

**THE ROLE OF HOME
GARDENING IN HOUSEHOLD
FOOD SECURITY IN BUTERE
DIVISION, WESTERN KENYA**

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ABSTRACT

Food security has been an issue of concern in Kenya and other parts of the developing world. Population has been increasing at the rate of 2.8% per annum while agricultural production has slowed down to 1.3%. This deficit has led to chronic food insecurity, which has been identified as the prime cause of malnutrition in many households. Food production in home gardens can significantly contribute to food security at household level. However, this has not been fully exploited. A study was set up to assess the role of home gardening on food security among rural households in Butere division between January and March 2003. The objectives of the study were: to identify the socio-demographic and agro-economic characteristics of index households, establish food security status of households, identify methods of food procurement for households, to establish factors that influence home gardening and to determine the role of home gardening in household food security. A descriptive survey design was used whereby 100 households were sampled using simple random sampling. Data were gathered using an interview schedule and an observation checklist. Twenty key informants were purposefully selected and responded to a self-administered questionnaire.

Data generated were analyzed both qualitatively and quantitatively. Pearson correlation coefficient was used to determine the role of home gardening in food security. Results revealed diverse socio-demographic and agro-economic characteristics of index households. Majority of households were food insecure with regard to food stock and the household's perception of food security but few were insecure with regard to number of meals eaten daily within households. Methods of food procurement were agricultural production, buying from the market and

gathering. Factors affecting home gardening included land, cash crop farming, technology and level of education. Home gardening plays a role in household food security with respect to land size and number of livestock but not with home garden crops. Home garden crops had no significant role on either food stock or number of meals eaten. Recommendations emphasized the promotion of home gardening by dispensing existing information to rural households, conducting more research, empowering rural households financially, improving infrastructure and educating households on utilization of home garden produce, as this would enhance food security. The data from this research will be useful to governmental and non-governmental agencies promoting food security and also home gardening and the rural households who are the target of this research. Also, the data will contribute to the general body of knowledge.

CHAPTER ONE

INTRODUCTION

1.1 Background

Food is a basic need for life. While developed countries exhibit high technological advancement in food production, gardening remains the most important method of food production for majority of the people in developing countries. The economies of most sub-Saharan African countries are dominated by agriculture, which represents the largest non-governmental sector on the continent. Agriculture and related activities represent about 30-35% continental Gross National Product (GDP) and are the main source of income and employment for three-quarters of the economically active (Werblow, 1996). However, agricultural production has slowed down to 1.3% in Africa since 1980. A population growth rate averaging 2.8% per annum over the last three years has meant an increasing food gap and decreasing availability of food supply (Werblow, 1996). At national level, this deficit has led to chronic food insecurity in all sub-Saharan African countries.

Kenya, as well, has been experiencing a decline in food production since the late 80's, while the population growth rate has been increasing. According to Oniang'o (2001), over 89% Kenyans are food poor, which means they are not adequately nourished. A majority of these people are in the rural areas. Consequently, there is an increase in morbidity and mortality rates as a result of malnutrition. The question we need to ask is, why are developing countries often food deficient especially when so many of them are well

endowed with natural resources, with a major portion of their population employed in agriculture?

Food insecurity has been identified as the prime cause of malnutrition in many Kenyan households. While poverty has been identified as one of the underlying causes of food insecurity (ACC/SCN, 1997), the lack of access to food accompanying it, results from processes of marginalization and conflicts (Eide, 1999). These in turn are affected by economic and political processes, and, to some extent, by cultural practices. According to Latham and Beaudry (1999), food security requires a nutritionally adequate and safe food supply at both national and household levels, a reasonable supply of food during the year and in all years, and access by each household to sufficient food to meet the needs of all.

Eide (1999) argues that while food supply has substantially increased globally, constraints on access to food and continuing inadequacy of incomes at household and national level to purchase food, instability of supply and demand, as well as natural and man-made disasters, have prevented basic food needs from being met. As food becomes scarce at household level, the poor continue to suffer in many ways. Many families have to go without food for even several days, and the issue of a balanced meal does not even arise at such times. Seasonal hunger has become rampant year in year out.

In Butere-Mumias district, food poverty affects the entire district (Poverty Eradication Commission, 2000). In the sugarbelt zone, most land is under cane, leaving no land for food crop production. High population growth rate, HIV and AIDS, and households headed by people without formal education, coupled with the slow maturation of

sugarcane are the major causes of food poverty and malnutrition in the district (Poverty Eradication Commission, 2000). The food insecurity situation has led to many stakeholders and experts in nutrition and agriculture proposing the empowerment of individuals and households to intensify production of food on the small lands available thus home gardening. Home gardens, as supplementary food production systems can enable households to raise sufficient food on small lands. Developing strategies for enhancing home gardening in Butere-Mumias, therefore, requires taking into account specific characteristics of the affected people such as the indigenous knowledge and the physical and socio-economic environment. Efforts have to be made at household and community level to identify and promote strategies for successful home gardening so as to enhance food security.

1.2 Statement of the Problem

Access to a nutritionally adequate and safe diet at all times is one of the most basic human rights, yet for a number of rural households in Butere-Mumias district, western Kenya, it remains unattainable. This could be attributed partly to the fact that food production strategies have not maximized the availability of land and greater variety of nutritious foods in the district. Food and Agriculture Organization; FAO (1997) noted that home gardening, for instance, despite its capacity to ensure food security, rarely receives official recognition, and is often haphazardly done. Western Kenya is endowed with a high agricultural biodiversity, yet prevalence of general malnutrition leading to underweight, marasmus and kwashiorkor are frequently reported (Butere-Mumias DDP, 2001-2006). Diets and inadequate food have been identified as the main causes of

malnutrition. Incidences of malnutrition are high, especially among children as reported from various health institutions within the district. This situation calls for a study to address the issue of diets and food adequacy at household level.

1.3 Purpose of the Study

Although several studies have been carried out to address the issue of food security in Butere division, no known study had been carried out to assess the role of home gardening in food security. Thus this study was carried out with the purpose of investigating the role played by home gardening in ensuring food security, as a step towards better household and community nutrition.

1.4 Objectives of the Study

This study addressed the following objectives:

General Objective:

- To determine the role of home gardening in household food security in Butere division.

Specific objectives:

- To identify the socio-demographic and agro-economic characteristics of households in Butere division.
- To establish the food security status of rural households in Butere division.
- To identify methods of food procurement for households in Butere division.
- To establish factors that influence home gardening in Butere division.

- To determine the relationship between home gardening and household food security.

1.5 Research Questions

- Are households in Butere division of western Kenya food secure?
- Does home gardening in rural households of Butere division play a role in ensuring household food security?

1.6 Assumptions of the Study

The study was conducted on the basis of the following assumption:

- That sampled households will be willing to participate in the study.
- That rural households in Butere division practice home gardening.

1.6 Significance of the Study

Information from this study can be used by both governmental and non-governmental organizations that promote food security strategies to promote home gardening. Those organizations already promoting home gardening can use this information to evaluate their projects. This can form a basis for laying out strategies for similar projects in future. The extension services of the Ministry of Agriculture can use this information to enhance their efforts in promoting food security, educate rural households on the benefits of home gardening, reduce food insecurity and improve quality of life. Nutritionists of the Ministry of Health and other Community Health Providers will find this information

useful in health promotion through good nutrition and prevention of nutritional deficiencies and disorders. Further still, the study will make a contribution to the general body of knowledge on food security and home gardening.

1.8 Limitations of the Study

This study focused on home gardening in Butere-Division, Butere-Mumias district, therefore, generalizations to other areas should be done with caution.

1.9 Definition of key terms

Food Security: access by all people at all times to the food needed for a healthy life (FAO 1997).

Home Garden: is a supplementary food production system managed and controlled by household members. It is used to raise home garden crops and livestock. A home garden is not the household's primary source of food.

Home garden crops: refers mainly to fruits, vegetables, spices, and legumes, roots and tubers grown on small scale. Maize may be considered when sparsely intercropped with the above.

Household: people who live together and share food and other resources available to them.

Key informants: individuals handpicked to respond to questionnaires because they are informative in relation to farming practices and the food security situation in Butere division. The information gathered is a quality check for data collected from index households.

Livestock: In this study, livestock refers to cattle, goats, sheep, pigs and poultry.

Modern methods of food production: the term refers to use of labor saving machinery and equipment, certified seeds, improved shelters, and services provided by qualified staff in agriculture, so as to improve yields in farms.

Poultry: this refers to chicken, ducks, geese, pigeons, turkey, quail and any other bird domesticated and reared by households.

Poverty: this term as used in this thesis refers to individual's and households' inability to meet their basic needs due to lack of money.

Priority crops: this will be used to refer to the first three crops that are grown by the households according to preference.

Traditional methods of food production: the term refers to farming activities characterized by lack of labor saving equipment, certified seeds, shelters and services of qualified agricultural staff.

1.10 Conceptual framework

This research used a modified model that indicates causative factors affecting food production and food availability in the household (Mason, Habitch, Tabartai and Valverde, 1984). In this model, food available in the household is identified as a factor that eventually affects nutritional status of a family and an individual. However, this study will consider the influence of various processes affecting availability of food in the household. The interrelations of various factors can be expressed as a flow of resources determining food availability. In this model, Mason *et. al.* (1984) conceptualize the relationship of resources and flow variables to nutritional outcome. Among the resources

are land, technology, labor, climate, education and environment. All these affect food production thus the success of strategies such as home gardening.

Food production in most rural households predicts food status. The model shows that land, technology, labor, climate, education and environment affect food production and food availability at national, community, household and individual levels, which in turn affects nutritional. This may also be affected by income whereby money influences food purchases. The focus of this study was on how home gardening, which is aimed at food production affects household food availability.

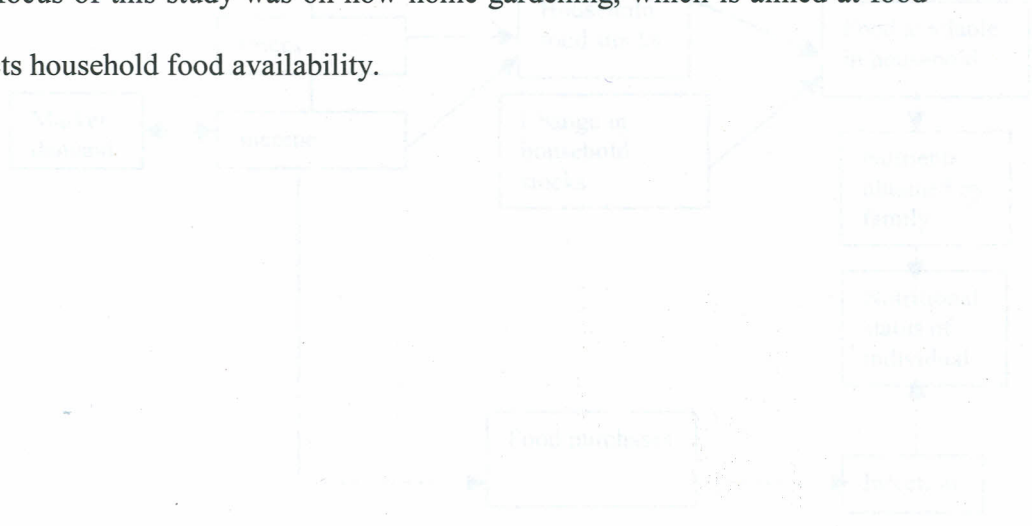
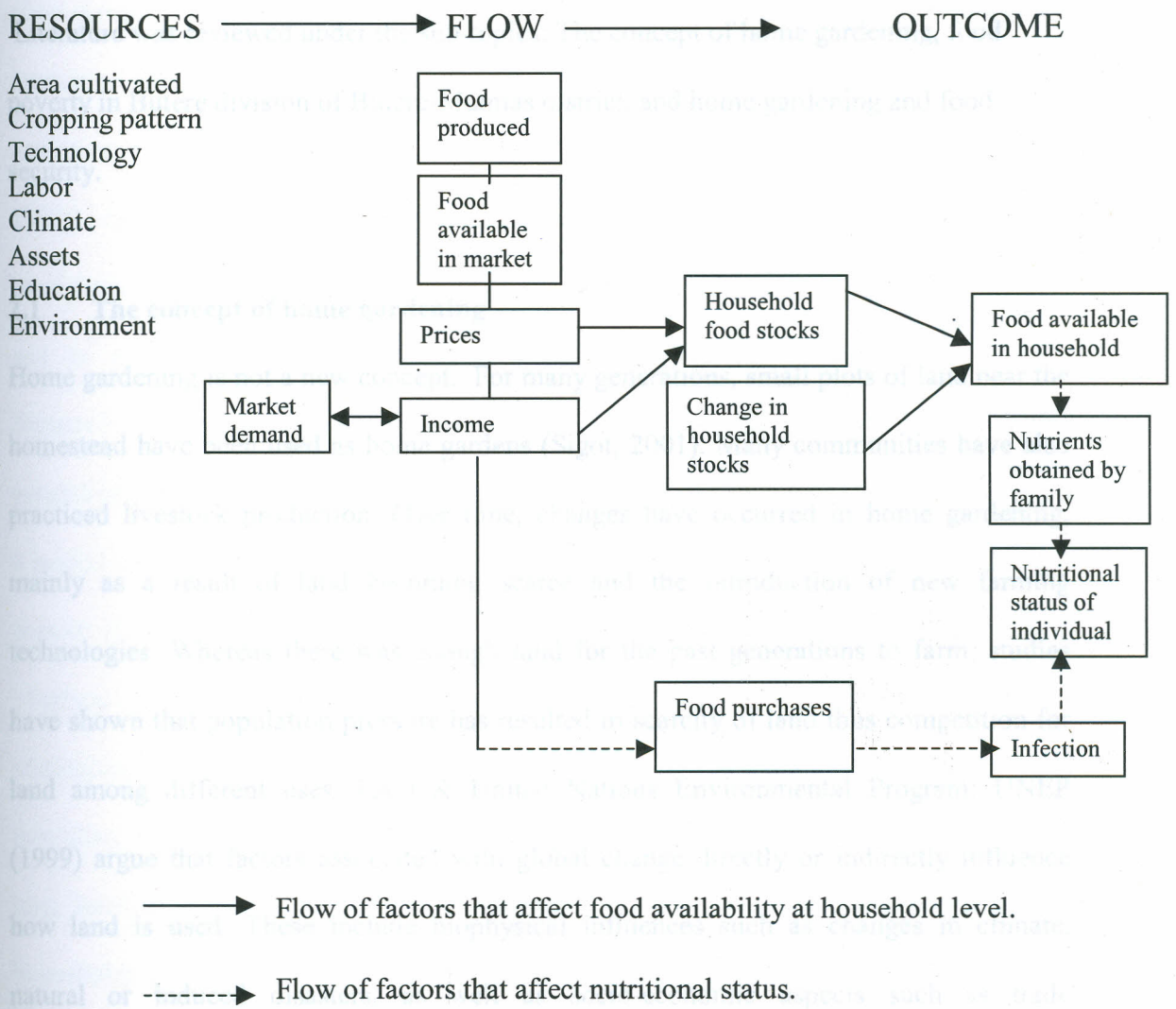


Figure 1: Relation of flow of variables to food availability in the household: hypothesized model for the study, modified from Mason *et. al.* (1984).



CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

Literature was reviewed under the sub-topics: The concept of home gardening, food poverty in Butere division of Butere-Mumias district, and home gardening and food security.

2.1 The concept of home gardening

Home gardening is not a new concept. For many generations, small plots of land near the homestead have been used as home gardens (Sigot, 2001). Many communities have also practiced livestock production. Over time, changes have occurred in home gardening, mainly as a result of land becoming scarce and the introduction of new farming technologies. Whereas there was enough land for the past generations to farm, studies have shown that population pressure has resulted in scarcity of land thus competition for land among different uses. FAO & United Nations Environmental Program; UNEP (1999) argue that factors associated with global change directly or indirectly influence how land is used. These include biophysical influences such as changes in climate, natural or induced disasters, as well as socio-economic aspects such as trade liberalization, globalization of markets, and privatization. These changes have largely affected the rural and the peri-urban communities especially in regard to farming practices.

According to Oniang'o (2001), fifty percent of the Kenyan poor people are found in the rural areas. Kujeke (1999) notes that a majority of these people are politically, economically and socially marginalized and that they obtain most of their nutrients from plant foods, which are cheaper and more accessible than animal foods. Seventy five percent of the rural poor obtain livelihoods from agricultural activities or from non-farm activities that depend mostly on agriculture (Pinstrup-Andersen, Pandya-Lorch & Babu, 1997). For this group of people, the production of food relative to the self-sufficiency level indicates an overall declining trend. This has resulted in food insecure households and an increase in malnutrition levels in rural households. Healthy people need a balanced diet consisting of starches, proteins, vitamins and minerals. Yet in many agricultural communities, people rely on one main staple crop whose seasonality implies a period of food shortage. This season is usually referred to as the lean or the hungry season (FAO, 1997), leading to many households suffering from seasonal hunger. Magistro (1997) noted that a mixed repertoire of food and income resources have been particularly effective in the past in smoothing household consumption patterns and providing a buffer against food scarcity during periods of high climatic stress such as long intervals between dry and wet seasons. It would, therefore, be important that households diversify their food crops in order to avoid seasonal hunger.

Traditional societies throughout Africa have always exploited edible wild plants to provide an adequate level of nutrition during seasonal hunger (Maundu, Ngugi & Kabuye, 1999). This has been done to improve food security, especially among rural households who are the most vulnerable to hunger and malnutrition. For instance, over

the years communities have built up a list of vegetable species in their environment, especially during periods of food shortages. However, food from the wild is also becoming scarce necessitating the domestication of species that have previously been gathered from the wild. Through home gardening, this can be made possible thus increasing production and ensuring their availability at all times within rural households. Traditional home gardens, therefore, continue to be important sources of food and nutrients for rural communities and in places where land is scarce, the home garden may be the only cultivated plot.

FAO (2001) has shown that whereas home gardening usually becomes a day to day activity in the wet season, the extent of home garden activities during the dry season is largely influenced by availability of a reliable water source. Households owning land near streams and rivers utilize these waters and continue to produce horticultural crops, mainly vegetables. Downing & Washington (1997) argue that climate, and particularly drought, affects a wide range of activities beyond just crop yields. These activities are land quality, on-farm storage, water supplies, labor migration, rates of urbanization and rural population growth, use of inputs such as fertilizer, farm income, as well as farmers' skill and experience. Thus the ability to predict rainfall variability a season in advance could have major impacts. The utility of long-range forecasts could be enormous, not just for early warning systems, but that policy makers and farmers alike should benefit.

A traditional African garden, therefore, should contain a mixture of perennial and annual crops, well adapted to the ecological conditions of the area. Crop mixtures found in a

home garden are often the result of the deliberate selection of a wide variety of plants and tree crops that occupy different layers and play supportive roles. The crops are often intercropped, with intercropping patterns varying from area to area. Muelhoff (2001) has suggested that gardens should be highly diversified to include vegetables, spices, medicinal plants, domestic animals, poultry and fisheries. Livestock, kept on a small scale, can provide food, income and manure. According to FAO (2001), producing many different crops in a small area allows more intensive production methods and a more effective utilization of scarce resources, land and water in particular. Home gardens also should allow the use of organic farming methods, for instance use of green manure, compost and natural pesticides, which reduce food production costs and above all, provide safe and healthy food for household consumption. Local households with well-developed home gardens possess the ideas, skills and resources not only to produce a variety of crops and animals, but also take advantage of their interdependence. The animals consume waste plants from the garden, and return nutrients to the soil in their manure. This reduces the cost of maintaining a home garden. This means household gardens can be developed with extremely limited economic resources. Though population pressure can result in home gardens being located some distance from the home it is essential to look at all potentially available land when assessing the production capacity and potential of a home garden.

2.2 Food poverty in Butere-Mumias District

Food insecurity is one of the major challenges facing Butere-Mumias district (Butere-Mumias DDP, 2001-2006). According to the Poverty Eradication Commission (2000),

food poverty affects the whole district. High population has led to land fragmentation, hence, inadequate food production. The average farm size per household is becoming smaller and smaller. This implies that employment opportunities and income from agricultural activities are gradually decreasing, a situation contributing to the increase in the depth of poverty. In Butere division, poverty is due to poor land use and undeveloped infrastructure. Also, there are negative effects of government policies such as increase in the cost of agricultural and other farm inputs. These discourage farmers from employing modern farming methods. Most affected groups are peasant farmers, AIDS orphans and households headed by people without formal education (Poverty Eradication Commission, 2000). Most land in the district is under sugarcane production. Some households have put almost all their land under cane, leaving no land for food crop production. This, coupled with the long maturation period of sugarcane is the major cause of food poverty and malnutrition in the district (Poverty Eradication Commission 2001). Findings of a Butere-Mumias district seminar on "The state of poverty and strategies for intervention" (1999) reaffirmed that over-dependence on cash crops, mainly sugarcane, has negatively affected production of food crops. Due to this, levels of malnutrition are high in the district.

Besides this, poor farm management techniques and planting uncertified seeds have led to low yields. The whole district produces only thirty four percent cereals and fifty percent pulses. Table 1 shows a statistical picture of food production in the district:

Table 1: Food production activities in Butere-Mumias district

<i>Average farm size:</i>	
Small scale	3.5 acres
Large scale	Above 20 acres
Main food crops produced (in order of importance)	Maize, beans, sweet potatoes, cassava, sorghum, finger millet/groundnuts.
Main cash crops produced	Sugarcane (about 54% arable land), sunflower, tea, coffee and bananas.
Total acreage under food crops	29,554.4 acres
Total acreage under cash crops	30,493 acres
Main livestock breed	Zebu
Number of fish ponds	878

Source: Butere-Mumias DDP, 2001-2006.

From the data in Table 1, it is evident that food production is low and cannot meet the demands of the high population. This implies that other methods of food procurement have to be employed or else many people would go hungry. There needs to be intervention that will address the issue of food production using the available resources so as to attain food security.

Availability of food at household level is also affected by food distribution. Factors affecting food distribution include poor infrastructure, inaccessibility to market centers, and men's unconcern, leading to women and children bearing the burden of seasonal hunger (Butere-Mumias district Seminar on "the state of poverty and strategies for intervention, 1999). There are only two towns in the entire district, while the local markets have a small catchment. The road network is poor, with all roads leading to

Butere town being murram. These become inaccessible during rainy seasons and dusty during the dry season, hence limiting accessibility by traders who may want to sell their surpluses in the area. Consequently, the government and some non-governmental organizations have proposed various strategies to step up food production in the district. These include intensification of agricultural extension services, agricultural research, campaigns to sensitize farmers for the purpose of changing attitudes, campaigns for the growing of traditional crops, which are now being neglected, and training of farmers on food preservation techniques. However, many of these strategies have not been implemented due to lack of funding and qualified personnel.

2.3 Home gardening and food security

Food security is an issue of concern internationally. The World Food Summit (WFS) and the Food and Agriculture Organization (FAO) of the United Nations (UN) reaffirmed in 1996 the right of everyone to have access to safe and nutritious food. This is consistent with the right to have adequate food and the fundamental right of everyone to be free from hunger (Eide, 1999). This right had been proclaimed in 1948 by the General Assembly, through the adoption of the Universal Declaration of Human Rights. Nevertheless, hunger continues to be widespread and the right of everyone to adequate food is extensively violated. This shows a wide gap between rights and reality.

Studies have consistently shown that home gardens can make a significant contribution in meeting daily household food needs for better nutrition and health. Direct access to a diversity of nutritionally rich foods, increased purchasing power from savings on food

bills and income from sales of garden products, and a fallback food provision during seasonal lean periods are some of the benefits of home gardening. In most African communities, people rely on one or two staple crops such as maize, millet, sorghum, rice, cassava, yam or sweet potato (FAO 2001). These crops tend to provide the bulk of the energy intake of household members. Home gardens supplement staple crops and add variety and nutritional value to the diet. They typically include roots, and tubers, green leafy vegetables, condiments, nuts, legumes and fruits, which are rich in micronutrients such as vitamin A and C, iron and sometimes B-complex vitamins (FAO, 2001).

A study done in Northern Thailand to control vitamin A deficiency through promotion of home gardening in 1988-1991 yielded positive results (Midmore, Ninez, & Venkataraman, 1991). Using various strategies, the promotion of production and consumption of certain local foods was done (Midmore et. al. 1991 pp. 24). The results were reported as follows:

“When the project was evaluated, the results showed that the behavioral and vitamin A status objectives were achieved. Overall, the intervention area manifested a significant improvement in knowledge, attitudes and practices compared with the control area, as well as improvement in vitamin A and nutritional status”.

This study is one of those that have proved the significance of home gardening in improving food security and nutritional status among low-income groups. The project

also supported Okigbo (1994) and Bragdon (2000) in their argument that home gardens play a significant role in safeguarding the genetic basis of traditional (local) crops.

According to Muelhoff (2001), having direct access to a variety of fresh garden foods on a daily basis significantly improves the quantity and quality of nutrients available to the family. Gardening households often obtain more than fifty percent of their household supply of vegetables, fruits, plantains, and herbs from their gardens. A survey conducted in rural Nepal which contains about ninety percent of the total population showed that eighty five to ninety four percent of households rely entirely on home gardens for a year-round supply of vegetables (Shrestha, Gautam, Rana & Sthapit, 2001). This is an important aspect of food security. In garden systems that include animal raising, poultry and fisheries, it is the primary and often only source of animal protein for households.

Further still, the requirements of a balanced diet are met when a consumer eats a diet that is diversified, that means a sufficient variety of foods are consumed daily, the foods are consumed in the right proportions, and they satisfy the consumer's taste, preference and food habits. Legumes, meat, chicken and fish provide protein and extra energy as well as important minerals and vitamins. Meat, chicken and fish provide plenty of iron, greatly increasing the iron value of a meal. Although expensive and frequently in short supply, meat, chicken and fish need to be incorporated in the diet for energy, and nutrients for children's growth and development. Muelhoff (2001) observed that in Africa, only 3.2% of dietary energy on average comes from this source. According to Abassa (1995), emphasis should be laid on production of livestock in sub-Saharan Africa, as they are

important sources of high-class proteins, minerals, vitamins and accessory factors that are not found in many plant materials. However, this does not underscore the fact that green leafy vegetables and yellow- and orange colored fruits provide essential vitamins and minerals, particularly folate, vitamin A, E and C. Vitamin A is also supplied by red palm oil, yellow maize orange-colored sweet potatoes, egg yolks and liver. The favorable practice of eating indigenous, leafy vegetables and legumes adds vital nutritional elements to the traditional African diet, namely good vegetable sources of vitamin A and C, and protein (FAO, 1987). In Africa, plant foods provide on average eighty percent of all vitamins and thirty percent of vitamin C.

