GENDER AND HOUSEHOLD FOOD SECURITY SITUATION IN CHAGGA HOMEGARDENS: A CASE STUDY OF ROMBO DISTRICT

BY

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A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE IN MANGEMENT OF NATURAL RESOURCES FOR SUSTAINABLE AGRICULTURE OF SOKOINE UNIVERSITY OF AGRICULTURE. MOROGORO, TANZANIA.

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ABSTRACT

The study was conducted in Rombo District in Kilimanjaro Region, Tanzania. The objective of the study was to assess gender and household food security situation in Chagga homegardens. A multistage sampling was employed to obtain a sample of 100 respondents. Primary data were obtained through personal observation, administering of structured questionnaire and focus group discussion. Secondary data was obtained from District Agriculture and Livestock Development Office and from Sokoine University of Agriculture Library, Morogoro. Data were analysed by using Statistical Package for Social Sciences (SPSS) computer program. The results of the study showed that homegarden crops contribute 67.7%, livestock 29.0% and homegarden trees 3.6% of the income from homegardens. In total the homegardens contributed 53.1% of the average household income while other sources were off-farm activities 35.9% and from open field farm was 11.0%. The homegardens contained about 27 species of food crops of which 12 species are reported by more than 70% respondents that are in danger of disappearing. More than 65% of the households in the study area were food insecure. Female-headed households were more vulnerable to food insecurity than male-headed ones. Socio-economic factors such as income, size of open field farm, level of education, sex and age of the head of household influence household food security significantly at ($P< 0.05$). The study also found that gender division of labour subjects women to high workload, which might influence household food security. Decisions on various production and expenditure of household resources were mostly done by men and this influences household food security. The study conclude that Household food security is significantly ($P<0.05$) influenced with socio-economic factors such as average

income, main occupation, sex, age and level of education of the household head, and socio-cultural factors. It is recommended that the government through its policy makers and the development planners should recognise and promote the role of women as producers and providers of food to the household. Analysis of food security situation and type of production system need to be carried out in various regions in order to suggest mechanisms for improving food security over time. Government assistance is needed to sensitise people to shift to areas with plenty of land for crop cultivation.

DECLARATION

I Mamkwe C. Edward do hereby declare to the Senate of Sokoine University of Agriculture that this dissertation is my original work and has not been submitted for a degree in any other University.

Signature .....

Date 17/10/2003

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ACRONYMS

AIDS- Acquired Immune-Deficiency Syndrome

DALDO- District Agricultural and Livestock Development Officer

FAO- Food and Agriculture Organization of the United Nations

HFS- Household Food Security

HIV- Human Immune Virus

ICRAF- International Centre for Research in AgroForestry

KEFRI- Kenya Forestry Research Institute

m a s l- Meters Above Sea Level

NORAD- Norwegian Agency for Development

OSSREA- Organisation for Social Science Research in Eastern and Southern Africa

SPR- Subsistence Potential Ratio

SPSS- Statistical Package for Social Sciences

SUA- Sokoine University of Agriculture

TFNC- Tanzania Food and Nutrition Centre

UNICEF- United Nations International Children Education Fund

URT- United Republic of Tanzania

WHO- World Health Organization

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background

1.1.1 Homegarden agroforestry

Homegardens are traditional farming systems, especially in regions of high population density and decreasing availability of arable land (O'ktingati, 1985). They are widely distributed in many parts of the world, including Tanzania in which they are found on the foothills of Mount Kilimanjaro and Mount Meru, the Pare highlands and Southern highlands. Homegardens may be composed of a large number of woody perennials and herbaceous species, carefully structured to form several vertical canopy strata and each component has a specific place as well as function. The choice of species in the garden depends largely on environmental and socio-economic factors, dietary habits of people and market demands. The system provides continuous production of different crops, tree products and livestock within limited area. Homegarden components contribute significantly to the household economy/income and food security (Karyomo, 1985). About 24% of the world population depends largely on agroforestry products (ICRAF, 1997).

Agroforestry is defined as a collective name for land use systems and practices in which woody perennials are deliberately combined on the same management unit with herbaceous crops and or animals, either in some form of spatial arrangement or temporal sequence. In agroforestry systems there are both ecological and economic

interactions among the different components (Nair, 1993). Agroforestry system refers to a type of land use that is specific to locality and described according to its biological composition and arrangement, level of technical management and socioeconomic features (Vergar, 1990) that are the most distinctive feature, taking place above ground, below ground and through transfer of biomass. Agroforestry systems enable people to increase diversity and production from the same piece of land. In addition to food and wood products, homegarden agroforestry has a wide and diverse potential to contribute to the preservation of the environment. It increases biodiversity, food security and reduction of pressure on woodlands.

Homegarden systems of production are used in Tanzania in order to meet needs of people in terms of food, fuel wood, fodder, medicines, soil fertility, shade and building materials meanwhile alleviating the problem of environmental degradation. For many years, the Chagga homegardens has provided a continuous ground cover and high degree of nutrient cycling, which made it possible for the homegardens to remain more or less sustainable with minimum external inputs. However, due to a rapid increase in human and animal population, the system is currently under considerable pressure, which threatens its sustainability (Nyaki and Mansoor, 1998). As populations continue to grow, pressure on arable land steadily increases. The reduced possibility for cropland expansion and severe shortage of land has compelled farmers to practice continuous cropping and completely abandon even seasonal fallowing.

Productivity of the homegardens is constrained by factors like drought and loss of fertility that are attributed to deforestation, which has led to serious erosion especially along river banks and steep slopes. Most catchment forests in these areas have been affected by deforestation (Semu *et al.*, 1992; OSSREA, 2002). It is observed that cropping intensity is still increasing as fragmentation of land goes on. In such a situation, little organic matter is return to the soil which leads to soil erosion and land degradation (OSSREA, 2002). Agriculture has to meet these challenges by increasing production on land already in use and by avoiding further encroachment on land that is only marginally suitable for cultivation. Environmental degradation has a direct effect on long term food security, thus, people have to increase production while at the same time conserving the production potentials of the land (Lori, 1998) Unreliability and unpredictability of rainfall causes periodic droughts that coupled with the lack of local capacity to purchase food create persistent threat to household food security in the region.

The economic future of Africa will depend on strong performance in the agricultural sector and particularly the role of small-scale farmers (Scott, 1996 cited in Kabutha and Humbly, 1996). A strong agricultural performance will require a transformation of land use and management. Agroforestry, which involves the deliberate integration of trees and shrubs under the same land use management with crops and livestock, offers a great opportunity to mitigate environmental degradation and deforestation (Mugah, 1996). Agroforesty, as a composite technology, has the potential for increasing land-use intensity while maintaining the productivity of the natural resource base. It enables the land to support much higher population density than

traditional agriculture (Roling, 1995). Trees like *Leucaena spp, Calliandra spp* and *Seshania spp* increase soil fertility through their nitrogen- fixing characteristics and also provide fodder for farm animals, while *Grevillea robusta* acts as a good source of mulch, wood fuel and timber. Agroforestry encompasses all enterprises of the farm holding and hence promotes and enhances complementarity and supplementarity, and minimises adverse competition among enterprises (Earle, 1993).

1.1.2 Food security

Food security is a complex field of analysis developed within disciplines of food science, nutrition and economics. It is a multidisciplinary cross-sector concept, which combines natural and social sciences in one integrated approach (Makundi *et al.*, 2001). For instance, a nutritionist might associate food security with food habits, norms and malnutrition. An agricultural economist might focus on grain prices and stores at national and regional levels; while an agriculturalist might focus on food production and processing at the local level. With regard to this, the World Bank (1986), has defined food security as the access by all people at all times for enough food for an active healthy life.

According to FAO (2001), the major thrust of food security concerns is to bring about a significant increase in agricultural production in a sustainable way and to achieve a substantial improvement in people's entitlement to adequate food and culturally appropriate food supplies. In Tanzania, agriculture, the leading economic sector is however, under-performing although it provides livelihood for more than

due to reduced work performance, lowering cognitive ability and school performance as well as reduced income earning. In addition, improved food security and increased income at household level ultimately culminate into healthy national income (Winrock, 2000).

