Washington D.C: International Food Policy Research Institute Report No.3.

Wickens G., (1986). Alternative uses of Browse In Browse in Africa: Current State of Knowledge.

Wilk R., (1989). Decision Making and Resource Plan within the household. USA: West View Press

World Bank (1989). Sub-Saharan Africa from Crisis to Sustainable Growth. Washington D.C: Oxford University Press

World Bank (1990) World Development Report. Washington D.C: World Bank.

Yambi O., (1996). Linking Women Household Food Security and Nutrition: A Conceptual Approach. In Women Agricultural Intensification and Household Food Security. Proceedings of a workshop on Women Agricultural Intensification and Household Food Security, held at the Sasakawa Centre, University of Cape Coast, Ghana 25-28 June 1996 pp 46-59

Zeller, M., Schreider, Von Braun, Heidhues (1987). Rural Finance for food Security for the Poor. Implications for Research and Policy. Washington D.C. International Food Policy Research Institute.

APPENDIX 1

AN INVESTIGATION OF RESOURCES WOMEN USE TO ENHANCE HOUSEHOLD FOOD SECURITY IN EMBU DISTRICT

The researcher will carefully read each of the following questions to the respondent and fill in the response that best describes the respondent's answer.

A. DEMOGRAPHIC INFORMATION

Division _____ Location _____

Sublocation _____ Village: _____

Household number _____ Date: _____

Marital status _____

1. Indicate your gender

2. Male []

(i) Female []

3. How old are you?

20-29

30-39

40-49

The 50-59

60 and above

4. Are you the head of the family?

1. Yes [] 2. No []

5. If answer is no, what is your relationship with the head of household?

6. How many people including (children, relatives, and friends) live in your household?

7. What is your highest level of education?

1 - None

2 - Primary

3 - Post Primary Training (specify e.g. carpentry, Tailoring, masonry)

4 - Secondary

5 - Post Secondary Training (specify e.g. carpentry, Tailoring, masonry)

8. Have you had any agricultural training?

1 = Yes []

2 = No []

9. If yes, specify the organisation, duration and skills acquired?

<u>Organisation</u>	<u>Duration</u>	<u>Skills Required</u>

What is your occupation?

9. How much money do you spend per month on food expenditure?

1. Below 1000
2. 1001-2500
3. 2501-5000
4. 7501-10000
5. Above 10,000

B. HOUSEHOLD'S FOOD SOURCES AND CONSUMPTION:

What is your family's food source?

1. Cultivation (land)
2. Buying (market)
3. Donation (gifts)
4. Cultivating and buying
5. Donation and cultivating
6. Buying and Donation

10. List the crops you grow in your farm?

11. Indicate the acreage, amount of food you harvest, donate, sell and for your household use.

Crop check	Amount harvested in debes	Amount donated	Amount wasted	Amount sold in Debes	Amount for house-hold use
Maize					
Sweet potatoes					
Beans					
Millet					
Pigeon peas					
Cow peas					
Irish potatoes					
Pigeon peas					
Cow peas					
Millet					
Sorghum					

12. How much food do you have in storage now from the last season?

[Measure debes, 2 kg tin]

Check in the - Granary _____

Cupboards _____

Pots _____

B. HUMAN RESOURCES

LABOUR

13. Who is responsible for the following activities?

Agriculture activities	Person Responsible
1. Preparing the fields	
2. Planting	
3. Weeding	
4. Pest Control	
5. Harvesting	
6. Food Processing	
7. Storage (pest control Measure)	
8. Marketing of Surplus foods	

- Code: 1. Household head 3. Children
2. Wife 4. Hired labour
5. Helping labour 6. All of the above

14. Which task in No.13 is not performed in the household? (Give Reasons)

15. Do you hire labour? 1= Yes [] 2= No []

16. If yes, for what task? List

- (i)
- (ii)
- (iii)
- (iv)
- (v)

17. Which period of the year do you often hire labour?

DECISION MAKING

18. Who makes decisions about farming practices and planning in this household with regards to the following crops/enterprise?