During the lean season, when the staple foods have been depleted and before the new harvest is ready, home garden foods can augment or replenish family food supplies (Muelhoff, 2001). Unlike field crops, home garden foods can be cultivated and made available, for family consumption year round, if there is enough water available. These gardens are a source of early crops such as maize and beans grown near the home, and these keep the family going as they await the main harvest (FAO, 2001). A case of the Nepalese home gardens showed that the variety of annual and perennial crops and vegetables grown in home gardens provide a secure supply of fresh produce throughout the year and meet the food and nutritional requirements of the family (Shrestha *et. al.* 2001). Maize for instance is harvested and eaten green to supplement the declining stock of the old harvest.

Home gardens can be used to ensure the stability and frequency of number of meals within the household. A project done in Kinshasa, Zaire in 1989 to help poor people take charge of their own destiny yielded significant results. The project 'Jardins et Elevages de Parcelle' (JEEP) was implemented to promote home gardening, in order to contribute to the health of the target people by enhancing food security (Mpoyi and Paulus 1997). Using various strategies, the project succeeded in securing a certain frequency of meals during crisis periods in the country. In view of this, a conclusion can be made that home gardening is an effective means, within reach of the poorest, to escape from the cycle of food insufficiency. The know-how remains among the populations and has a chance to be transmitted from generation to generation. Thus, for rural households, home gardening is a viable strategy to reduce food poverty and malnutrition.

Other than providing direct access to food, home gardens can provide income from the sale of produce and non-food items including spices, herbs and medicinal plants (Muelhoff, 2001; FAO, 2001; FAO, 1987). For instance the sale of livestock and their products contributes half or more of the cash income earned by farmers engaged in mixed crop-livestock production in sub-Saharan Africa (Abassa, 1995). According to Olembo, Fedha and Ngaira (1995), there is still a strong reliance on the use of herbs as medicinal plants even today. The sale of home garden produce can make a substantial contribution to household income, especially during seasons when sources of employment and income are limited or harvests are reduced by natural disasters such as floods, outbreak of pests or animal disease, or personal illness. At these times, income from home gardens can be

used to purchase food items that the family cannot produce, thus adding variety to meals and supplementing production.

Home gardens have also been shown to improve agro-biodiversity. There is a growing realization that biodiversity is a fundamental basis of agricultural production and food security, as well as a valuable ingredient of ecological stability (Thrupp, 1998). However, agro-biodiversity is rapidly disappearing throughout the world. Thrupp (1998) notes that the loss of diversity extends from genetic resources in plants and animals to species diversity among crops, livestock, insects and microorganisms. Such losses jeopardize production, threaten food security, and result in high economic as well as social costs. Accordingly, the livelihoods and survival of local people are imperiled. Therefore, home gardening should be promoted in order to preserve genetic resources.

For home garden projects to be successful and sustainable, therefore, a number of important elements need to be considered. FAO (1997) has suggested some important factors to consider in encouraging the expansion for home gardens, which include security of land tenure to facilitate long-term investment in home gardens. In Kenya, land tenure was found to affect food security (Inter-agency task force on Food Security in the Horn of Africa, 2000). This task force found out that lack of secure land tenure results in inadequate incentives for farmers to invest in land improvement or to implement effective soil conservation measures. This exacerbates land degradation and reduces the potential for combating food insecurity in the medium and long term. Thus land use policies should ensure long-term investments. Other considerations are better extension services,

including credit, to promote the wider establishment of home gardens and improve their management.

Nwa (1997) also suggested some approaches to increased agricultural production and food security in sub-Saharan Africa. These include the development of drought resistant and short duration crop varieties that can be raised in home gardens, the use of indigenous food plants, pests, diseases and weed control strategies, as well as land maintenance and degraded land restoration. Abassa (1995) further noted that the food production performance of African livestock sector is inadequate. Therefore, research needs to be intensified in order to realize Africa's great potential for livestock development. Since home gardening is a complex and varied production system forming part of a wider household economy, gardening interventions to improve nutrition require a good understanding of local conditions so that project goals can be adapted locally (FAO 1997). It is necessary for extension workers to work closely with farmers, especially with women farmers, to identify resources and other constraints and locally appropriate ways to promote home gardens that are sustainable. Also, technological delivery to farmers should be promoted and access to credit by farmers for primary production enhanced.

According to Muelhoff (2001), households can use several strategies for ensuring continuous access to a variety of nutritious foods. These include the year round production of variety of home garden foods and the preservation, processing and adequate storage of foods. Households can thus insure themselves against seasonal

shortfalls, but this requires planning and thinking about what is the most effective use of available resources so as to prevent hungry seasons. Appropriate gardening techniques are available to extend garden production and enable households to process and store perishable staples, legumes, vegetables and fruits, in order to extend their availability and enhance their marketing. But for most rural households, accessibility to these techniques is still a big hindrance to their food security.

2.4 Gaps in literature

In view of the reviewed literature, studies done on home gardens have not yielded any information on home gardens and food security in Western Kenya. Thus the researcher was intrigued to carry out an investigation to determine the role played by home gardens in food security in Butere division of Butere-Mumias district, Western Kenya.

CHAPTER THREE

RESEARCH METHODS

3.0 Introduction

This chapter provides information on: The research design, area of study, population and sampling, research instruments, data collection procedures, data analysis and measurement of variables.

3.1 Research design

A descriptive survey design was used in this study. Survey research is used to study the distribution of characteristics in a population (Mason and Bramble, 1997). It can be considered a way to measure or observe properties of a population. There is an attempt to collect data from members of a population in order to determine the current status of the population with respect to one or more variables (Mugenda and Mugenda, 1999). This method was used, as it is appropriate to gather data from a large sample of a population within a short time. It also allows for study of social conditions and determines relationships that exist between people and variables under study.

3.2 Time and Area of study

This study was carried out in Butere division of Butere-Mumias district between January and March 2003. This was a hot and dry season with no rains and almost no crop production activities going on. Butere-Mumias district is the most recent and smallest of the eight districts of western province. The district was carved out of the larger Kakamega district (figure 2). It covers a total area of 939.3 sq. km. It borders Busia and

Bungoma districts to the west, Siaya and Vihiga districts to the south, and Kakamega district to the north. The district is divided into five administrative divisions, twenty locations and seventy-eight sub-locations. The divisions are Matungu, Mumias, Butere, Khwisero and South Wanga. Butere division has the highest number of administrative units i.e. eight locations and twenty-five sub-locations, and it covers a total area of 209.8 sq. km.

In terms of physio-geographic and natural conditions, the entire district has a varying topography with a few hills and valleys dissected by a number of small streams. It has an extensive undulating peneplain that dips southwards from about 1,641m to 1,500m above sea level, to a further 1,250m to the west. Granite rocks cover more than half of the district roughly to the north, while meta-sedimentary rocks of the Kavirondian system on the other hand cover most of the southern part of the area, but with narrow strips of Nyanzian system volcanic rocks. Because of these rocks, the district has a variety of soils. Butere division in particular has soils ranging from sandy loams, clay loams and well drained loam soils. The good and well-developed soils have led to farmers devoting almost 68% of their arable land to sugarcane production.

The district is also dissected by a number of streams and rivers, giving it ample surface water resources. The major rivers are Nzoia, Yala, Lusumu, Lairi, and Viratsi, and their tributaries. The rivers flow all year round. This combined with good climate and the underlying rocks offer a high potential for agriculture. In addition, the district has high rainfall almost the whole year round. However, the rainfall is less in intensity between

December and February. The annual rainfall ranges from 1,597- 2,873mm per year. This enables farmers to have two cropping seasons district-wide. The temperatures are relatively high all year round, with mean annual temperature being 29°C. The high temperatures and rainfall allow for crop development the whole year round.

The population density of the district is high, with Butere division having 572 persons per sq. km (District Statistics Office, Butere, 2001). Most people are settled on their ancestral land, which has further been sub-divided into smaller units. The high population density coupled with poor soils in some parts, that cannot support a variety of crops, has led to pockets of poverty springing up in parts of the district.



Figure 1: Map of Butere District

Source: District Statistics Office, Butere, 2001

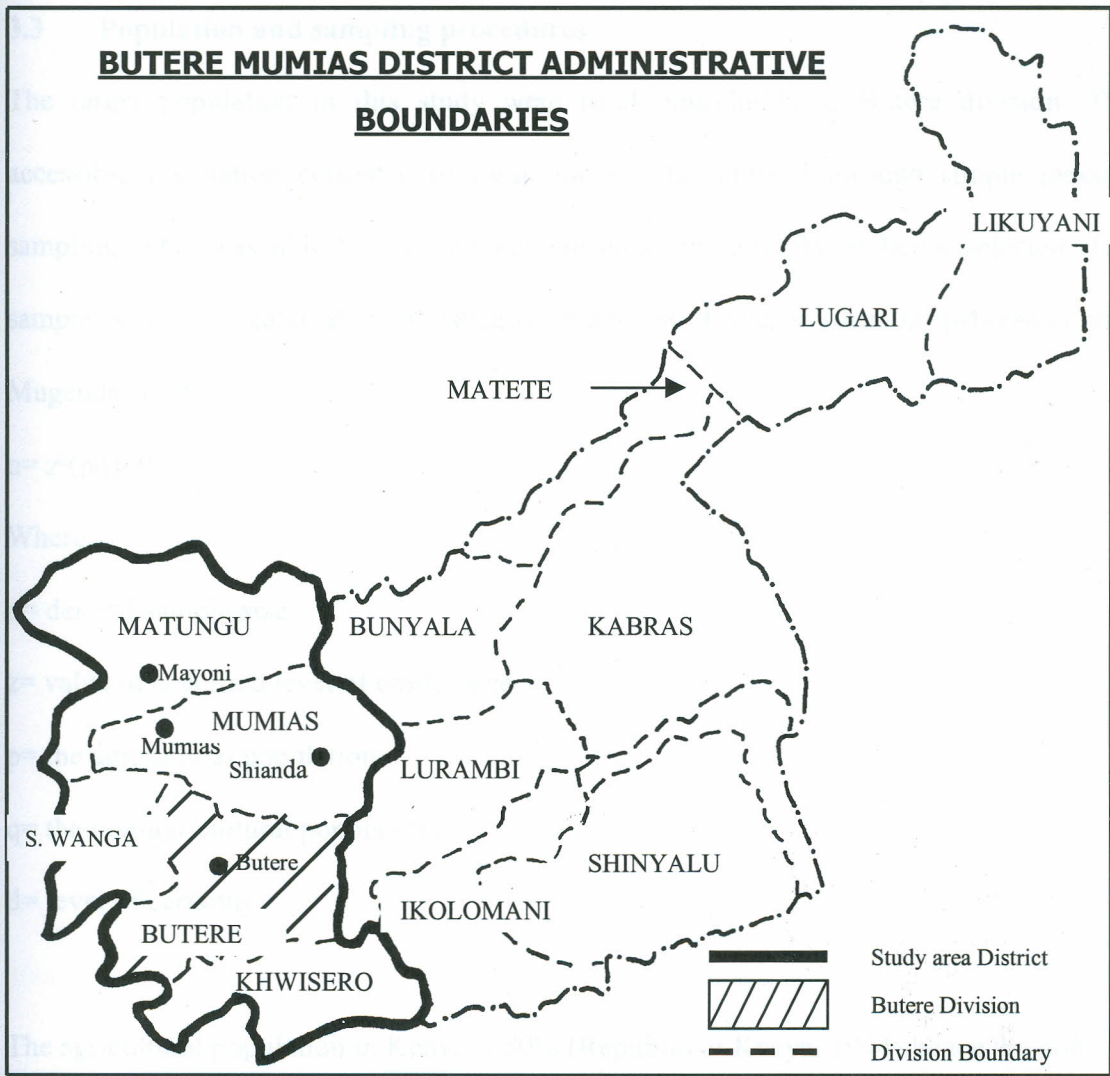


Figure 2: Location of Butere Division

Source: Kakamega District Development Plan, 1993-1997.

3.3 Population and sampling procedures

The target population in this study were rural households in Butere division. The accessible population consisted of rural households obtained through simple random sampling. This was able to give subjects an equal opportunity of being selected. The sample size was calculated statistically using the Fisher's formula (Mugenda and Mugenda, 1999):

$$n = z^2(pq)/d^2$$

Where;

n= desired sample size

z= value of specified level of confidence

p= the agricultural population

q= the non-agricultural population.

d= level of certainty

The agricultural population in Kenya is 80% (Republic of Kenya, 1994) hence the non-agricultural population is twenty percent (20%). Substituting these values for the above formula:

$$n = \frac{1.92^2 \times (80 \times 20)^2}{0.05^2}$$

$$n = 245.86 = 246 \text{ households.}$$

Thus, the sample size obtained by this formula was 246 households. However, due to time and financial constraints, the researcher settled for 100 households to form the study sample. The 100 households were selected from all the households in the division by

simple random sampling. At the divisional level, a list of households was made. Each household was assigned a number, the numbers were put together and then picked randomly. Households corresponding to the numbers picked were included in the sample. Also, purposive sampling was used to obtain a sample of 20 key informants who included local governmental agriculture and home economics extension officers, and staff of non-governmental organizations involved with food security/home gardening in the division.

3.4 Data collection

3.4.1 Data collection instruments

Data were collected using a questionnaire (Appendix A), an interview schedule (Appendix B) and an observation checklist (Appendix C). The questionnaire was designed to be self-administered, and to elicit both qualitative and quantitative data. The interview schedule was designed to gather valid and reliable information on household food status and also on home gardening activities through the responses of the interviewee. This method was deemed appropriate because it allowed the researcher to understand and capture the respondents' point of view through probing and incidental information given (Gall, Borg, & Gall, 1996). Moreover, most rural men and women are illiterate or semi-illiterate and therefore, cannot adequately handle a self-administered questionnaire. The instrument included both open-ended and close-ended questions, which yielded qualitative and quantitative data respectively (appendices A, B and C).