Food insecurity is more severe in rural areas, where 90% of Africa's poor live. The number of chronically undernourished is projected to increase by over 100 million by the year 2010. The pressure on land, vegetation and water supplies has made Africa increasingly prone to food security crises. Despite the vast problem of HIV, which causes AIDS for which sub Saharan Africa is most affected, Africa still has the highest contribution to global population by over one billion in the next 50 years (Xinhua, 2001). Addressing food security and land degradation problems are thus, crucial for the future development of the continent. If no serious action is taken, Africa's demand for food will increase by 150% by the year 2020 and the demand for imported cereals will triple (Dembner, 1995). Homegarden has an important role to play in this effort, as it restores and maintains soil fertility while contributing towards intensification and diversification of land use.

Household food security in developing countries is determined by what a household is able to produce, process, store, prepare and buy from the market. In turn these are determined by the agricultural available resources to that household such as climate and ecology, the amount and quality of land, the level and type of technology, the availability of production assets, as well as the amount and division of labour. According to Frankenberger (1996), food security has social linkages, including

access to health services and healthy environment, education and adequate care of children and women. These non-food linkages influence households' decisions regarding livelihood resources, such as income and labour, which are direct determinants of household food security.

1.1.4 Gender

Understanding women and men's relationships plays an important role in developing solutions to household food security. It is assumed in this study that the factors determining household food security can be understood better if examined in the context of gender relation, as men and women have different roles, needs and interests. While at the theoretical level gender remains a culturally defined state of being male or female, in this study the definition is operationalised to reflect the power knowledge and role men and women have in influencing food security (Mosha, 1990). However, no solution will be successful without the policy environment and recognizing that policy and institutional reform are crucial to ensuring higher agricultural productivity in the continent.

1.2 Problem statement

For centuries the homegardens have been able to sustain population growth to a level at which Kilimanjaro region to which Rombo district belongs has been one with the highest population density in rural Tanzania. The homegardens were able to provide a wide range of traditional foods. They include edible leaves, nuts, fruits and vegetables, which are important in enhancing nutritional balance in daily diets.

However, in recent decades the system seems to collapse in some areas (Okting'ati, 1994). The land has been under continuous production without enough replacement of nutrients. Recently, there is a declining food production from homegardens although agroforestry is considered to be a promising approach to alleviate the problem of environmental degradation and food insecurity. Lack of interest of youth on land matters has led to a serious out-migration of youth and men. This leaves behind elderly people and children who may not be able to fully participate in the traditional system of agroforestry. The system is therefore in danger of losing its potentials and become unsustainable. Declining of the system's productivity potential as a result of some socio-economic and socio-cultural factors definitely lead to food insecurity in the region. In Tanzania the proportion of households in the rural areas which suffers from food insecurity is very high (about 77%) (TFNC 1992). In the region, gender division of labour is highly specific and inequitable such that once distorted by external factors like increasing population pressure, wage labour, migration of youth and men to urban areas has led to a decline of the system's potential to curb hunger.

1.3 Justification

In the study area, there is land scarcity with population density of 136 persons per square kilometers and therefore it needs intensive agriculture with improved husbandry to compensate for the increasing population pressure. According to Lorri (1998), people need to increase production per unit area while at the same time conserve the production potential of the land. Due to the limited external input

availability and use by the traditional farmers, systems like homegardens, which have low input and high regenerative production potentials, for food security deserve attention and promotion. Its promotion will be possible if together with other factors like climatic and environmental factors the socio-economic and socio-cultural factors that influence food security are clearly analysed, identified and understood. Parallel to this, information about the food insecure and vulnerable people is often lacking in many countries (FAO, 2000). There is therefore a need to identify some socio-economic and socio-cultural factors in homegarden agroforestry system influencing household food security in order to improve it so that it remains sustainable for food security at present and in the future.

Food insecurity constitutes a big problem in different parts of Tanzania (Ringia, 1990; Wagao 1991; Kavishe, 1993). The World Bank also estimated that about 6.6 million people in Tanzania were chronically food insecure (World Bank, 1985). There is thus an urgent need to improve agricultural productivity if sustained productive agriculture and food security is to be developed. This is because agriculture is important, as a vehicle for addressing food security problems in Tanzania. It is the principal means of ensuring food availability (Makundi *et al.* 2001). Improved agriculture will strengthen the economic base and thus improve accessibility to food (Kavishe. 1993). In Tanzania the situation of food security at household level is highly deficient (Makundi *et al* 2001). This makes it difficult to examine magnitude and the trend of the problem of household food insecurity over time. The findings of this study will contribute information in order to substantiate

the magnitude of household food insecurity problem in the study area and form a base to call for interventions to rescue the situation.

Women and men have different gender based roles and responsibilities in their own lives, families, households and communities. They have different access to and control over resources and different opportunities to participate in decision making to matters pertaining to investment, production and consumption at the household level. Gender perspectives aimed at in this study is to show the contribution and roles of men and women in homegarden production system although it is known that the issue of food availability at the household level is closely linked to women who are providers of food to their families. Gender segregated information reveals how men and women operate in that system of production for subsistence and income, which both have influence on household food security. It is thus, justifiable to evaluate the situation/status of food security in the homegarden system in order to achieve sustainable household food security.

1.4 Objective of the study

1.4.1 Main objective

To find out the contribution of livestock, food-crops, and tree plant components of homegardens to household food security and assessment of its status in the homegarden system in Rombo District. This will assist in developing appropriate interventions leading to a better and sustainable homegardens for household food security.

1.4.2 Specific objectives

1 To find out the contribution of livestock, food crops and tree plant components of the homegarden system to household income for food security in the study area.

2 To determine the status of household food security in the homegarden system

3 To assess the socio-economic factors influencing household food security in homegarden system. These include off farm activities to supplement household food requirements, household labour force, possession of open field farm, distance to open field farm and household labour out-migration.

4 To assess socio-cultural factors in the Chagga homegardens affecting household food security. These include gender division of labour and decision-making at household level.

1.4.3 Working hypotheses

(a) **Null hypothesis**

Different homegarden components including livestock food crops and tree plants have insignificant role in household food security.

Alternative hypothesis

Different homegarden components have significant role in household food security.

(b) **Null hypothesis**

There is no household food insecurity in the homegarden system.

Alternative hypothesis

There is household food insecurity in the homegarden system.

(c) **Null hypothesis**

Socio-economic and socio-cultural factors like off farm activities to supplement household food requirements, household labour force, possession of open field farm, distance to open field farm and household labour out-migration as well as gender division of labour and decision making respectively do not influence household food security.

Alternative hypothesis

Socio-economic and socio-cultural factors like off farm activities to supplement household food security, household labour force, possession of open field farm, distance to open field farm and household labour out-migration as well as gender division of labour and decision making respectively influence household food security.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Homegardens and food security

Homegardens are traditional production systems of long history in the tropical countries which involve deliberate management of multipurpose trees and shrubs in intimate association with annual and perennial agricultural crops and invariably livestock within the compounds of the individual houses (Fernandes *et al*, 1984). The whole crop-tree-animal unit is intensively managed by family labour. Homegardens are characterized by a high diversity of plant species with different flowering, fruiting and cropping seasons thus enabling the homegardens to function as living food stores and potential additional food source (Karyomo, 1985). Household gardens supply and supplement the subsistence requirements and generate secondary income. The gardens produce food crops, vegetables, spices, medicinal plants, fuelwood, pollen and nectar for the honeybees. According to Njuki (2001), the majority of farmers keep livestock for the purpose of obtaining milk and manure while others is for the purpose of obtaining manure for the homegarden.

Analyses of the structural and functional aspects of tropical homegardens show that the average size is less than 0.5 ha with large numbers of tree and herbaceous species in a multistrata arrangement. While there is a remarkable similarity among the homegardens with respect to the type and nature of herbaceous crops, the tree species change with environmental and socio-cultural factors (O'Kting'ati *et al.*, 1984).