Enterprise	Decision Maker	Enterprise	Decision maker
Maize		Beans	
Irish potatoes		Sweet potatoes	
Tomatoes		Millet	
Cabbages		Sorghum	
Milking livestock		Pigeon peas	
Feeding livestock		Cow peas	
Green grams		Fruit trees	
Macadamia nuts		Planting Trees- <i>grivellea</i> Timber	
Tea		Coffee	

Codes for Decision making:

1. Husband only
2. Husband and wife jointly
3. Wife only

19. Rights of wife

(a) Does wife have a field under exclusive control?

1= Yes [] 2= No []

(b) Does wife have control of any income source?

If yes, from which sources:

20. Explain how you organise your time

Morning _____

Lunch _____

Evening _____

LAND

21. How many acres of land do you have?

22. How much land have you allocated food and cash crops respectively?

Food crops _____ acreage _____

Cash crops _____ acreage _____

23. How do you ensure you have maximum yields from your land?

24. What problems do you face in trying to obtain maximum yields?

25. How far is your land from the road? _____ km.

26. How does the road affect your transporting goods to and from the market?

FARMING CAPITAL

27. List the farm implements that you have and explain purpose, suitability and adequacy of them.

Implements	Purpose/Activity	Suitability of Equipment to Activity	Adequacy
Wheel barrow			
Panga			
Fork Jembe			
Slasher			
Ox-cart			
Ox-plough			
Tractor			

28. Indicate the suitability, adequacy of the following farm inputs.

29. Do you have access to any credit facilities?

1= Yes [] 2= No []

30. If yes, state the creditor(s), purpose and amount and repayment period?

Source	Purpose	Amount	Repayment period
--------	---------	--------	------------------

--	--	--	--

Codes for suitability

- 1= Least Suitable 2= Less suitable 3= Suitable
 4= fairly suitable 5= Most suitable

Codes for Adequacy

- 1= None 2= Not enough 3= Fair enough
 4= Enough 5= Most Enough

CONSTRAINTS

31. What are the major problems you encounter in trying to make you household food sufficient?

32. How do you minimize these problems (Stated above)?

APPENDIX II

FOCUS GROUP INTERVIEW SCHEDULE

- Q1. What task do you perform between January and December?
- Q2. Which months are the busiest on the farm and what are the levels of gender involvement.

<u>Month</u>	<u>Activities</u>	<u>Who does the job</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____

- Q3. When do you start experiencing food shortages in this region?
- Q4. How do you ensure that your households is food secure?
- Q5. In your opinion, how would you utilize the resources you have to ensure you are food sufficient?
- Q6. What are your sources of agriculture information (messages)?
- Q7. How often do you get this information (training)?
- Q8. How does the agriculture information help you?

APPENDIX III

Table A: Average food requirements for an average adult male in Kenya.

Type	Requirement/Person per Day	Requirement/Person per year
Maize	330 grams	1 1/3 bags
Pulses	100 grams	36 Kgs
Fruits	40 grams (1 small fruit)	365 fruits
Vegetables (leafy)	100 grams	36 Kgs
Eggs	3 eggs/week	156 eggs
Milk	1 glass	365 glasses
Meat	100 grams	36 Kgs

The above data can be used to calculate the approximate amount of food to be stored per family, but it should be noted that different ecological zones have different foodstuffs and the most important point to note here is that the rule of "3: (the main food groups) must be kept during the planning stages through planting, harvesting, storage and consumption.

Example: Calculations based on the above figures indicate that a family of eight persons should store the following

Maize	10-14 bags/year
Beans	4 bags/year
Eggs	40 trays/year
Meat	288 Kgs/year
Vegetables/fruits	288 Kgs/year
Fruits	2920 small fruits/year
Milk	400 litres/year

Source: Human Nutrition in Tropical Africa, P.229-230.

APPENDIX IV

Table B. Amount of food needed for storage for Karurumo, Kianjuki and Nguviu Sub-locations to Ensure Food Sufficiency per Household.

Karurumo	1 bag = 90 Kg = 5 debes
Average numbers of persons in a household are six.	
Maize	8-11 bags/year
Pulses (beans)	3 bag/year
Eggs	30 trays/year
Fruits	2190 small fruits/year
Milk	300 litres/year
Kianjuki and Nguviu sub-locations 1 bag = 90 Kg = 5 debes	
Average Number of persons in household are seven	
Maize	9-13 bags/year
Pulses (Beans)	4 bags/year
Eggs	35 trays/year
Meat	252 Kgs/yea
Fruits	2555 small fruits/year
Milk	350 litres