In the observation checklist, the researcher observed phenomena and recorded information about the characteristics of the phenomena. The instrument was used to

record information on home gardens in use i.e. type of crops grown, animals reared and methods of rearing, the environment and conditions of the home gardens and the homestead (appendices A, B and C).

3.4.2 Pretesting of the instruments

Pretesting was done to help check for poor wording of questions, ambiguity, inappropriate sequencing of questions and sensitivity. The questionnaire was pretested on two key informants, while the interview schedule and observation checklist were pretested on eight households selected from each of the eight locations. The pretest sample were those who qualified to be in the sample but were not included in the sample. This subsequently, helped the researcher to improve the instruments accordingly. The necessary revisions were done before data collection began.

3.4.3 Data collection procedures

Questionnaires were distributed to sampled key informants, who were 20 in number, by the researcher. Three weeks were allowed for response to the questions, after which the researcher collected them back. The response rate was 100%. The interview schedule was administered to one member of each of the 100 households sampled, who plays a major role in food provision. Interviews were arranged with each respondent for households at a time convenient for them. Interviews were carried out in respondents' homes, thus enabling the interviewer to observe and record information on the home gardens as well. The researcher read the questions in the interview schedule to the interviewee, and then wrote down the responses. The interviewer asked the interviewee to lead the way to the

home gardens. The interviewer then made and recorded observations on the type of crops and livestock raised, methods of rearing, and the general home environment.

3.5 Data analysis

Data were analyzed both qualitatively and quantitatively. The Statistical Package for Social Sciences (SPSS) 8.0 for windows version was used in quantitative data analysis. In qualitative data analysis, general statements were made on how categories or themes of data are related. This was done to give a picture of home gardening activities and food availability in rural households sampled for the study. In quantitative data analysis, descriptive statistics were used to further explain home gardening activities and food availability. The statistics generated frequency distribution and percentages, which were used to discuss the socio-demographic and agro-economic data. Some of the open-ended items in the questionnaire, interview schedule and observation checklist were categorized and coded, then analyzed quantitatively. The Pearson Correlation Coefficient was used to help establish the relationship between indicators of food security i.e. food stock and number of meals, and home gardening indicators i.e. size of land, home garden crops and home garden animals. Cross tabulation and filtering of data were used to summarize home gardening and food security indicators for measurement, after which, Pearson Correlation Coefficient was applied to determine the relationship between home gardening and food security. This enabled the researcher to establish whether home gardening as an independent variable, plays a role in food status of a household (dependent variable). Similarly, findings of the observation checklist were triangulated

with the rest of the data for emphasis and to explain certain phenomena or findings. Some statements given by respondents were reported verbatim.

3.6 Measurement of variables

Home gardening: this variable was measured using the following indicators:

- Land: the size of land for home gardening was used.
- Food production: food production activities (home garden crops and livestock) were determined and used.

Food security: this was measured using the following indicators:

- Number of meals eaten daily by households.
- Food stock: availability of food in store was determined.
- Households' perception of food security.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.0 Introduction:

This chapter will present and discuss the findings according to research data collected and analyzed. Results were discussed under the following sub-topics: socio-demographic characteristics of households, agro-economic characteristics of households, food security status of households in Butere division, food procurement among households in Butere division, factors influencing home gardening, and the role of home gardening on household food security.

4.1 Socio-demographic characteristics of households

Results of this study revealed different socio-demographic characteristics of index households in Butere division. Table 2 summarizes the ages of respondents, marital status, residence, number of children, household size and the chief provider of food within the household. Data revealed that 55% respondents were between the ages of 20years and 50years, while 45% of respondents were above 50years. Age influences the economic productivity of individuals. It is general knowledge that people are most productive between the ages of 20 and 50years. Above 50years of age, individuals' economic productivity begins to decline. This implies that food procurement by these individuals may decline, thus insufficient food.

Table 2: Socio-demographic characteristics of index households

Particulars	Number	Percentage %
Age of respondents¹ (yrs)		
20-29	8	8.0
30-39	27	27.0
40-49	20	20.0
50	45	45.0
Marital status²		
Married	82	82.0
Widowed	16	16.0
Separated	2	2.0
Residence of spouse³		
Home	72	72.0
Other	10	10.0
Not applicable	18	18.0
Household size⁴ (persons)		
1-2	7	7.0
3-4	20	20.0
5-6	29	29.0
7-8	21	21.0
9	23	23.0
TOTAL PER CATEGORY (1,2,3,4)	100	100.0

Marital status affects ownership and utilization of resources such as land, labor, money and food within the household. Table 2 reveals that 82% of respondents were married. This may imply that their spouses control resource expenditure and this may affect home gardening and food security. For instance, the Inter-agency task force on food security in the horn of Africa (2000) identified land ownership as one of the bottlenecks in elimination of food insecurity in the horn of Africa. In Western Kenya, land is owned by men thus women may not make major decisions on how it should be utilized. The 16% respondents who were widowed and 2% separated may make decisions independently on use of their resources thus utilizing them maximally. Further, the residence of spouse may also affect resources available for home gardening. Table 2 shows that 72% of

respondents' spouses reside at home. This shows that they may contribute to resources such as labor and money as inputs in home gardening thus more food production at household level. The household size affects the amount of food consumed by households. From table 2, we observe that 44% of households had 7 and above members, which are large. This implies that more food is required to feed them and to stock, as compared to small families, which require less food.

Data in table 3 shows the level of education attained by respondents and their spouses. From this data, 68% of the respondents had attained less than basic (primary) education. In this category, the highest frequency i.e. 37% was among those with lower primary education. This may affect their motivation to acquire new agricultural information, and also limit their sources of acquiring such information, resulting in poor agricultural practices hence low production. Twenty three percent of the respondents had secondary education. This may imply that they have better capacity to seek, acquire and internalize new agricultural ideas, leading to improved agricultural practices and hence higher yields. College education was attained by 9% only of respondents. With the exposure they may have acquired, the implication would be that they could apply new ideas and techniques to obtain high yields in their agricultural practices. Home gardening as a component of agriculture requires intensive practices in order to realize high yields thus the need for education.

Table 3: Education level of Respondents and spouses:

Particulars	Number	Percent %
Respondents¹		
Lower primary	37	37.0
Upper primary	31	31.0
Secondary	23	23.0
College	9	9.0
Spouses²		
None	1	1.0
Lower primary	29	29.0
Upper primary	26	26.0
Secondary	14	14.0
College	12	12.0
Not applicable	18	18.0
TOTAL PER CATEGORY (1, 2)	100	100

Table 3 further shows that 29% of spouses had lower primary education while 26% had upper primary education. This may affect acquisition and adaptation of new agricultural information that will in turn affect home gardening practices. Only 14% of spouses had secondary education, implying that a limited number of spouses may seek access, acquire and accommodate agricultural information. Similarly, a small percentage i.e. 10% had college education while only 2% had university education. This shows that the number of spouses who may be exposed and more informed are limited, thus affecting changes in agricultural practice.

4.2 Agro-economic characteristics of households

The agro-economic characteristics of index households involved land ownership, occupation and income levels. Data on land owned by index households revealed that 31% of the households had less than 1 acre of land (table 4). This is small and cannot

produce enough food for households unless intensive methods are employed. An important finding is that majority of households i.e. 86% had land size of 3acres and below. This is in contrast with data given by the district development plan, that the average land size for small-scale farmers is 3.5acres (Butere-Mumias DDP, 2001-2006). This may be explained by the fact that land fragmentation occurs at a fast rate due to high population growth rate.

Table 4: The agro-economic characteristics of households:

Particulars	Number	Percent-%
Household land size (acres)¹		
1	31	31.0
1.1-2	25	25.0
2.1-3	30	30.0
3.1-4	6	6.0
4.1-5	2	2.0
5.1	6	6.0
Occupation (respondent)²		
Farmer	88	88.0
Business	10	10.0
Civil servant	2	2.0
Occupation (spouse)³		
Farmer	60	60.0
Business	10	10.0
Civil servant	8	8.0
Teacher	4	4.0
Not applicable	18	18.0
Total monthly income⁴ (Kshs)		
2000	18	18.0
2001-4000	12	12.0
4001-6000	8	8.0
6001-8000	4	4.0
8001	2	2.0
Unknown	56	56.0
TOTAL PER CATEGORY (1, 2, 3, 4)	100	100

Farming was the main occupation for majority of the respondents, and/or their spouses. 88% of the respondents indicated farming as an occupation, while 60% of the spouses were farmers by occupation. This data again, agrees with the Sessional Paper No. 2 of 1994 on National Food Policy, which records 80% of the population in Kenya to be agricultural. The data implies that households can maximize home gardening strategies for food security. Table 4 further reveals that 56% of households could not quantify their total monthly income, while 38% had less than Kshs. 6000. This reflects low income levels among households in Butere division. The data agrees with the report of the Poverty Eradication Commission (2000), which revealed high poverty levels in households of Butere division. This can affect investment in home gardening as well as household purchases of food to stock.

Generally, data has revealed a range of socio-demographic and agro-economic profiles of rural households in Butere division. These play an important role in determining food security of households as well as home gardening activities undertaken by households to enhance food security.

4.3 The food security status of households

Food security status of households was determined using the amount of food in store, the number of meals eaten daily by households and the households' perception of food security.

4.3.1 Food in store

This referred to the food stock obtained from crop harvests of the households' farming activities. Data collected on the amount of food stored revealed that majority of households did not have any food in store. Table 5 shows data on the food in store among households of Butere division. Twenty eight percent only of households had maize in store while 72% of households had no maize in store. An even smaller population of 20% of households had some beans in store while 80% did not have beans in store. Others included sorghum, which was stored by 10% of households and nuts, which were stored by 8% of households.

Table 5: Amount of food in store in households

Particulars (Kilograms)	Number of households	Percentage
Maize		
50-100	10	32.0
101-150	3	12.0
151-200	7	26.0
201-300	5	18.0
301	3	12.0
TOTAL	28	100.0
Beans		
50-100	14	70.0
100-150	4	20.0
150-200	2	10.0
TOTAL	20	100.0
Sorghum		
50-100	6	60.0
101-150	2	20.0
151-200	2	20.0
TOTAL	10	100.0
Nuts		
50	5	62.0
51-100	3	38.0
TOTAL	8	100.0

These data imply that in relation to food stock, majority of households were food insecure, as they did not have any food in store. Further, the quantity of food stored showed that the amounts do not suffice for majority of households. Table 6 shows the duration that the available food stock lasts within households.

Table 6: Duration of food stock in households

Food stock	Frequency	Percent
0-3 months	20	20.0
4-6 months	40	40.0
7-9 months	15	15.0
10-12 months	25	25.0
TOTAL	100	100.0

The data reveals that 25% only of households had food stock that lasts the whole year round. Majority of households i.e. 75% had to consider other ways of procuring food. The data agrees with Republic of Kenya (2001-2006), which showed low food production levels within Butere-Mumias district as a whole.

4.3.2 Number of meals eaten daily by households

Data collected on number of meals eaten during two periods of the year i.e. January to June and July to December revealed that there were no significant changes in number of meals eaten year round among rural households in Butere division. These seasons were chosen because January to June represents times of food scarcity while July to December represent time of food adequacy. Table 7 shows the average number of meals eaten by households on a daily basis.

Table 7: Number of meals eaten daily by households

Number of meals	Number of households (Frequency)	Percent
1	2	2.0
2	30	30.0
3	64	64.0
4	4	4.0
TOTAL	100	100.0

On average, the minimum number of meals eaten was found to be one. This is represented by 2% of households. Thirty percent of households ate two meals per day. For these categories of households, food security is an issue as they fall below the recommended number of meals, which are three in a day (Maxwell and Frankenberger, 1992). Sixty four percent of households ate three meals per day. The maximum number of meals eaten was four, represented by 4% of households. This shows that majority of households in Butere division are able to meet the recommended number of meals that should be eaten in a day thus food security. However, for 32% of households who eat 2 meals and below, food security is still a major issue.

The fact that there was lack of change in number of meals year round yet households did not have sufficient food stock was intriguing. The lack of change in number of meals was attributed to a number of factors. First, some households chose to adopt coping mechanisms such as high dependence on home garden crops. 90% of households in Butere division indicated that they changed their diets such that 'ugali' is eaten less number of times and instead, foods like sweet potatoes, arrowroots and cassava are consumed more. Cassava is sometimes processed to produce flour, which is used to make

“ugali”. The finding agrees with Mpoyi and Paulus (1997) who noted that a home gardening promotion project done in Kinshasa, Zaire succeeded in securing a certain frequency of meals for the poor during crisis periods.

Secondly, there has been diversity in methods of food procurement in Butere division. Buying and gathering of food has been significant in meeting food deficits at household level, thus helping to maintain the number of meals eaten daily. A number of households indicated that they relied on buying and gathering during lean seasons. Lack of change in number of meals may also be attributed to habit. When some households adopt a habit of eating a certain number of meals, this may not change irrespective of food surpluses or deficits. A respondent who served two meals per day made this remark:

"I like to be consistent in serving two meals per day. I do not change this even when I have surpluses because it would deplete the stock fast, then I would worry as to where to get more"(Home maker, Butere Division).

According to this respondent, the food stock lasts the year round because she is consistent with the number of meals served.