Homegarden systems are inherently complex and better understood by farmers than by scientist (Fernandes *et al.*, 1984; O'ktingati, 1985). This is a neglected type of agroforestry. They haven't been exposed to scientific experimentation just like other agroforestry practices such as alley cropping and hedgerow inter-cropping. When new components such as new or improved trees or crops become available, however, their evaluation should not be left solely to the farmers. Trees in compounds are usually grown for environmental benefit or food, yet more scientific input could contribute to optimising the practices used. Production in homegardens is mainly of a subsistence nature (Rugalema *et al.*, 1995), but studies of existing homegardens have shown that given appropriate infrastructure and incentives, a wide range of high-value cash crops (coffee, vanilla, black pepper and cardamom) are produced. Furthermore, despite the very high species diversity of tropical homegardens, their current and potential role as inhabited micro-sites for the conservation of biological diversity has largely been overlooked.

Homegarden is perhaps the most intensive land use system, providing all sorts of nutritional elements at low cost and in an ecologically friendly way. It conserves biological diversity especially of cultivated plants (FAO, 1996). This is especially relevant to areas of the tropics under pressure from increasing populations and indiscriminate deforestation (Fernandes and Nair, 1986). Yields are generally low but this is more than compensated for by the diversity and nutritious nature of the products. More importantly, unlike the seasonal harvests of staple foods from outlying fields, homegarden harvests are continuous. This continuous production facilitates harvest of the required product when needed for consumption and thereby

considerably reduces post-harvest losses, which can be as high as 70% due to poor storage facilities.

2.2 The concept of food security

According to FAO (1996), food security exist when all people, at all times, have physical and economic access to sufficient and safe nutritious food to meet their dietary need and food preferences for an active and healthy life. A society that can be said to enjoy food security is the one that has developed the internal mechanism that will enable it to sustain the food norm in the face of crises threatening to lower the achieved level of food consumption (Oshaug, 1994). Achieving food security means ensuring that sufficient food is available, that supplies are relatively stable and that those in need of food can obtain it. Food insecurity is the inverse of food security: a condition in which a population does not have access to sufficient, safe and nutritious food over a given period to meet dietary needs and preferences for an active life. Possible causes are insufficient food availability, insufficient food access, and inadequate food utilisation. Food utilisation is a measure of whether a population will be able to derive sufficient nutrition from available and accessible food to meet its dietary needs.

2.2.1 Food security situation

Food insecurity is expected to accelerate in sub-Saharan Africa. Sub-Saharan Africa's share of the world's food insecure population is projected to almost quadruple from 11% in 1969/71 to 39% in 2010. According to the FAO (1996),

about 40 % of the total African population, largely children and women, face mounting problems of poverty and malnutrition. This is, inadequate nutrition due to a lack of access to adequate calories, proteins, vitamins and other essential micronutrients. Decreasing levels of mortality combined with persistently high (but gradually or marginally declining) fertility rates, have resulted in large increases in population, which is growing at an annual rate of 2.6% compared to a world average of 1.3%. Countries such as Angola, Botswana, Malawi, Namibia, Tanzania and Zimbabwe in southern Africa and Gambia, Mali and Niger in west Africa to name a few, had population growth rates exceeding 3% between 1990 and 1995. Food demand is expected to increase tremendously in the coming decades. It is estimated that sub-Saharan Africa will account for 10.6% of the 690 million tones increase in the global demand for cereals, 5% of the 115 million tones increase in the global demand for meat products and 42.8% of the 234 million tones increase in the global demand for roots and tubers between 1995 and 2020. These large increases in food demand will result not only from increase in population but also urbanization (FAO, 1996).

2.2.2 Food security determinants

The key elements to determine food security at any time are: availability of enough food for active and healthy life, the access to food stability of supply, that is the guarantee that one has access to it at any given time (Maxwell and Smith, 1992).

2.2.2.1 Availability/adequacy

Food availability is a measure of the food that is, and will be, physically available in the relevant vicinity of a population during the given period through a combination of domestic production, stocks, or net imports. This is the food in stock plus what can be picked directly from the fields and gardens as well as from foraging from wild foods. According to FAO (1996), major components of food availability are domestic food production, food imports and food aids. In some households, food and other food crops can be sold and cash income obtained used in purchasing food from the market (Mwakalobo and Shively, 2001). Food availability requires adequate products from agriculture, smooth market operations infrastructure and free flow of information (Wandel and Holmboe-Ottesen, 1992). Food adequacy reflects both quantity and quality of the food that is enough to meet daily requirements by providing all essential nutrients for the all members of the household or society (Lorri and Kavishe, 1990). According to Wandel, and Holmboe-Ottesen (1992), availability of food however, is not in itself a sufficient condition to food security. The issue of food availability at household level is closely linked to women who are providers of food to their families.

2.2.2.2 Food access

According to Mwakalobo and Shively (2001), food access is a measure of the population's ability to acquire available food for the given consumption period through a combination of its own production and stocks, market transactions, or transfers. Food access encompasses physical, economic and social aspects. Physical

access to food relates both adequacy of supply and the efficiency with which food is distributed, including storage, preservation, transportation, marketing and processing. Economic access relates to resources for the procurement of food, the ability to generate income actually available for consumption purposes. According to Holmboe-Ottesen and Wandel (1990), economic access refers to the ability of people to establish entitlement over a requisite amount of food, the ability to generate income, whether in cash or in kind and the proportion of income that is actually available for consumption purposes. Social access refers to the social support network and equity within the social and economic organization of household and community as a whole. It is claimed by URT (1992), that, among factors that determine food accessibility in the household is feeding frequency. Feeding frequency for Tanzanian population has been seen to be low, on average twice or three times a day. Inadequate food resource in the household has consequences in feeding frequency. The limited time, especially that of women for food preparation is the main reason that affects feeding frequencies in the household. Time allocation study done in Rukwa Tanzania by Wandel and Holmboe-Ottesen (1992), showed that competing demand for women's time due to increased economic work reduce time they spend on cooking thus undermined the feeding frequencies in the households. Households reduced eating frequencies to two meals per day.

2.2.2.3 Stability of food supply

It refers to a continuous flow and availability of food in the household or society either through the quantity stored or from external sources. This can be archived

through equitable income distribution, effective markets together with other public and informal supports and safety nets (Oshaug, 1994).

2.2.3 Different levels of food security

2.2.3.1 National level food security

At national level, food security is described as a satisfactory balance between food demand and food supply at reasonable prices (Thomson and Metz, 1997). This definition intends to indicate a situation where there have been no major upheavals in food markets in the recent past, where adequate food is available and where most of the population has access to that food. In short a country is food secure when all the individuals in the country are food secure. At national level, changes in food security can be identified over time by rising prices. This will affect the poorest first, as they spend a higher proportion of their income on food. Thus, the absence of imbalance between food demand and food supply does not mean that all households in the nation are food secure. It means that if they suffer food insecurity, it is because they lack entitlement to food. A country may be food secure at national level but have a considerable number of food insecure households. This will generally be identified in regional or socio-economic terms.

2.2.3.2 Food security at household level

At household level food security refers to the ability of the household to secure either from own production or through purchase, adequate food for dietary needs of its

members. Ensuring food security is a necessary condition for improving the nutrition of each member in the household, though by itself is not sufficient because of other socio-cultural problems related to distribution of the food among the household members (Nyange, 2000). The definition of household food security accepted by he Committee on World Food Security refines this definition as follows: physical and economic access to adequate food for all household members, without undue risk of losing such access. This introduces the concept of vulnerability.

2.2.3.3 Food security at individual level

According to Thomson and Metz (1997), an individual is said to be food secure if his or her food consumption is always greater than need, as defined by physiological requirement. Consumption is determined by the claim the individual has on household food resources. This may be affected by individual earnings and assets, or by the individual's position in the household. It is certainly unusual for an individual's share of household food consumption to be determined solely by need. Usually, individual consumption can be influenced by other factors like, food preferences, eating habits, cultural taboos and norms. It is therefore clear that food security at one level does not imply food security at a lower level of aggregation. A country which is food insecure will almost have certainly contain groups of the population which are food secure, and many countries which are food secure at a national level will contain groups of population which suffer from severe food insecurity. Food security at household level does not imply that all members of the

household are food secure. A food insecure household may equally contain food secure members.