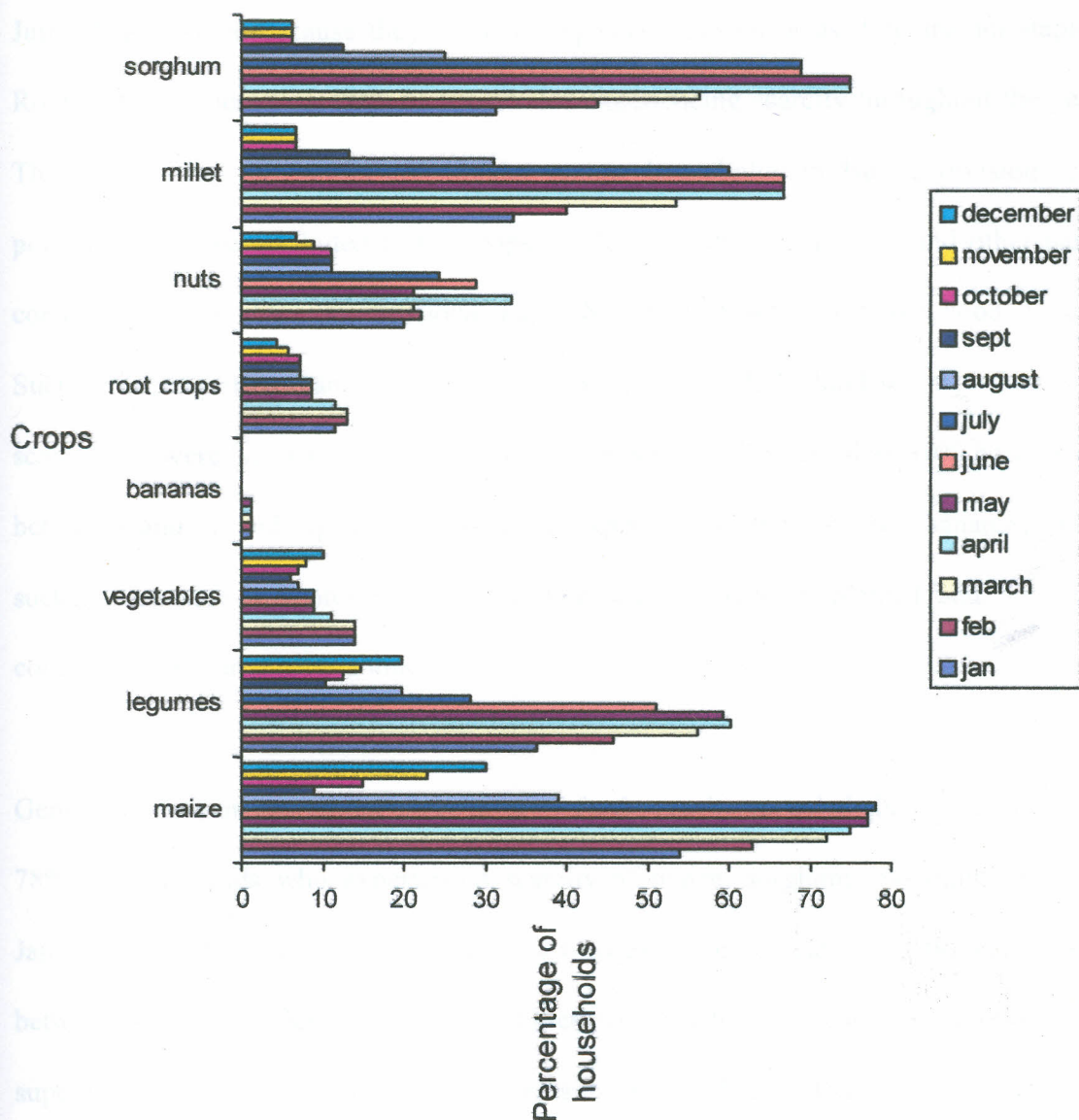
Thus, with regard to number of meals eaten daily by households, 68% of households in Butere division can be said to be food secure while 32% of households can be said to be food insecure.

4.3.3 Household perception of food security:

Households' perception of food security was based on what households interpreted as food. In Butere division, the staple food is "ugali". When "ugali" becomes scarce within households, they perceive themselves as "hungry". Data collected revealed that households suffered from food insecurity because of seasonal hunger. The Figure 4 shows seasons of food scarcity among households in Butere division. Households are most affected when the staple food "ugali" derived from maize, sorghum and millet is scarce. The scarcity of these foods was found to be highest within households between January and July. This could be as a result of the dry season that occurs between December and February (Butere-Mumias DDP, 2001-2006), which does not favor crop production.

Figure 4 shows that maize, as the staple food was scarce in 50-78% of households from January to July. Scarcity of millet and sorghum, which contribute significantly to the staple food, 'ugali', showed a similar trend. During this period, all the affected households perceived themselves as food insecure. This scarcity may be attributed to depletion of food stock from previous harvest, agreeing with Muelhoff (2001) and Shrestha et. al (2001), who acknowledged that there are lean seasons when staple foods are depleted. The peak season for scarcity of legumes was from January to June, whereby more than 30-60% of households experienced scarcity. However, 50% only of the affected households perceived themselves as food insecure. This could be attributed to the minimal contribution of beans to the diet.

Figure 3: Seasonal scarcity of food as reported by households

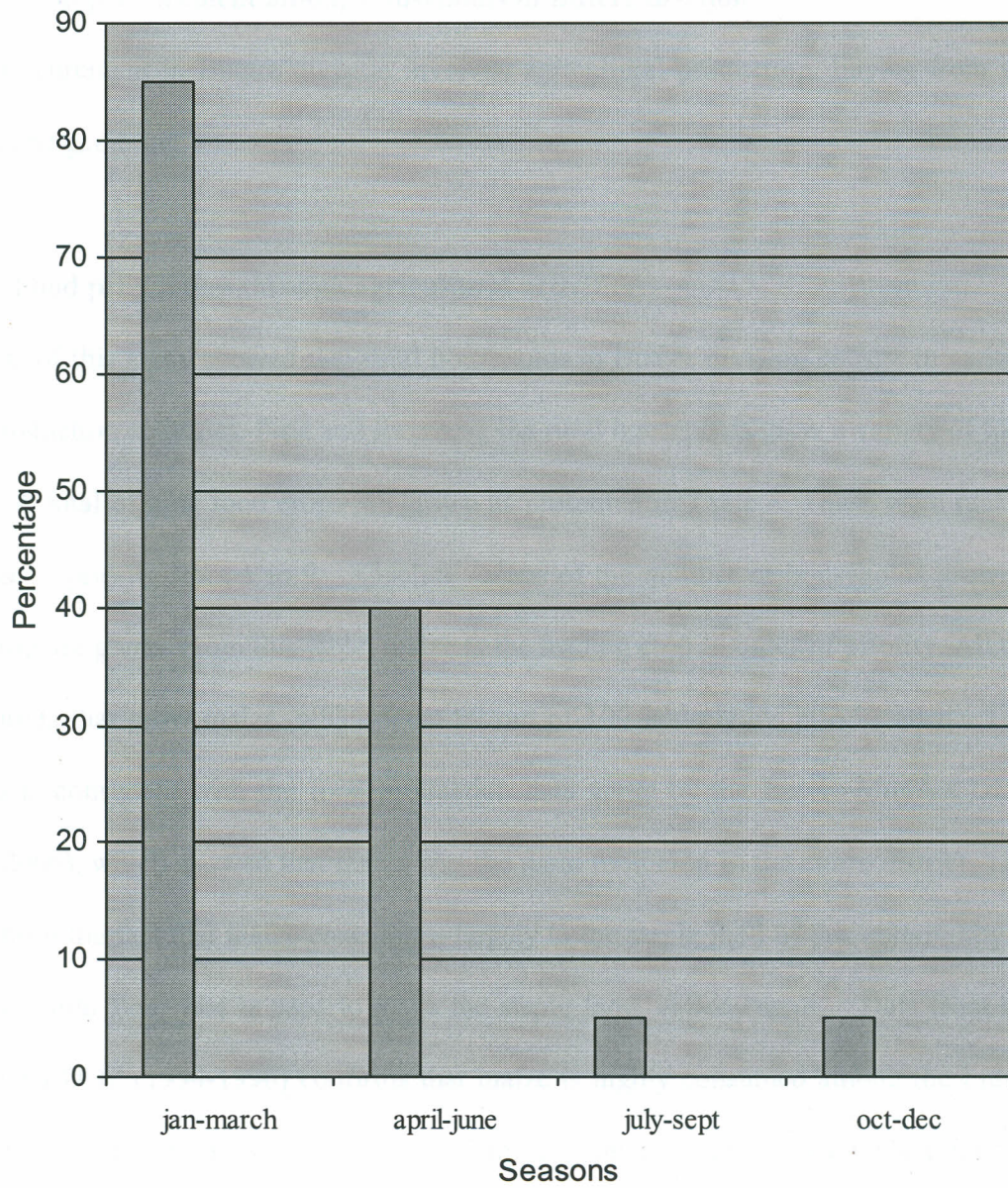


Vegetables were the only priority crop that experienced least scarcity, with 5-15% only of households lacking vegetables in the home throughout the year. A possible explanation for this could be that vegetables are grown on small pieces of land that can easily be managed (Muelhoff, 2001), and also along streams even in dry seasons (Republic of Kenya 2001-2006). Nuts were scarce in 20-35% of households between January and

June. This may be because they are not frequently consumed, as they are not staples. Root crops had less than 20% of households experiencing scarcity throughout the year. This means that root crops are popular among households in Butere division. The popularity may be attributed to the crops' ability to withstand drought and other harsh conditions (Nwa, 1997, the Sessional Paper No. 2 of 1994 on National Food Policy). Such crops, therefore, can remarkably contribute to household food security. The least scarce crop were bananas, whose scarcity was experienced by less than 10% households between January and April. This could be explained by the fact that bananas, being suckers, are able to reproduce on their own without being re-planted and thus will continue in the gardens for a long time.

Generally, data on household perception of food security revealed that a maximum of 78% of households who experienced scarcity of maize, sorghum and millet between January and July, and a maximum of 30% who experienced scarcity of the same crops between August and December perceived themselves as food insecure. The data was also supported by information from key informants who indicated that there was seasonal hunger in Butere division. This occurred mostly between January and June as shown in figure 5.

Figure 4: Seasonal scarcity of food in Butere division as reported by key informants



From figure 5, 85% of key informants said that seasonal hunger occurred between January and March, while 40% said the occurrence was between April and June. Below 10% of key informants showed that there was seasonal hunger between July and

September and October and December. This shows that during the later seasons, a few number of households experience seasonal hunger.

4.4 Food procurement among households in Butere division

Food procurement in Butere division involved agricultural production, buying from the market and gathering.

4.4.1 Food production through agricultural activities:

Findings of this study showed that rural households in Butere division engage in various food production activities. First and foremost, the rural households grow a variety of food crops. A total of nine food crops are grown as presented in Table 8. These were ranked in order of priority from 1 to 9. Absolute values of the number of households growing each crop are given. From this table, maize is the leading crop in order of priority. All the households that grow maize, which were 99 out of 100 households prioritized it. This finding is consistent with the food production data given by the Butere-Mumias DDP, (2001-2006), which showed that maize was the main food crop in the entire district. This arises from the fact that maize contributes largely to the staple food of this community. It is ground into flour that is used to make the staple food, called "ugali". Data from the Kakamega DDP (1994-1996) confirms that maize is highly consumed among the Luhya community, who are also the natives of Butere-Mumias. Thus, households prioritize maize, no matter how small their land size could be.

Table 8: Crops grown by households in order of priority.

Crops/ priority	Maize	Millet	Sorghum	Legumes	Nuts	Root crops	Bananas	Vegetables
1	92	-	-	1	-	-	3	5
2	2	4	4	68	2	6	4	9
3	5	3	6	14	17	16	10	29
4	-	3	3	8	11	27	19	20
5	-	-	-	4	9	15	27	23
6	-	3	1	1	5	4	12	9
7	-	1	2	-	-	1	3	2
8	-	1	-	-	1	-	2	1
9	-	-	-	-	-	-	-	1
Total	99	15	16	96	45	69	80	99
Not grown	1	85	84	4	55	31	20	1
TOTAL	100	100	100	100	100	100	100	100

N=100 - not applicable

Legumes were second in priority, being grown by 96 households while 83 households gave it priority. This again agrees with food production data given by the Butere-Mumias DDP (2001-2006), where beans were shown to be a main crop. Within this community, legumes contribute significantly to the diet as they are used to accompany staples and also, they are prepared as snacks. Again, this is confirmed by data in the Kakamega DDP (1994-1996). An important finding of this study is that vegetables were among priority crops within households, yet this was not recognized in the data given in the district development plan (Butere-Mumias DDP, 2001-2006). Vegetables, mostly traditional African vegetables, are given priority by 43 households, while they are grown by a total of 99 households. As an important home garden crop and vitamin source (Muelhoff 2001), these vegetables serve as an accompaniment to the maize meal dishes, which are mainly carbohydrate, and also contribute to food and nutrient intake (mainly vitamins) of household members.

Other important crops grown as priority crops included root crops, nuts and bananas respectively. Root crops were given priority by 22 households, nuts by 19 households, and bananas by 17 households. The Butere-Mumias DDP (2001-2006) also acknowledges the production of these crops, although not as main crops. From key informants, the root crops, bananas and nuts were found to contribute significantly to the diet, as accompaniments to tea at breakfast and at times as a main meal. Cassava, which is a main root crop, is utilized not only as a snack but can also be ground into flour for making 'ugali' the staple food. This also, is confirmed by the Kakamega DDP (1994-1996).