2.2.4 Indicators to assess household food security

Food security can be monitored at national, regional, household and at individual levels. At national and regional levels, food security can be monitored in terms of indicators of production, supply, trade, stock and market price (Valdes and Kornandes, 1981). More accurately, it can be monitored at household and individual levels. In the process to monitor and reduce food insecurity we must determine who are food insecure, why and how they become vulnerable. In order to delineate households, which are food insecure, Frankenberger (1985), pointed out a number of indicators. Broadly, these indicators are divided to process indicators and outcome indicators. The former reflect both supply and access by pointing to the risk of event and coping ability while the later serves as proxies for food consumption.

2.2.4.1 Process indicators

2.2.4.1.1 Risk of event indicators

These are critical dimensions of household food security (HFS), which reflect the ability of the household to obtain food that is available in the area. These are indicators that provide information on the likelihood of the shock or disaster event that will adversely affect HFS (Burton and Shoham, 1991). They include measures of agricultural inputs and production including agro-meteorological data, access to

natural resources, institutional development and market infrastructure and exposure to regional conflicts or its consequences.

2.2.4.1.2 Copping ability indicators

These are indicators that reflect food access (Burton and Shoham, 1991) and they include socio-economic variables that represent the degree of stress being experienced by the population as economic and social conditions change and how the household respond to the changes. They provide information on the capacity of the population affected by a shock or disaster to withstand the effects.

2.2.4.2 Outcome indicators

These are generally estimates for adequate food consummations. They can be grouped into direct and indirect outcome indicators. Direct outcome indicators reflect actual food consumption rather than to market channel information or medical status. These include household budget and consumption data, household perception of food security, and food frequency assessment. This type of indicator is however, difficult to collect and are not readily available. On the other hand indirect outcome indicators include storage estimates and Subsistence Potential Ratio (SPR). Frankenberger (1985), pointed out that SPR compares the amount of food (calculated in energy), which a household can produce over a year or a month with the energy requirement of the entire household for that year or month. According to Wagao (1991), a more practical and simple form of SPR is the use of food security card that has been designed by Tanzania Food and Nutrition Centre (TFNC).

2.2.5 Household food insecurity

A household is said to be food insecure when it fails to meet its dietary food intake in terms of quantity and quality (Lorri and Kavishe, 1990; Kajumulo, 1993). In areas where it exists a certain degree of food deficit at one time or another during the year is evidence to suggest that household food insecurity is widespread and chronic. This is especially prior to harvesting (Mosha *et al.*, 1992).

2.2.5.1 Types of household food insecurity

Described in this section are types of food insecurity. They can either be chronic, transitory, or seasonal. Chronic food insecurity is a persistent lack of household's ability to buy or produce enough food. Chronic food insecurity can be attributed to persistent drought (Liwenga, 1995). It can be subdivided into either a lack of overall food quantity, normally measured in calories intake or insufficiencies at the level of particular nutrients. According to FAO (2001), some 800 million people in developing countries, about 20% of their total population are chronically undernourished. Regarding this, the FAO member states in the 1996 World Food Summit, recommended that accurate and timely information be made available on the incidence, nature and causes of chronic food insecurity and vulnerability. This is crucial for national policy makers in their effort to formulate and implement policies and programs to reduce the number of undernourished and to achieve food security for all (FAO, 2000). Transitory food insecurity refers to a temporary decline in household access to enough food resulting from instability in food production and prices or household income (FAO/WHO, 1992;) and health condition. The most

severe form of transitory food insecurity is famine (Reutlinger, 1985). Seasonal food insecurity means a lack of sufficient food during a certain periods or seasons.

2.2.6 Factors contributing to household food insecurity

Food insecurity in Tanzania is mainly attributed to climatic conditions, labour availability, steep increase in prices and poor availability and so utilisation of agrochemicals, pest and diseases and underutilization of local foods (Ministry of agriculture, 1996). According to FAO (1996), major components of food availability are domestic food production, food imports and aids. Food availability is therefore determined by levels of domestic production and the extent of storage losses and food transfer from one point to another (FAO/WHO, 1992).

2.2.6.1 Environmental problems affecting food security

Under natural conditions and without external inputs, the carrying capacity of most ecosystems is quite low, generally below 2 persons per ha (Bayliss-Smith 1982). As soon as there is population pressure, people tend to over-exploit the land. In the worst cases, people are so much in need of food and fuel that they are forced to destroy their environment in an attempt to delay their own destruction (Gallopin and Berrera, 1976). In high potential highland areas, population pressure is so high because they tend to attract people. This leads to over-exploitation of the land resource even though the carrying capacity is high as the case is in the study area. According to Beets (1990), the present farming systems, infrastructure and structure of the society in Africa, the population pressure will trigger the following events:

over-exploitation of the environment, over-cropping, overgrazing, excessive collection of fuel-wood and under-fertilisation since the fallow cycle is too short. Others are decline in the natural resource base and carrying capacity; ever decreasing productivity of farming systems and food shortage and famine. When there are strong disturbance from outside such as inappropriate policies and strategies and decreased supply of external inputs these events tend to accelerate.

According to Kavishe (1993), the United Nations has estimated that the degraded area in Tanzania is between 33 and 45 percent of the total land area. The land resource is dwindling while the growing population needs more food, fuel and other basic commodities. Most of the factors affecting food production and thus availability like land use, soil fertility and climate form part of the environmental system that affects food security. They determine the agricultural production and consumption system.

2.2.6.2 Women's workload

Katani (1999), contended that women's overwork due to over-expenditure of time and energy in undertaking various tasks creates the condition of inadequate children's and female adult food intake by reducing the number of meals. During peak period the number of daily meals can be as low as one and the care with which the food is prepared can be reduced.

2.2.6.3 Inappropriate feeding practices, inadequate food supply and lack of purchasing power

Inadequate feeding, especially for young children or inadequate weaning foods and low intake of animal proteins by growing children are major direct causes of food insecurity. These inappropriate feeding practices originate or are deep rooted in social and cultural behaviour systems. Inadequate food supply in rural households may be caused by some factors like crop failures, storage and production deficiencies as well as excessive sale of foods (TFNC, 1992). Inadequate purchasing power among the rural and urban poor cause widespread hunger in many nations.

2.2.6.4 Socio-cultural aspects

Some cultural and social norms exist in many communities in Africa that have not only created a division of labour on gender line but have institutionalised some prohibitions to ownership, access and management of some farm resources and products among members of the household based on their sex. In peasant settings farmers display wealth only in ritual forms, they exercise religious sanctions, permit wealth to be displayed only through the rites of conspicuous giving (Clawson, 1978).

2.2.7 Effect of male out-migration

As a direct outcome of male out-migration and the social designs, women constitute the majority of farmers in many rural areas. As a section of society that takes responsibility for family and household maintenance, women are producers and

consumers of larger portions of agrofrestry products. They therefore have a stake in these systems and consequently take great care for them. Because of their closeness to these systems, women are banks of useful indigenous knowledge (Kabutha and Hambly, 1996). In a recent study on gender, environment and development Thomas-Slater and Rocheleau (1995), found that 27% of small-holding in Kenya are managed solely by women who are also the legal heads of households; another 47% of small-holdings is managed by women whose husbands are away from home.

2.2.8 Production and sustainability in homegarden farming systems

Beet (1990), contends that most traditional farming systems were sustainable, that is production did not go on at the expense of sustainability. Farmers tended to have considerable knowledge of their environment and did not over-exploit it. They knew which parts of the landscape were best suited to which crops and they were often good managers of their land. They would leave certain trees while clearing because they knew that the trees were beneficial to the soil but nowadays people often clear land without thinking about the consequences as a result many if not most of the agricultural systems are in a state of ecological degradation. As a result the production capacity is put under considerable pressure to expand. According to Crawley (2002), the productivity of the highlands is dwindling largely because of high and growing human population. Soil fertility, crop yields, water supplies, forest cover and biodiversity are all decreasing while crop pest and diseases are on the rise. Farmers are consequently growing poor.

2.2.9 Agricultural biodiversity for food security

Agricultural biodiversity results from the interaction between the environment, genetic resources and the management systems and practices used by culturally diverse peoples resulting in the different ways land and water resources are used for production. It thus encompasses the variety and variability of animals, plants and micro-organisms which are necessary to sustain key functions of the agro-ecosystem, its structure and processes for, and in support of, food production and food security (FAO, 1996). These locally diverse food production systems are under threat and, with them, the accompanying local knowledge, culture and skills of the food producers. With this decline, agricultural biodiversity is disappearing and the scale of loss is extensive and with the disappearance of harvested species, varieties and breeds goes a wide range of unharvested species. A survey of farm households in the Republic of Korea showed that of 14 crops cultivated in home gardens, an average of only 26% of the landraces cultivated there in 1985 were still present in 1993. The retention rate did not exceed 50% for any crop, and for two crops it was zero. These results are disturbing, as such homegardens have traditionally been important conservation sites, especially for vegetable crops.

2.2.10 Women's roles to household food security

Women also contribute approximately 46% of Africa's farm labour (The World Bank, 1986). Several studies have highlighted the need to recognise, appreciate and support the key roles played by African women in household food security, nutrition and health, population growth and environmental management. Hence, the challenge

is to empower women for sustainable development by addressing several constraints, particularly their heavy work load, their economic exclusion, land tenure bias and other injustices, lack of institutional support, technological inadequacy, and power inequalities.

2.3 Household food security and gender concerns

Gender is a relation of power between women and men. It also refers to different roles that men and women play in society. Gender differentiation comes about as a result of specific experiences, knowledge and skills, which women and men develop as they carry out responsibilities assigned to them (Fernandes, 1994). The degree of gender specificity attached to the knowledge and skills within a society depend not only on the way responsibilities are allocated among men and women but also on the degree of flexibility in which men and women have to carry out the other's assignments. Gender roles vary from one country to another but almost everywhere women face disadvantages relative to men in the social, economic and political sphere of life. Where men are considered as principal decision-makers women often hold a subordinate position in negotiation about managing family resources (FAO, 2001). According to Ishengoma (1998), the family does decisions on different production activities and resources allocation in all cases but always the husband takes the leading role. This contribute to household food insecurity, taking into account that women play a big role in household food production but they cannot make decision on different production activities. Women's poor access to and control of resources and low socio-economic status makes them more vulnerable to physical

and sexual abuse that expose them to sexually transmitted diseases. However, changing gender relations entails challenging different institutions, which are all controlled by men, i.e., religion, media, family education and the state.

2.3.1 Reducing gender inequality

According to OSSREA (2002), concepts of gender equality are still relatively new and threatening to men who are accustomed to having authorities in household, community, economy and national politics in many places. It may also be frightening to women, who fear the implications of the changes for their personal lives. To seek gender equality is to shed-off most of our cultural beliefs, because most of these cultural values and norms demand more from women than men. Women are considered to be the custodians of patriarchal culture. It is argued in the World Bank reports by Dollar and Gotti, (1999), that reducing gender inequalities can bring about greater economic prosperity and reducing poverty. The study found that a one-percent increase in secondary schooling for women results in 0.3 percent increase in economic growth (Dollar and Gotti, 1999). Worldwide, more men than women are literate (80%) compared with 64%. Women in less developed countries complete fewer years of education than men, on average and are more likely to be illiterate (Bledsoe *et al.*, 1999).

According to FAO (1989), traditional gender division of labour seems to be changing under the impact of labour mobility. There is sufficient evidence to show that women are increasingly performing farm tasks that were formerly considered to be

exclusively for men. A survey of over 200 rural families in Egyptian Delta found that nearly one half of all women interviewed were engaged in ploughing, traditionally a male task in that country.

Women have traditionally specialised in certain farm tasks, whether as family or as hired labour. For family labour, women often have primary responsibility for the production of food to be consumed by the family while men concentrate on cash crops (FAO, 1990). In many African societies, the husband manages the main granary of the household while the wife manages the kitchen. Thus, the essentials of grain or root crop supply are controlled by the man (decision on production, choice of crops, storage or sale). The woman, for her part, must ensure daily food consumption (what to eat now, tomorrow, in the next week or the next month). She often has to manage, and perhaps share with her husband, the daily hopes and fears for the availability or disappearance of food supplies. She has to ration their food so that the amount of grain or root crop received from her husband lasts as long as possible (FAO, 1996). Food self sufficiency strategies at household level cannot be effectively sustained without the full involvement of women.

2.3.2 Women as food producers

Women in developing countries hold the key to the future of the earth's agricultural systems and to food and livelihood security through their roles in the selection of seed, the management of small livestock and the conservation and sustainable use of plant and animal diversity. Rural women's key role as food providers and food

producers links them directly to the management of genetic resources for food agriculture and has given them unique knowledge of local species, ecosystems and their use acquired from centuries of practical experience (FAO, 1996). Such subsistence farmers cannot afford external inputs, such as fertilizers and pesticides, veterinary products, high quality feeds and fuel for cooking and heating. They rely on maintaining a wide diversity of crops and wild plants and animal breeds and strains that are adapted to the local environment. This is in order to protect against crop failure and animal disease or death, to provide a continuos and varied food supply and to ward against hunger and malnutrition.

2.4 The role of gender in food security

The kind of relationship that exists between men and women affects hierarchies of access, use and control, resulting to different perception and priorities to ensure household food security (Appleton and Hill, 1994). Women's and men's knowledge on drought resistant varieties, wild foods (such as wild fruits, roots or tubers and vegetables) and medicinal plants has assisted in ensuring rural-based household food security. Women are the ones who process food, collect vegetables and prepare or cook food for their families, usually assisted by the female children. Therefore, they know more of the food plants than men.

2.5 Gender roles in agroforestry

Homegarden as a farming system with a diversity of product mix creates much opportunity for all members of the farming household to be gainfully employed in the farming activities. The divisibility and multidisciplinarity of agroforestry works,

is an agenda for males and females and the young males and females in the family. However, some cultural and social norms exist in many communities in Africa that have not only created a division of labour on gender line but have institutionalized some prohibitions to ownership, access and management of some farm resources and products among members of the household based on their sex. The division of labour in many societies places on women the responsibility for obtaining food, fuel wood and fodder, products that are obtained in part from trees (Hoskins, 1983; Cecelski, 1985; Mohlnar, 1985). No matter who plants trees, women's cooperation and labour are crucial for keeping them alive (Fortmann, 1986). Because men and women have a stake in the growing and use of trees, involvement of both groups is critical. Incorporation of the needs and concerns of both men and women in development constitutes the gender perspective in this sphere (Kabutha and Hambly, 1996). According to the World Bank (1986), women farmers are responsible for producing as much as 70% of the agricultural output that feeds African families. Women also contribute approximately 46% of Africa's farm labour. It should be noted that most of this food is produced in small mixed farms that hold a wide variety of crops, animals, fodder and trees and do fit in the definition of homegarden. This is, perhaps, the most common system of production in the rural parts of Africa.

2.6 Cultural norms and customs

Cultural beliefs and customs have a strong influence on homegarden and food security. They include ritual and legal prohibitions against planting or using certain trees, regulations on where trees and food crops may be planted, limitation on who

may plant trees and certain types of food crops, and rules concerning the use of trees and their products (Emerton, 1996). It is difficult to make any generalizations about cultural norms and customs because they vary for different people in different areas. They are however powerful determinants of people's actions and often hold more local influence than rules and legislation set by the central government.

2.7 Land tenure and tree ownership

Women are restrained from tree planting through taboos and beliefs as it was reported in Maragoli area in Kenya (Ipara, 1993). Among these taboos and beliefs are: If a woman plants a tree, her husband will die; If a woman plants a tree, she will become barren; If a woman plants a tree she will equate herself to her husband and challenge his authority and supremacy as the head of the household; and if a woman plants a tree, wood from the tree will not be used for construction. Because of these threats and beliefs, most women do not engage in tree planting. However, Ipara (1993), reported that despite this 25% of the women population braved planting trees. In many African societies, men own the cash crops such as timber and market oriented fruit trees while women own the subsistence or food crops. In a homegarden system also, the tree component is owned by men while the food or arable crops are owned by women. For this reason, only men have the right to plant trees and the right to use the trees. A woman may have access and usufruct right to her husband's land for purposes of growing subsistence and annual crops but not to the trees growing on the land (Chavang, 1988).