Other than food crops, households in Butere division undertake the rearing of livestock. It was established that households in Butere division keep livestock to a limited extent, which are significant to diets of some households. Table 9 shows frequency distribution of livestock kept by households in Butere division.

Table 9: Number of livestock reared by households

Particulars	Number of households	Percent
Cattle¹	26	26.0
None	52	52.0
1-3	18	18.0
4-6	3	3.0
7-9	1	1.0
10-12		
Sheep²		
None	78	78.0
1-5	20	20.0
6-10	1	1.0
11-15	1	1.0
Goats³		
None	92	92.0
1-5	7	7.0
6-10	1	..1.0
Poultry⁴		
None	7	7.0
1-10	73	73.0
11-20	13	13.0
21-30	2	2.0
31-40	5	5.0
TOTAL PER CATEGORY (1,2,3,4)	100	100.0

A majority of households had between 1-3 cattle as represented by 52% households. Also a fairly large percentage (26%) households had no cattle. The highest number of cattle owned was 10, represented by 1% households. This data agrees with observations of Youdeowei et. al. (1986) that in developing countries, usually only three to ten animals are kept by households. In Butere division, many households did not keep cattle, which may affect their practice of home gardening as well as food availability to the household members. The finding is important since no data had been documented on rearing of cattle in the division, except the main livestock breed, which is Zebu (Butere-Mumias

DDP, 2001-2006). The table also shows that a majority of households (78%) do not rear sheep. The highest number of sheep reared was 15 represented by 1% households. A number of households of those who reared sheep had 1-5 sheep. These data imply that sheep rearing is not popular among households in Butere division. Some households explained that sheep rearing is not worth because the returns are low. Also, a possible explanation for households not rearing sheep could be that grazing land is limited, and since a majority of households do not zero-graze, there may be no sufficient fodder. This is an important finding as no data has been documented on sheep rearing in the division.

Table 9 further shows that 92% of households, which is very high, do not rear goats. A meager 7% of households had 1-5 goats while 1% only had 6-10 goats. This implies that goat rearing is not popular in Butere division. The main reason given by households for not rearing goats was that goats are destructive to food crops and are hard to tame. The finding is important because no data has been documented on goat rearing in Butere division. Poultry keeping was the most popular amongst all activities of livestock keeping. A majority 73% of households had 1-10 poultry, 13% households had 11-20 poultry, while 5% households had 31 and above poultry. This implies that many households can obtain food from poultry and their products (eggs), if they are consumed within the household. Seven percent only of households did not keep any poultry. This is an important finding as no data has been documented on poultry keeping in Butere division. A possible explanation for the popularity of poultry keeping could be that the method of rearing is less expensive and also the poultry itself is not expensive thus many households can afford to buy and keep.

From observation, the rearing of cattle is done by tethering them in fallow land or grazing in the fields and along the road. Twenty percent of households only had zero grazing units while 80% of households did not have them. In some homesteads there were no cowsheds and animals stayed outdoors at night. This could be as a result of the community maintaining local breeds of cattle, which can withstand adverse weather conditions. Youdeowei et. al. (1986) observed that the traditional farmer is satisfied with moving cattle from place to place. Further, cattle mate at random and there has been virtually no marked improvement in the productive traits of native cattle. This has led to low productivity in terms of milk and meat. The lack of proper feeding methods and shelter for cattle exposes them to many hazards such as hunger, pests, diseases and bad weather. This affects their productivity thus the need to promote better methods of rearing cattle by stakeholders in this sector.

Observation of methods of rearing sheep revealed that 100% households did not employ modern methods of sheep rearing or a combination of modern and traditional methods. Except for 1% households that kept 15 sheep and grew nappier grass for them, the rest of the households (99%) tethered them. There were no shelters constructed especially for housing sheep, thus sheep would be housed in vacated houses or share housing with cattle. The observation agrees with Youdeowei et. al.(1986) who observed that sheep rearing in developing countries does not receive the recognition it deserves, thus the productivity is low. Consequently households need to be encouraged to rear sheep. Considerations of benefits such as production of manure for organic farming should also

be enforced. For those already rearing, information needs to be given to them concerning how to feed and shelter the sheep well in order to reap maximum benefits from them.

Findings of the observation of methods of rearing revealed that 100% households tethered their goats, which is not an effective method of goat rearing. This could be a contributing factor to destruction of crops by goats as the tethers may loosen or cut, letting the goats free to find their way to the gardens. One respondent declared:

"They are a nuisance!"(Farmer, Butere division).

It is, therefore, necessary that households get information on improved methods of goat rearing that will contain them to avoid crop destruction and also increase productivity of milk and meat. This may require funds to be able to fence the goats in. But as noted by the Inter-agency task force on food security in the horn of Africa (2000), many farmers today are not able to access funds to improve their farms. Other benefits of goat rearing such as production of manure should also be considered and emphasized. This may help households to appreciate this activity of home gardening.

It was observed that 100% households keep free-range poultry. This is in agreement with Youdeowei et. al. (1986) who observed that the local breeds of poultry all over the tropics still roam about the villages, pick up whatever nutrients they can find and mate indiscriminately with one another. This, however, affects production of both eggs and meat. Also, some households do not bother about housing for poultry, whereby many were left to spend nights in the kitchens and on cold floors. While the free-range method

may be cheap, it poses a risk to poultry as they are exposed to pests, diseases, bad weather and wild animals and sometimes hunger. The data on poultry rearing may imply that households still do not have information on alternative methods of poultry rearing. Also, the households may lack funds to fence in and feed the birds (Inter-agency task force on food security in the horn of Africa, 2000).

Generally, data on livestock rearing agrees with observations by Abassa (1995) that the food production performance of African livestock sector is inadequate. This has affected the food security and nutritional status of individuals and households who are not able to access animal proteins easily as a result of the expense of these proteins. Households have had to depend on food crops for nutrient supply. The inadequacy of livestock at household level and the high levels of poverty have led households into selling the few livestock they have and their products, instead of consuming them locally. The promotion and improvement of livestock rearing will, therefore, play a major role in food security.

Determination of how crops and livestock produced by households were consumed indicated that priority was given to local consumption for crops and that for most households selling is done only when one is in need of money to meet a specific and pressing issue. This concurred with findings from key informants, where responses for local consumption of crops ranked highest. Also, the finding agrees with data from the Butere-Mumias DDP (2001-2006), which showed that most food crops are produced for local consumption. This may be as a result of low food production in the district as a whole, as shown in Table 1. It was established that local consumption of foods grown

was 100%. Local consumption and selling of the foodstuffs was 75%, while exclusive selling was not reported by respondents (Table 10).

Table 10: Consumption of crops and livestock produced by households

Consumption	Number of households (Frequency)	Percent
Crops		
Local	100	100.0
Local and sale	75	75.0
No sale	25	25.0
Livestock		
Local	80	80.0
Local and sale of livestock	80	80.0
Local and sale of products	70	70.0

Multiple responses allowed

Frequency data on consumption of livestock (table 10) showed that local consumption of livestock was 80%, thus 20% households do not consume livestock locally. Both local consumption and selling of livestock was equally high, standing at 80%. Selling of products was 70%. Exclusive selling of livestock and/or products was not reported by respondents. Livestock provided meat, milk and eggs. This agrees with Abassa (1995) and Muelhoff (2001) who recognized the importance of livestock and their products in the diet, mainly as a source of high-class proteins. From the consumption data in Table 10, a conclusion can be made that a number of households derive a good part of their food, especially the total proteins consumed from the livestock they raise.

The data further show that some households were not utilizing their livestock and products for food benefit of their members. The difference in consumption between crops

and animals could be attributed to the fact that value is attached to livestock. Whereas crops have lower monetary value, livestock are expensive (Abassa, 1995), and also, they serve many functions in this community other than food. This may affect local consumption of livestock. The functions identified were dowry, the passing of funeral rites and production of manure to a smaller extent. However, the consumption of products such as milk and eggs by some households ensures food security and variety to households thus reducing occurrence of food poverty and monotony of diet (Muelhoff, 2001).

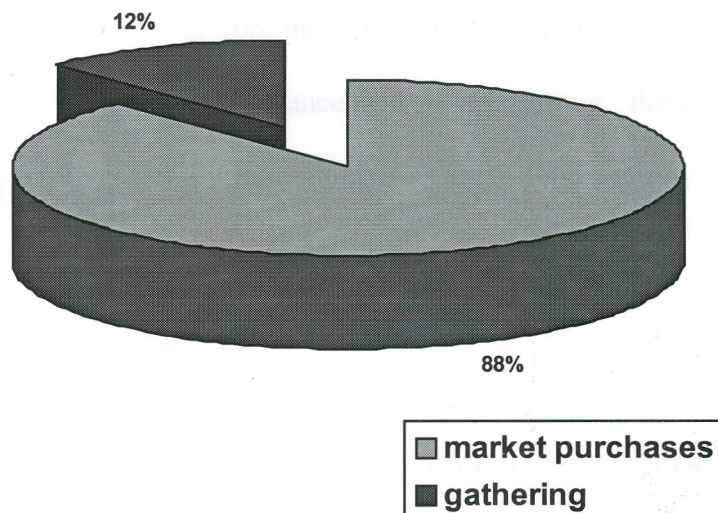
4.4.2 Buying from the market

Findings of this study showed that buying of food from the market is an important method of food procurement among households in Butere division. The method is necessitated by the inadequate food production at household level, leading to food shortages (Butere-Mumias DDP, 2001-2006). It is also used to acquire food that is not produced within the household. Buying was rated an important method of food acquisition for most households, second to agricultural production. Figure 5 shows that 88% households buy food as a supplement to agricultural production. Households resort to buying, especially for staples such as maize, and vegetables, root crops and bananas when they are scarce. This finding concurs with data from key informants, which showed buying as the leading method of food supplementation and also the Butere-Mumias DDP (2001-2006), which identified buying as a method of bridging the gap between food availability and demand at household level.

The Sessional Paper No. 2 of 1994 on National Food Policy has shown that food deficits at household level at times lead to deficit at national level so that the government has to import food to meet local demand. Individuals and households then buy food from the market thus spending a larger share of their budget on food. This was also observed by Dent et. al. (1994), who argued that in most African countries, most of the population is forced to use much of their income on basic foodstuffs. Buying of food is expensive and is affected by income. When households have money, they are able to purchase a variety of food and in larger quantities. The Sessional Paper No. 2 of 1994 on National Food Policy argues that the fact that the average per capita nutrition would be adequate does not imply that the whole population would be able to purchase sufficient foodstuffs to be sure of a nutritionally adequate diet. Inequalities in income distribution have a direct effect on the quantity and quality of food consumed.

Given the high poverty level in Butere division (Poverty Eradication Commission, 2001), many households are not able to afford this method, inspite of food being available in the market places. Under such circumstances, and for policies aimed at food security, and increasing the nutritional intake of low income groups (Sessional Paper No. 2 of 1994 on National Food Policy), considerably more food should be supplied by the government if the entire population is to be fed adequately. An increase in supply will lead to a subsequent reduction of food prices thus more households can afford to buy.

Figure 5: Supplementary methods of food procurement for households in Butere division:



4.4.3 Gathering

Gathering from the wild, though not very popular, is still significant in food security and its contribution to diets cannot be overlooked. Figure 5 above shows that 12% of rural households still gather food from the wild. This is practiced, especially for wild vegetables and fruits and is in agreement with Maundu et. al.(1997) and Magistro (1997),

who noted that edible wild plants have been exploited by agricultural communities especially during periods of food shortage . This method is not very popular as seen above, probably due to lack of fallow and forestland where such plants can be found. However fruits such as guava, raspberries and mangoes, and a variety of indigenous green vegetables, mushrooms and termites are still being collected from the wild. During the rainy season there are a variety of vegetables that grow wild in most parts of western Kenya due to its high agricultural biodiversity. Thus, even households who have no vegetables in their gardens do benefit from these. Due to the continued loss of fallow and forest land as well as technological advancement in agriculture, there is need for domestication of the wild species by households to ensure food security and prevent genetic loss (Maundu et.al. 1997).

4.5 Factors influencing home gardening

Results of this investigation showed that there are various factors influencing home gardening both positively and negatively as identified by key informants and respondents. These include land, cash crop farming, technology and information

4.5.1 Land

Land was found to be a very significant factor affecting home gardening. This is in terms of size, type of soils and accessibility.

Size

According to findings shown in Table 11, the average land size in relation to needs was little. This mainly is as a result of the high population density in the division as noted from key informants and also in agreement with the Poverty Eradication Commission (2001) data as well as FAO and UNEP (1999) findings. From the frequency data below, 52% of households indicated that their land was small for food production, while 2% had big land and 46% were satisfied with their land size. The households whose land size is small thus cannot produce enough food to meet their needs year round.

Table 11: Land in relation to farming needs

Land	Number of households (Frequency)	Percent
Size¹		
Small	52	52.0
Big	2	2.0
Sufficient	46	46.0
Soils²		
Wet	3	30.0
Unproductive	42	42.0
Productive	55	55.0
Accessibility³		
Very near	88	88.0
Near	12	12.0
TOTAL PER CATEGORY (1,2,3)	100	100.0

From the key informants, land scarcity rated highest as the most significant constraint to household food production

Figure 6: Constraints to food production in Butere division

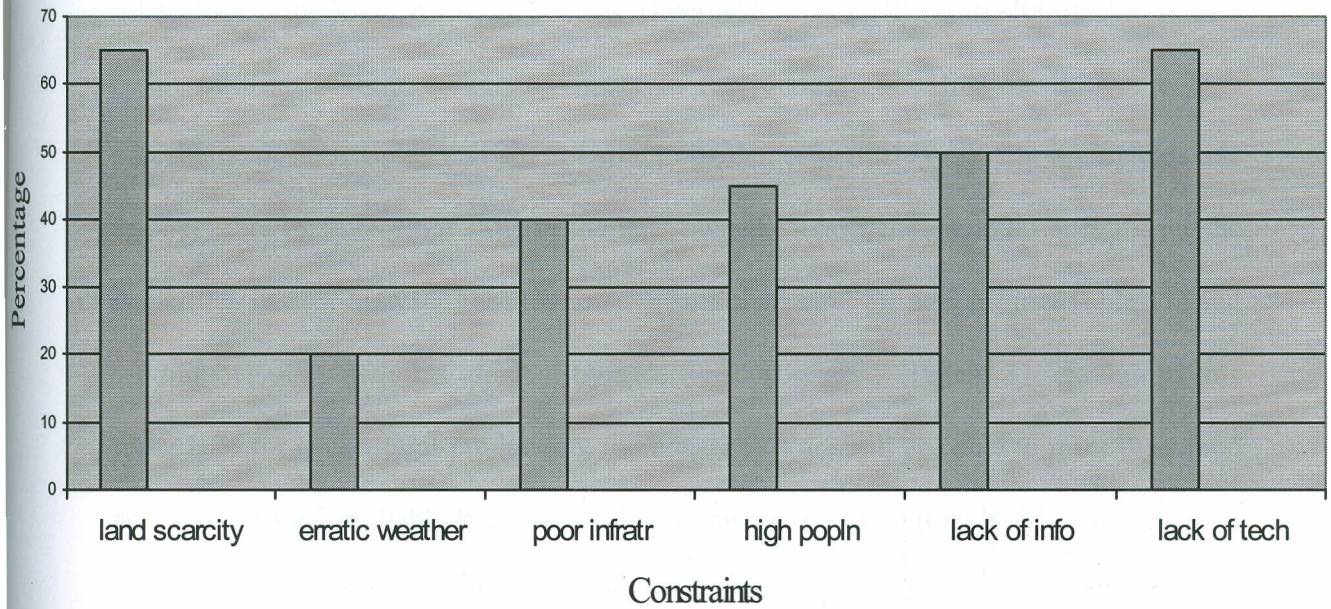


Figure 6 shows the constraints to food production as identified by key informants. Sixty five percent of respondents noted that because of the small land sizes, households are not able to produce sufficient food and also, crop diversity within the division has decreased. Since land is a resource that cannot be expanded, there is need to find ways of intensifying the use of the available land in order to produce sufficient food and retain crop diversity.

Soils

Soils were found to affect the type of crops grown and the yield. From data in Table 11, 3% of households indicated their soils to be wet, 42% unproductive, while 55% had no difficulties with soils. According to the Butere-Mumias DDP (2001-2006), this is as a result of the different underlying rocks in this district. The findings reflect a high percentage of households that are not able to garden effectively or obtain high yields due to poor state of soils. Poor soils in the land owned by households could account for the disparities in data between those who have sufficient land for agriculture (Table 11) and the number of households affected by specific food scarcity (Figure 3). Though having some land for agricultural production, the households are still not able to meet their food needs year round probably because yields are low owing to poor soils. The issue of poor soils affecting many households in Butere division needs to be addressed.

Accessibility to land

Home gardening in Butere division is boosted by the fact that all lands were easily accessible. Findings from this study showed that 88% of lands were very near the homesteads while. This enhanced ease of accessibility, so that farmers did not have to walk long distances hence fatigue. Further, having the crops near homes enables households to tender them effectively as suggested by FAO (1997), and guard against some parasites and theft.

4.5.2 Cash crop farming

This is a major agricultural undertaking amongst rural households in Butere division. It was observed that 65% of the population were practicing cash crop farming, mainly sugarcane, while only 35% had food crops exclusively. This was irrespective of land sizes owned by households. This finding agrees with data by the Butere-Mumias DDP (2001-2006), which showed that a total of 30,493 acres of land in the district was under cash crop farming as compared to 29,554.4 acres under food crops (Table 1). Also, the Poverty Eradication Commission (2000) noted that there was overdependence on cash crops in the entire district. The cash crops compete with food crops for the small lands available, thus affecting home gardening. While cash crops have some benefits to the community such as lumpsome payment after harvest, the practice is not beneficial to a community that has scarce land. Also, because most cash crops have a long maturation period, households are drawn in to debts and even end up leasing the crop (Poverty Eradication Commission 2001), so that by the time the lumpsome payment is done, the money is spent on clearing debts.

Other than land fragmentation to accommodate cash crops a lot of time and other resources are spent on tendering of cash crops at the expense of food crops. A variety of good quality food crops cannot be produced as a result of this thus food poverty.

4.5.3 Technology

Technology was found to influence home gardening thus food production (Figure6). It was observed that the methods of food production employed were mostly traditional. From the data in Table 11, 80% of households employed traditional methods, while 20% only combined both traditional and modern methods to a small extent. Those who practiced traditional farming methods did not use fertilizers or organic manure in planting or top dressing; they used uncertified seeds, and did not apply pesticides to crops. Crops were left to survive on their own although they were weeded by hoeing. In livestock rearing, traditional methods had no zero grazing units and chicken were free-running.

On the contrary, households who combined traditional and modern methods of farming would apply either fertilizers or organic manure and use certified seeds and sometimes pesticides. They had zero grazing units and some had their chicken fenced in. No household employed modern methods exclusively (Table 12).

Table 12: Methods of food production in Butere division

Method	Frequency	Percent	Valid percent	Cumulative percent
Traditional	80	80.0	80.0	80.0
Combination	20	20.0	20.0	100.0
Modern	0	0	0	100.0

This shows that in Butere division many farmers have not adopted improved methods of farming. Home gardening is not, therefore, practiced to the optimum due to lack of

modern methods. For this reason, the expected levels of food sufficiency are not attained. A possible explanation for lack of improved methods could be that households have no information on these improved methods. Further, those who may have information may lack funds to effect it thus sticking to the traditional ones, which they consider cheaper. Separate data also showed that 4% of households only had some agricultural technology devices used in gardening. These included small-scale irrigation technology. Ninety six percent of households practiced traditional farming methods. Data imply that few households can continue to produce food in times of drought while the rest, especially those who have no land by the streams cannot produce any crops. Also for the households with some technological devices, less labor, time and energy is needed to perform tasks that would otherwise consume a lot of resources.

Lack of technology has greatly contributed to low food production levels and wastage of resources such as land, human power and time, concurring with FAO (2001) that lack of technology has been a constraint to home gardening. This factor was also identified by key informants and ranks highly among factors constraining food production (Figure 6). It was noted that production, preservation and storage technology are all lacking among rural households in Butere division. The implications of this have been low productivity and wastage of food when there are surpluses as echoed by the Poverty Eradication Commission (2000). Therefore, there is need to improve agricultural technology among rural households in Butere division so as to realize better yields and also to preserve surpluses for future use.

In relation to technology, erratic weather patterns have affected crops, animals and poultry. This has been observed in the most recent years, when changes in rainfall patterns have thrown farmers into confusion. As observed by Magistro (1997), many farmers have realized losses in terms of low yields, while investments become greater. Due to the fact that they lack equipment to water their gardens, the crops dry up or are attacked by pests that are favored by dry conditions. Despite changes in climatic conditions and rainfall patterns, households in Butere division have stuck to their traditional timing for planting seasons (Poverty Eradication Commission, 2001). Hence, there is need for households to adapt to changing times, especially for rainy seasons so that they do not waste resources planting at the wrong time.

4.5.4 Information

Information is yet another factor affecting home gardening. Many farmers still practice traditional methods of farming and cash crop farming on their small pieces of land partly because they are not informed of any other alternative. Fifty percent of key informants noted this factor to be a constraint to food production (Figure 6). Without information, households are not able to improve their techniques of food production as required in home gardening. Lack of information could be a consequence of poor infrastructure in the division, particularly road networks and telecommunication (Butere-Mumias DDP, 2001-2006), which has hampered transmission of agricultural information in one way or another. For instance, it has been difficult for extension officers to reach farmers and vice versa. As a result, information is concentrated among the few who have access to it, to the detriment of the majority.

Generally, the above factors identified by households and key informants as constraining food production were the main hindrances to household food security. Since majority of households in Butere division engage in peasant farming because of small land sizes, they may not be able to procure enough food from gardening unless the above factors are addressed.

4.6 The role of home gardening on household food security

Results from this study showed that home gardening plays some role in household food security. Pearson correlation coefficient was applied on indicators of home gardening and those of food security to determine their correlation. Results obtained are discussed as follows.

4.6.1 Size of land and food stock

The correlation between size of land and food stock was significant ($p \leq 0.01$) with a correlation coefficient of 0.336 as shown in Table 13. This indicates that an increase in size of land will result in a moderate increase in food stock. Households that had larger pieces of land had more food stock as compared to those who had smaller pieces of land. The size of land still affects food stock in Butere division probably because of poor land use practices as noted by the Poverty Eradication Commission (2000). Households have neither intensified nor diversified food production on the small sizes of land available. From observation, methods of food and livestock production are still very traditional, requiring larger portions of land in order to produce much food. Further still, cash crop

farming has adversely affected food production by competing for the limited time and human power available, thus food crop farming cannot be intensified.

Table 13: Correlation of Size of land and food stock

Correlation		Size of land	Food stock
Size of land	Pearson Correlation Sig.(2-tailed) N	1.000 . 100	.336** .001 100
Food stock	Pearson Correlation Sig. (2-tailed) N	.336** .001 100	1.000 . 100

**Correlation is significant at the 0.001 level (2-tailed).

4.6.2 Size of land and number of meals eaten daily by households

There was no significant ($p > 0.05$) correlation between size of land and number of meals (Table 14). A correlation coefficient of 0.133 was obtained implying that an increase in size of land did not highly affect the number of meals eaten daily by households. The size of land that a household owns, therefore, does not play an important role on the number of meals eaten within the household.

Table 14: Correlation of size of land and number of meals eaten daily

Correlation		Size of land	No. of meals eaten daily
Size of land	Pearson Correlation Sig. (2-tailed) N	1.000 . 100	.133 .188 100
No. of meals eaten daily	Pearson Correlation Sig. (2-tailed) N	.133 .188 100	1.000 . 100

This observation could be explained by the fact that methods of obtaining food like buying (The Sessional Paper No. 2 of 1994 on National Food Policy) and gathering may be employed. Some households bridge the gap between food scarcity and number of meals by buying or gathering thus being able to avoid changes in number of meals as a result of small size of land.

4.6.3 Home garden crops and food stock

Results of the Pearson correlation coefficient as shown in Table 15 revealed that the correlation between home garden crops and food stock was not significant ($p > 0.05$) with a correlation coefficient of 0.117, indicating that increase in home garden crops did not highly affect increase in food stock. Thus home garden crops do not play an important role in relation to food stock.

Table 15: Correlation of home garden crops and food stock

Correlation		Home garden crops	Food stock
Home garden crops	Pearson Correlation	1.000	.117
	Sig. (2-tailed)	.	.248
	N	100	100
Food stock	Pearson Correlation	.117	1.000
	Sig. (2-tailed)	.248	.
	N	100	100

These findings imply that in Butere division, home gardening may not be an established practice, agreeing with the data given by Butere-Mumias DDP (2001-2006), that the most important food crop produced was maize. The production of home garden foods was so low that it did not affect food stock. Also, FAO (2001) noted that home gardening is still

a neglected practice among many communities. Thus, despite the capacity of home garden crops to affect food stock (Shrestha et. al. 2002), households in Butere division do not experience this.

4.6.4 Home garden crops and number of meals eaten daily

There was no relationship between home garden crops and number of meals eaten daily. The correlation coefficient obtained was 0 at $p > 0.05$ as shown in Table 16. The value implies that changes in home garden crops did not at all affect changes in number of meals eaten daily, therefore, the role played by home garden crops on number of meals is insignificant.

Table 16: Correlation of home garden crops and number of meals eaten daily

Correlation	Home garden crops	No. of meals eaten daily
Home garden crops Pearson correlation	1.00	.000
Sig. (2-tailed)	.	1.000
N	100	100
No. of meals eaten daily Pearson correlation	.000	1.000
Sig. (2-tailed)	1.000	.
N	100	100

A possible explanation for this observation is that many households may have resorted to selling their foodstuffs in order to meet other basic needs as noted by the Poverty Eradication Commission (2001). Data from the key informants elicited 75% responses to the affirmative for selling farm produce by households. To some extent, this agrees with Muelhoff (2001) who noted that home gardens could be income generating. However, the Poverty Eradication Commission (2001) discouraged the habit of excessive selling of

foodstuffs despite low yields. Most of foodstuffs sold are home garden foods thus leading to insignificant effect on the number of meals eaten daily.

4.6.5 Number of livestock and food stock

The correlation of number of livestock and food stock was significant ($p \leq 0.05$) with a correlation coefficient of 0.211 (Table 17). This implies that changes in number of livestock moderately affected changes in food stock. Increase in number of livestock in the households led to a corresponding increase in food stock. This agrees with the argument of Abassa (1995) that increased livestock keeping can improve food security of a household.