CHAPTER THREE

3.0 METHODOLOGY

3.1 Study area

The study was conducted in Rombo District because it is one of the districts, which have a long experience in homegarden, and so it is able to provide practical information about the homegarden components and food security situation in the homegarden. Rombo district is selected because is bordered by neighbouring country, the republic of Kenya it may thus be affected by cross-border trade of some food and non-food commodities from the homegardens that may influence household food security. These non-food commodities particularly referred are trees for timber. Also the area is selected due to easy accessibility.

3.2 Geographical location

The district lies between latitude 2° 50′ South and 3° 23′ South and longitude 37° 15′ East and 37° 41′ East. It is bordered by the Republic of Kenya to the north and east, Monduli district (Arusha region) to the west and Moshi rural district to the south. Rombo District covers a land area of 990 square kilometres that are equivalent to 99,000 hectares. The land used for agriculture is 440 square kilometres, while the others are 380 square kilometres forestry, 130 square kilometres grazing land and 30 square kilometres are for special uses (like water catchment and human settlement).

3.3 Climate

Rombo district receives bimodal rainfall pattern of 500–2000 mm per annum. Short rains fall in October to December while long rains fall in March to May. Temperature ranges from 14°–20°C. However, climate changes according to altitude of the area. The district can therefore be sub-divided into three agro-ecological zones as follows: The highland zone, which lies between 1600-2000 meters above sea level (m a s l). It receives adequate rainfall of 1200-2000 mm per annum. The middle zone, lies between 1000-1500 m a s l with rainfall ranging between 900-1100 mm per annum. This is the most populated zone. This area experiences occasional crop failure because of inadequate rainfall (URT, 2000). Lowland zone lies between 800-1000 m a s l and receives rainfall between 400-900 mm per annum. Crop failure is common due to unreliable rainfall.

3.4 Population

According to 1988 census, Rombo district had 200,859 people, out of whom 94,617 were males while 106,242 were females. It had a population growth rate of 2.4% compared to the National growth rate of 2.8%. It was projected to have 267,897 people by the year 2000. According to 1988 census, the population density was 136 people per square kilometres with an average household size of 5.6 people. Average household land holding is 0.25-2.0 ha depending on the agro-ecological zone.

3.5 Economic activities

Major economic activities are agriculture. and livestock keeping in which they practice zero grazing. Main food crops are banana, maize, finger millet, beans, round potato and some groundnuts to some people. Coffee is the only main cash crop produced in the area. Other economic activities are petty trade activities in food crops like bananas, maize, beans and finger millet.

3.6 Research design

A cross sectional research design was adopted in which data was collected only once. According to Babbie (1990) and Bailey (1978), this design allows data to be collected at single point in time without repetition from a sample selected to represent large population.

3.7 Sampling techniques

Multistage sampling technique was employed. This technique is convenient for studying large and diverse populations, of which the list of actual individuals to be studied is not available (Fowler, 1993). The sampling stages were the division, ward, village and finally the household, which was the sampling unit of the study. In this study, a household is considered a unit of analysis because all decisions about investment, production and consumption are made at the household level (Corbett, 1988). At each stage, random sampling method was used in order to avoid biases and so obtain a true representative of the population intended.

3.8 Sampling procedures and sample size

A multistage sampling technique was employed. In it, a random sampling method using random numbers in a scientific calculator was used to select two divisions, whereby Tarakea and Usseri Divsions were randomly selected. Applying similar method, two wards, one from each selected division were selected. In this case Nanjara-Reha and Kirongo-Samanga wards were obtained. From each of the 2 selected wards, two villages were purposively selected, one from lowland and the other one from the highland to represent the ecological zones. These villages included Kirongochini and Samanga from Kirongosamanga ward and Nayeme and Msangai from Nanjara-Reha Ward. Kirongochini and Nayeme are from lowlands while Samanga and Msangai are from highlands. Finally, 5% of households were randomly selected from each village register after being segregated according to sex of the head of household. According to Boyd *et al.* (1981), a significant representation of the population is achieved when a sample of 5% of the total population is taken for the study. In obtaining a sample Boyd's formula, n/N*100 = C was applied, where C represents a figure greater or equal to 5% of the village households, N is the total number of households in the village and n is the number of selected households. A fixed whole number of the households was calculated and selected resulting in 5% or closest to 5% (as long as it is above 5%) of the total households in the village. The entire sample therefore consisted of 100 respondents. The sample was composed of 51 male and 49 female heads of households, Table1.

Table 1: Sampled respondents

Village	Male	Female	Total
Kirongochini	11	10	21
Samanga	15	12	27
Msangai	13	13	26
Nayeme	12	14	26
Total	51	49	100

Source: Survey data (2002)

The female heads of households included those who were unmarried, widowed or separated and those married but their husbands were absent from home. Local authorities (the village leaders) were used to identify female-headed households in the study area. The household heads were the key respondents of the study although other members of the household were encouraged to participate in order to supplement and enrich the information required.

3.9 Data collection

Data was collected through both formal and informal surveys. Informal surveys were carried out to get an in-depth understanding of socio-economic and socio-cultural characteristics of the study population. Both primary and secondary data were used in the study. Primary data were obtained through a field survey, administering structured questionnaire and focus group discussion guided with a prepared checklist of well-structured probe questions. The pre-testing of questionnaire preceded the actual exercise of data collection, and all necessary modifications were made. Pre-testing of the questionnaire was done to 20 households. The interviewers were the researcher assisted with two village extension officers. The extension officers were

trained for two days to be familiar with the questions so as to be able to capture from the respondent the information meant by the questionnaire. To ensure high-rate of response, the interviewers conducted face to face interview with the respondents at home. Secondary data were obtained from district agricultural and forestry offices as well as from the Sokoine National Agricylture Library at Sokoine University of Agriculture in Morogoro.

3.10 Main survey

The survey was carried out in three phases. The first phase involved a transect-walk along the altitudinal zones. A detailed field survey was conducted to obtain physical observation on the structure and composition of various homegarden components and their roles. This allowed the researcher to identify the differences in composition of the homegarden as moving from highland to lowland zones.

The second phase was implemented through use of structured questionnaire. The questionnaire was administered to either male or female heads of the household. It included both closed and open-ended questions. The questions demanded listing of trees, food crops and livestock kept in the homegarden. The questions also inquired about the food security situation of the household by checking on the awareness about the vulnerability of the household to food insecurity, the period of food shortage, number of meals taken during food shortage and strategies used to cope with food insecurity. Number of meals taken per day, awareness about food insecurity and number of months of food shortage was used as indicators for household food insecurity in the study area. The households which took less than two

meals for adults and less than three meals for children are considered food insecure. Socio-economic factors, like income of the household, farm size, household number of out-migrant, source of income, occupation and level of education was also collected. Socio-cultural factors included household gender division of labour, decision-making power of men and women, perceptions, and norms governing management and production in homegardens, in relation to household food security.

The third phase involved focus-group discussions. These were conducted at two levels, at district and at village levels. At district level, it involved the agricultural extension staff and the forestry and natural resources officers. At the village level it involved the use of key informants who had full experience and information about the Chagga homegardens. These were composed of elderly people, agricultural extension officers, elite farmers and others who were willing to provide the required information. A checklist of probe questions was used in order to enrich the information obtained through the questionnaire and an elaboration of physically observed data. In all groups gender balance was necessarily given due consideration.

3.11 Data analysis

The quantitative collected data were coded and entered to a computer prior to analysis using Statistical Package for Social Sciences (SPSS) program. Descriptive statistics such as percentages means and standard deviation were computed. Cross tabulation involving Chi-square test was adopted in testing association between different qualitative variables. Multiple regression equation was developed to show the relationship between food security indicator which was the number of meals taken per day and socio-economic factors which included size of the hpmegarden,

size of open field farm, number of household members and sex, age, and level of education of the head of household as well as the agroecological zone

The regression equation is as shown below:

$$Y = a + b_1x_1 + b_2x_2 + \ldots\ldots\ldots\ldots\ldots + b_ix_i + e$$

Where:

Y_i= The i^{th} observed value of the dependent variable (number of meals taken per day)

X_1 to X_i = independent variables (agro-ecological zone, size of the homegarden, size of open field farm, number of household members and sex, age, and level of education of the head of household).

a= Intercept

b_1 to b_i = Independent variable coefficients

e= Random error

i= 1,2,3...n. where n is the total number of variables

Hypothesis tested was:

H_0: (β=0) (meaning that there is no relationship between dependent and independent variables).

H_1: ($\beta \neq 0$) (meaning that there is a positive or negative relationship between dependent and independent variables).

A two-tailed t-test at 0.05level of significance was used to reject or accept the test hypotheses. In this case, Ho was rejected only where $P<0.05$.

Content and Structural-Function Analysis were used to analyse information and qualitative data. The components of verbal discussion were analysed in detail with

the help of content analysis method. In this way the recorded dialogue with respondents was broken-down into smallest meaningful units of information or themes and tendencies. This helped the researcher in ascertaining values and attitude of respondents. Structural-Function Analysis was also used to explain the way social facts relate to each other within a social system and the manner they relate to the physical surroundings. This type of analysis helped the researcher to distinguish between manifest and latent functions. Manifest functions are those consequences that are intended and recognised by the actor in the system (Katani, 1999). Latent functions are those consequences that are neither intended nor recognised (Kajembe, 1994).

CHAPTER FOUR

4.0 RESULTS AND DISCUSSION

4.1 Overview

This part discusses the findings of the study. It comprises the following sub-titles: Socio-economic characteristic of the respondent, including sex, age, education level, main occupation and household income. The discussion also covers the homegarden components and their contribution on household food security. It covers the tree plants and food crops of the Chagga homegardens, food crops in danger of disappearing and the reason for their disappearance as well as common livestock. The household food security situation in homegarden system which considers awareness about vulnerability to household food insecurity, duration (months) of food shortage in a year, and number of meals taken per day. These were used as indicators of household food insecurity in the study area. Reasons for food insecurity as well as copping strategies in the study area are also discussed. Socio-economic factors influencing household food security are discussed. They include off-farm activities to supplement household income for food security, size of the homegarden, number of household members who are able to work, possession of open field farms, distance to these farms and labour out-migration. Finally is discussion on socio-cultural factors like gender division of labour and decision-making and how they influence household food security.

60 years many parents were usually taken care of by their descendants who were mostly their sons since inheritance according to the Chagga ethnicity is partrilinear. Although management of the homegarden is done partly by the descendant, decision for management activities remain to the elder head of household. At this age they no longer can be able to perform heavy tasks in the homegarden that demand high physical energy such as planting and thinning of banana plants and pruning as well as felling of higher and large trees. The age between 31 and 45 formed the second large group because many males marry at 30 years and above. It was revealed from focus group discussion that males were usually allocated piece of land by their parents after their marriage and therefore became heads of households.

4.2.2 Education level of respondents

Most of the respondents, 49% had primary school education, of which 29 were male and 20 were females. Twenty four percent of the respondents (Table 2) had no formal education whereas among them 17 were female while only 7 were males. Twenty percent had attended adult education of which 9 were male and 11 were females. Very few, 3% had secondary school education. There is a significant difference ($P<0.05$) in level of education between males and females. This shows that female had less opportunity to education than males due to the preference given to male children given by parents. Similarly, according to Bledsoe *et al* (1999), more men than women are literate (80%) compared with 64% world-wide. Women in less developed countries complete fewer years of education than men, on average and are more likely to be illiterate.

4.2.3 Main occupations of the heads of households

The results in Table 2 show that the main occupation of majority, 80% of the heads of households was small-scale farming. Others, 6% combined small-scale farming and employment, 8% combined small-scale farming and petty business, while 6% were involved in small-scale farming, petty business and employment. This diversification of activities allows for some flexibility in allocation of household labour and reduces the risk of household food insecurity because failure in one activity can be compensated in another activity. Cumulative earnings from different sources can ultimately ensure food security.

4.3 Sources of income for the households

4.3.1 Contribution of individual homegarden components to the homegarden income

Combination of crops, livestock and trees in the homegarden helps to ensure continuous harvests and thus acts as savings account for the household food security. Table 3 shows the contribution of various homegarden components to income from homegarden.

Table 3: Percentage contribution of homegarden components to homegarden income for food security

Homegarden component	Income (Tshs)	Percentage (%)
Homegarden crops	74 150.0	67.7
Livestock	31 929.0	29.0
Homegarden trees	3 914.0	3.6
Total	109 993	100

Source: Survey data (2002)

The result shows that various homegarden components contribute to household income, which determine household food security. Table 3 shows that homegarden crops contribute 67.7%, livestock 29.0% and homegarden trees 3.6%. Homegarden crops included coffee, bananas, maize beans, Irish potatoes and minor crops like yams, coco-yams and fruits like mangoes, oranges, avocados guava and passion fruits. The results show that homegarden crops contribute large proportion of the income followed by livestock and lastly tree component. This is because of coffee, which is a cash crop, which dominate in all households, and its price is high compared to other food crops without considering their cost of production. Mostly all households keep livestock for the purpose of obtaining manure for their homegardens in addition to other economic returns like milk, meat and cash. As a results livestock are sold rarely to obtain cash to buy food when there is deficit or in order to meet other household non-food demands. Tree component contributes the least. Sale of trees seem to be practised by only few households because customarily tree and tree products were perceived as common property. If they belong to some ones homegarden then it can be requested from the owner in which he/she may pay in kind except for valuable timber species like *Gevillea robusta, Cordia africana, eucalptus spp., pinus* spp, *Albizia schimperiana* and *Albizia gumifera* which they pay in cash. So it was difficult to obtain sufficient data for sold trees in order to show monetary contribution of trees to household income. This implies that percentage contribution of trees could be higher than the reported in table 3.

4.3.2 Main sources of income for the households

The main sources of income for households in the study area were from sell of homegarden products, sell of crops from open field farms and earnings from off-farm activities including engaging in casual labour, petty business, carpentry, local brewing and employment. Table 4 shows main sources of income in the study area and their percentage contribution to the average household income.

Table 4: Main sources of income for the households

Income source	Mean income (Tshs)	Percentage (%)
Homegarden	109 993.50	53.1
Open field farm	22 718.31	11.0
Off-farm activities	74 285.71	35.9
Total	206 997.02	100.0

Source: Survey data (2002)

The results in table 4 show that income from homegarden contributed 53.1%, off-farm activities 35.9% and form open field farm contributed 11.0% to the average household income. This implies that the households depend mainly on the homegardens and only in small proportion on open field farms for their income and food security. Off-farm activities also top up to the income in order to ensure household food security.

4.4 Average household income

Table 5: Average household incomes

Average annual household income (Tshs)	Percentage response		
	Male	Female	Total
Below 30 000	4	23	27
31 000-100 000	24	20	44
101 000-150 000	17	6	23
Above150 000	6	-	6

Source: Survey data (2002)

The results in table 5 show that majority of the households, 44% have an average annual income of between Tshs, 31 000 and 100 000 followed by those with annual income below Tshs 30 000 forming 27%, which were comprising mainly of female heads of households, Table 5. The households with average annual income between Tshs 101 000 and 150 000 formed 23% and were composed of more male than female (17 and 6 respectively) headed households. Those households with average annual income above Tshs 150 000 formed 6%. These were composed of only male-headed households. The chi-square test result showed that the difference in income between male and female-headed households was significant ($P<0.05$). Usually male-headed households had higher income than female-headed ones. This implies that male-headed households has higher probability of being food secure than female headed ones since income is a major determinant of access to food.

4.5.1 Homegarden components and their role to household food security

The homegarden components in this study are considered in three broad groups to include tress and shrubs, animals and food crops.