Table 17: Correlation of number of livestock and food stock

Correlation		No. of livestock	Food stock
No. of livestock	Pearson correlation	1.000	.211*
	Sig. (2-tailed)	.	.035
	N	100	100
Food stock	Pearson correlation	.211*	1.000
	Sig. (2-tailed)	.035	.
	N	100	100

This could be explained by the fact that livestock waste is used to produce farmyard manure, which is used in gardens to improve yields thus resulting in more food stock. This concurs with the reports of FAO (2001) and Muelhoff (2001) who suggested that the home garden could take advantage of the interdependence in order to reduce the cost of maintenance and to produce more food. Also, livestock products such as milk and eggs could be used in the diet thus more food available to the household.

4.6.6 Number of livestock and number of meals eaten daily

Data in Table 18 shows that the correlation between number of livestock and number of meals eaten daily was insignificant ($p > 0.05$) with a correlation coefficient of 0.064. This implies that there were minimal changes in number of meals eaten daily caused by changes in number of livestock.

Table 18: Correlation of number of livestock and number of meals eaten daily

Correlation	No. of livestock	No. of meals eaten daily
No. of livestock	1.000	.064
Pearson correlation	.	.527
Sig. (2-tailed)	100	100
N		
No. of meals eaten daily	.064	1.000
Pearson correlation	.527	.
Sig. (2-tailed)	100	100
N		

A change in the number of livestock appears not to affect the number of meals eaten daily, probably because livestock as a source of food is utilized occasionally. It is not common practice for households to slaughter livestock since their monetary value is high (Abassa, 1995). Some households may also find it unacceptable to consume products such as eggs due to ignorance or cultural beliefs (Poverty Eradication Commission, 2001) hence they sell them. Milk as the most commonly consumed product is incorporated in tea, usually accompanying a carbohydrate. Thus if a household takes black tea instead of tea with milk, it will not affect the number of times meals taken but the quality. Further, the fact that households in Butere division rear few livestock could mean that the effect of the livestock on number of meals is negligible.

Based on the findings above, home gardening plays a significant role in household food security among households in Butere division with respect to the land sizes and number of livestock, but not with home garden crops. With land sizes/number of livestock and food stock, there was a positive correlation in both cases, meaning that when the size of land/number of livestock increases (or decreases), there will be a corresponding increase (or decrease) in food stock.

The results presented and discussed in this chapter reveal that many households in Butere division are food insecure. These households are affected by seasonal food scarcity, which seems to persist every year, resulting in poor diets. If no intervention is instituted, the situation may lead to inadequate food intake and inadequate nutrient intake, hence, undernutrition (Muelhoff 2001, FAO 2001). Also, data has shown that home gardening plays an important role in household food security, whereby they contribute to higher food stock. Home garden crops are greatly utilized during seasonal hunger when the staple foods are out of stock. The crops are used as snacks to accompany tea, while others are sold to obtain money for buying the staples or other uses within the home.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

5.1.1 Purpose of the Study

The purpose of this study was to generate and document information on the role of home gardens in food security among rural households in Butere division, Butere-Mumias district, western Kenya. It sought to establish whether households in Butere division are food secure and also whether home gardens play any role in food security.

5.1.2 Research Objectives

The study addressed the objectives:

- To identify the socio-demographic and agro-economic characteristics of households in Butere division.
- To establish the food security status of rural households in Butere division.
- To identify methods of food procurement for households in Butere division.
- To establish factors that influence home gardening in Butere division.
- To determine the role of home gardening on household food security.

5.1.3 Methodology

A descriptive survey design was adopted in this study. A sample of 100 rural households was selected randomly from the division, while purposive sampling was used to obtain 20 key informants. Data was collected using a self-administered questionnaire for key

informants, an interview schedule and an observation checklist for the households. Interviews were arranged with respondents in their homes, to allow for observation of the home gardens. Data were organized into categories, so that some were reported verbatim while others were coded and analyzed using the Statistical Package for Social Sciences (SPSS) 8.0 for windows version. This generated frequency distributions and percentages for description. Pearson Correlation Coefficient was used to determine the role of home gardening on food security.

5.2 Results

5.2.1 Socio-demographic characteristics of households

Data revealed that 55% respondents were between the ages of 20years and 50years. Also, 45% of respondents were above 50years of age. On marital status, 82% of respondents were married, 16% respondents were widowed, while 2% separated. Further, data on the residence of spouse showed that 72% of respondents' spouses reside at home while 28% reside elsewhere. Findings on the household size revealed that 44% of households had 7 and above members, which are large. Sixty eight percent of the population had attained less than basic (primary) education. The highest frequency i.e. 37% was among those with lower primary education, 23% of the population had secondary education, while 9% only of the population had college education. Findings of the study further showed that 29% of spouses had lower primary education while 26% had upper primary education. Only 14% of spouses had secondary education, 10% had college education while 2% had university education.

5.2.2 Agro-economic characteristics of households

The agro-economic characteristics of index households involved land ownership, occupation and income levels. Data on land owned by index households revealed that 31% of the households had less than 1 acre of land and 69% of households had 1.1 and above acres of land. Eighty nine percent of households had below 3 acres of land. Farming was the main occupation for majority of the respondents, and/or their spouses. 88% of the respondents indicated farming as an occupation, while 60% of the spouses were farmers by occupation. Data further revealed that 56% of households could not quantify their total monthly income, while majority of the rest 44% had a monthly income of less than Kshs. 6000.

5.2.3 The food security status of households

Data collected on the amount of food stored revealed that 28% only of households had maize in store while 72% of households had no maize in store. An even smaller population of 20% of households had some beans in store while 80% did not have beans in store. Sorghum was stored by 10% of households and nuts, which were stored by 8% of households. Further, the quantity of food stored showed that the amounts do not suffice for majority of households. Data revealed that 25% only of households had food stock that lasts the whole year round. Majority of households i.e. 75% had to consider other ways of procuring food. Findings on number of meals eaten during two periods of the year i.e. January to June and July to December revealed that there were no significant changes in number of meals eaten year round among rural households in Butere division.

Two percent of households ate one meal per day, 30% of households ate two meals per day, 64% of households ate three meals per day, and 4% of households ate four meals per day. For 32% of households who ate 2 meals and below, food security is still a major issue of concern. The lack of change in number of meals was attributed to adoption of coping mechanisms such as high dependence on home garden crops. 90% of households utilized coping mechanisms. Secondly, there is diversity in methods of food procurement in Butere division. Lack of change in number of meals may also be attributed to habit. When some households adopt a habit of eating a certain number of meals, this may not change irrespective of food surpluses or deficits. With regard to number of meals eaten daily by households, 68% of households in Butere division can be said to be food secure while 32% of households can be said to be food insecure. Households' perception of food security was based on what households interpreted as food. In Butere division, the staple food is "ugali". When "ugali" becomes scarce within households, they perceive themselves as "hungry". Data collected revealed that households suffered food insecurity as a result of seasonal hunger. The scarcity of food was found to be highest within households between January and July. Maize was scarce in 50-78% of households from January to July. Scarcity of millet and sorghum showed a similar trend. Legumes were scarce from January to June, whereby more than 30-60% of households experienced scarcity. However, 50% only of the affected households perceived themselves as food insecure. Vegetables were the only priority crop that experienced least scarcity, with 5-15% only of households lacking vegetables in the home throughout the year. Nuts were scarce in 20-35% of households between January and June. Root crops had less than 20% of households experiencing scarcity throughout the year. Scarcity of bananas was

experienced by less than 10% households between January and April. Generally, data on household perception of food security revealed that a maximum of 78% of households who experienced scarcity of maize, sorghum and millet perceived themselves as food insecure between January and July.

5.2.4 Food procurement among households in Butere division

The food production activities identified were crop production and livestock production. Food crops produced were maize, grown by 99 households; legumes, grown by 96 households; vegetables, grown by 99 households; root crops, grown by 69 households; nuts, grown by 45 households; bananas, grown by 80 households; sorghum, grown by 16 households and millet, grown by 15 households. The leading crops in priority were maize, legumes and vegetables. Most crops produced were home garden crops. In addition households kept cattle, sheep, goats and poultry, although to a small extent. A percentage of 74 households kept cattle, 22 households kept sheep, only 8 households kept goats, and 93 households kept poultry. Most of the crops produced were consumed within the household. This was done by 100% households. Also, 75% households sold of the produce. In comparison to food crops, more households sold their livestock instead of consuming them within the household. 80% households consumed livestock while 20% did not consume locally. 80% of those who consumed also sold livestock, while 70% of households sold livestock products. Buying of food was found to be another method of food procurement employed by 88% of households, while gathering was employed by 12%.

5.2.3 Factors influencing home gardening

The first factor that was found to influence home gardening was land. This was in terms of size, quality of soils, and accessibility. Fifty two percent of households had small land while 46% had sufficient land for agricultural production. Two percent of households indicated that their land was big. In regard to soil quality, 55% of households indicated productive soils, 42% unproductive, while 3% had wet soils. All lands were easily accessible, hence, a boost to home gardening. Secondly, cash crop farming was found to be a hindrance to home gardening. Sixty five percent of households grew sugarcane while 35% only of households had food crops exclusively. Technology was yet another factor influencing home gardening. Eighty percent of households employed traditional methods of food production while 20% households combined traditional and some modern methods. Lastly, information was found to influence home gardening in that it was lacking among the rural households. A contributing factor to this was found to be poor infrastructure within Butere division.

5.2.4 The role of home gardening on household food security

Pearson correlation coefficient was used to establish whether home gardening plays a role in food security. The correlation between size of land, and food stock and number of livestock and food stock were found to be significant. The correlation between size of land and number of meals, home garden crops and food stock, home garden crops and number of meals, and number of livestock and number of meals were not significant.

5.3 Conclusions

Based on the outlined results, the following conclusions have been made:

- Agricultural production was the main method of food procurement for households in Butere division. Every household ensured that they produced some crops. Livestock keeping was minimal and not diversified. The fact that all households practiced agriculture makes them an ideal target for dissemination of agricultural information, which will enable them realize better yields for household food security.
- Most households grow home garden crops but they do not prioritize them, except for vegetables. Yet, these crops are a buffer to the households during lean seasons. The priority crops were maize and legumes, whose stock for most households did not last long. Sorghum and millet, which were staple crops, are slowly being wiped out from this community as fewer households are now growing them.
- Methods of agricultural production in Butere division were extensively traditional. This has led to low production in terms of yields and wastage of resources such as time and labor. Given the urgency of making rural households food secure so as to curb malnutrition, this community is ideal for improvement of their agricultural methods.
- The size of land for agricultural production for most households was small and majority were peasant farmers. The repeated use of the small lands without improvement of the soils can contribute to soil infertility. Owing to the small size of land and lack of zero grazing units, livestock have no sufficient fodder, hence, low productivity.

- Seasonal hunger is rampant among many households between the months of January and July, given the low productivity levels. This renders households food insecure. Though there is heavy reliance on home garden crops, they do not meet the daily food requirements of households as home gardening is done on small scale.
- A high percentage of households were selling their produce, despite the fact that the produce was not sufficient for even the households themselves. The reason given for this is that money could be required for other needs such as education and medical expenses.
- Market purchases of food and gathering are resorted to in times of seasonal hunger. Though these methods of food procurement are handy, they are unreliable as buying depends on availability of money and food in the market, while gathering depends on the availability of fallow and forest land. This implies that for the majority poor in this community, production of food is still the cheaper option.
- Land, cash crop farming, technology, information and belonging to social groups are factors influencing home gardening. Therefore, there is need for combined effort of the government, non-governmental organizations and individual households to address these and find lasting solutions.
- Home gardening plays a role in food security with regard to food stock. This implies that when a household has a home garden, they are likely to have more food in store for future use. Home gardens did not play a role in food security

with regard to number of meals. Again, this finding requires further investigation into the number of meals eaten daily throughout the year and their quality.

- Home gardening is still a haphazard practice in a majority of households within Butere division. Among such households, there are no designated pieces of land for home gardening, while those who had did not maintain them well.

5.3 Recommendations

Based on the findings that have emerged from the study, it is recommended that:

- There should be dispensation of existing information on home gardening and stakeholders and households should seek more information on effective home gardening so that their potentials in household food security can be maximized. Many households have not adopted resource saving- high yielding methods because they have no information on their existence. Also diversification of methods of dispensing information to farmers/households should be done, with emphasis being laid on extension by extension workers. Also, the media can offer more information, for instance, radio programs, as this is the most used media.
- Households practicing home gardening should be discouraged from selling their produce until the household's food requirement is met. This could be done through home economics extension that will emphasize the nutritive value and importance of eating these foods. Local administrators could also advise their community members through "barazas" and other social gatherings.
- Feasible alternatives that emphasize food crop farming in favor of cash crop farming should be offered to households by stakeholders in agriculture and food

security agencies, so that households may see the benefit and go for them. For instance projects on vegetable gardens can ensure food supply as well as income to the households, as is being done in parts of Asia. Since sugarcane farming has drawn most agricultural resources, there is very little left for food production.

- Farmers/households should have access to loans that will offer them capital for investment. This could be offered by micro-finance institutions to individuals and social groups. The initial cost of home gardening could be expensive for households to afford, as they need technological methods in order to realize good yield. These can lure farmers away from sugarcane production. These loans can be paid over time with small interests.
- The government, through the Ministry of Housing, Roads and Public works needs to improve infrastructure in the division and the district at large. Road network is very poor thus many households cannot be reached. Better infrastructure will quicken dispensation of information, hence, quick action by the recipients.

5.4 Suggestions for further research

More research is needed on:

- The nutritive value of home garden foods particularly the indigenous foods. This may help promote them in our society that has taken preference to exotic foods.
- Gender roles in home gardening.
- Preservation techniques for home garden foods that could be adopted by the rural households.

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