4.5.1 Homegarden trees

Tree component is one characteristic of the Chagga homegardens. Most trees found in the homegarden are multipurpose types. This is due to land scarcity and as a result people tend to optimise use of their land so that they can satisfy their diverse needs. Due to population pressure over the land, communal lands where the community used to obtain resources like firewood, fodder, building material and herbal medicines are no longer existing. As a tradition the Chagga people tend trees in their

homegardens, which they either plant or retain them when they inherit the homegardens ("chamba"). This provides boundaries with neighbours, shade and privacy around their houses/homes. Dominant trees and shrubs found in the Chagga homegardens are presented in appendix 3.

The Chagga homegardens contained about 46 tree and shrub species in which 42 were identified species while 4 were not identified (Appendix 3). Trees were usually inter-cropped with food crops like banana, coffee and other minor crops like tubers and vegetables. They could be scattered throughout the homegarden but were much concentrated along the boundaries, thus forming live fences. The results in Appendix 3 also showed that homegarden trees provided various social and economic functions. These included provision of timber, whithies and poles for building. These were provided by such species as *Cupressus lusitanica*, *Olea africana*, *Olea europea*, *Grevillea robusta*, *Cordia africana* and *Eucalyptus spp* to mention a few. *Cordia africana* are highly valued trees for their hard wood being used in house construction and furniture making. The species was also used for construction of traditional barrels used for keeping local brew ("wari"). The over-use and probably low gradual replacement of this tree species has led to its current scarcity, 12.1% as shown in Appendix 3. *Grevillea robusta* is a prevalent species for timber. It was found dominant in almost all homegardens, 83.8% (Appendix 3). *Grevillea robusta* is not an indigenous species but it has become naturalised species since it has spread almost all over the region and it seems to dominate.

Some trees also provide support to other plants like creeping/ climber plants such as *Dioscorea sp. Passiflora edulis* and *Telfairia pedata* as well as stacking to banana plants. These included *Arundinaria alpina, Ricinus communis, Commiphora zimmermannii* and *Rauvolfia caffra.* Other homegarden trees were fruit trees and they were reported to play important roles in household food security, especially for children who remain at home in most cases without an adult person to cook for them as they may be committed to other economic activities away from home. The key informants argued that children and women were the main consumers of fruits because fruits were categorised as minor food item and they are used during famine or food shortage. These fruit trees included *Annona sp, Prunus persica, Persea americana, Mangifera indica, Psidium guajava, Carica papaya, Citrus limon, Citrus sinensis* and *Azanza garckeana.*

Other trees provided vegetable and fodder. Examples are *Manihoti graziovii* and *Morus alba.* Others provided live fence and shade around homes and these include *Tetradenia riparia, Toderia asiatica, Commiphora zimmermannii,* and *Dracaena spp.* Some of the trees have socio-cultural values. According to Chagga traditions trees like *Dracaena spp.* are used in performing cultural ritual such as weddings and making sacrifices as well as seeking harmony for people who have been in quarrel. They are also important in demarcating graveyards of a particular clan.

Some trees provide local medicine for certain ailments. These comprised of *Dracaena spp, Tetradenia riparia, Commiphora zimmermannii, Toderia asiatica, Erythrina abyssinica, and Carica papaya.* It is also contended by Crawley (2002),

that there is a very genuine and sensible concern globally about conservation of biodiversity with special focus on medicinal plants. This is because in many developing countries medicinal plants have been and will continue to be crucial to general health of the population especially those who are not reached by or cannot afford the modern medicine.

Generally it is difficult to classify each tree to its specific function because as it can be observed, majority of trees in the homegarden have more than one function. This is due to shortage of land and people tend to eliminate some trees that cannot provide different functions and retain those with diverse uses. This phenomenon however, has pernicious effects to biodiversity as well as sustainability of the system because some trees though do not have any specific or major identified function they play part in soil erosions control, addition and retention of soil nutrients and regulation of atmospheric conditions. Consequently all these have indirect adverse effect to household food security.

4.5.2 Management of trees in the homegarden

The farmers have local knowledge of management of trees in order to avoid competition with food crops. They know as to what type of crops are shade tolerant and can therefore be inter-cropped with tall tress. Other crops are climber plants like *Dioscorea sp. Vigna unguiculata, Dioscorea triphyla, Canavalia ensiformis*, and *Dioscorea bulbifera* which can reach higher levels for light by the help of their support plants. Some trees in the homegarden are usually pruned regularly because are used as fodder for livestock meanwhile it helps to reduce competition for light.

competition for light. Trees that cannot provide fodder are intentionally pruned regularly in order to reduce shade and stimulate their vertical and lateral growth. The wooded part of the pruning are used as firewood and the remainder supply mulch to homegaedens meanwhile supplying nutrient to the soil and reduce soil erosion

4.5.3 Food crops of the Chagga homegardens

Table 6 shows various food crops found in the Chagga homegardens.

Table 6: Food crops of the Chagga homegardens

Local name	English name	Scientific name	Percentage
Ng'inda	Banana	*Musa spp.*	100
Mahemba	Maize	*Zea mayz*	95
Maharaki	Beans	*Phaseolus vulgaris*	98
Soko	Cowpeas	*Vigna unguiculata*	41
Mhoko	Cassava	*Manihot esculanta*	52
Ngwao	Yams	*Dioscorea sp*	41
Matuma	Coco-yams	*Colocasia spp.*	23
Mtama	Sorghum	*Sorghum bicolor (L)*	16
Aliseti	Sunflower	*Hellanthus sp*	66
Masidi	Pumpkins	*Curcubita maxima*	19
Bilibili	Pepper	*Capsicum annuum*	13
Mnafu	Nightshade	*Solanum sp*	67
Mayova	Sugarcane	*Saccharum ofisinarum*	17
Umbi	Finger-millet	*Eleucine coracana*	9
Mrungu	Irish potato	*Solanum tuberosum*	33
Ngwasheni	Sweet potato	*Ipomoea batatas*	27
Ngolowo		*Vigna unguiculata*	25
Mashomba		*Carnavalia ensiformis*	17
Madodosi			15
Mchicha	Amaranthus	*Amaranthus spp*	12
Nju	Pigeon peas	*Cajanus cajan*	29
Binsi	Peas	*Vigna unguiculata*	18
Buha		*Phaseolus lunatus*	9
Mabiringanya	Eggplant	*Solanum sp*	26
Masabibu		*Passiflora edulis*	16
Makungu		*Telfairia pedata*	6
Mafure	Taro	*Dioscorea triphyla*	15
Mamaya		*Dioscorea bulbifera*	12

Source: Survey data (2002)

The homegardens are characterized by a high diversity of plant species with different flowering, fruiting and cropping seasons. This enables the homegardens to function as living food stores and potential additional food source (Karyomo, 1985). The homegarden in the study area had about 28 species of food crops, Table 6. They included a wide variety of bananas, tubers, fruits and vegetable crops that contributed to the household food security. These included tubers like *Dioscorea sp, Colocasia spp, Ipomea batatas* and *Dioscorea triphyla*. Others are grain legumes like *Phaseolus lunatus, Carnavalia ensiformis* and *Cajanus cajan* while others are fruits and vegetables including *Curcubita maxima, Passiflora edulis*, and *Solanum sp* as well as nuts such as *Telfairia pedata*.

4.5.4 Homegarden food plants in danger of disappearing

Homegardens have traditionally been important conservation sites for agricultural biodiversity especially for plantains, bananas, tubers, fruits and vegetable crops. They result from the interaction between the environment, genetic resources and the management systems and practices used by culturally diverse peoples resulting in the different ways land resources is used for production. This is however, no longer the case with some homegardens as a result of some attributing factors, which are social, economic or environmental. The Table 7 below presents some of crops that are claimed to be in the state of disappearing.

Table 7: Homegarden plants in danger of disappearing

Crop	Percentage response by village				
	Kirongochini	Samanga	Msangai	Nayeme	Total
Phaseolus lunatus	17(27)*	22(21)	22(26)	22(26)	83(100)
Cajanus cajan	19(25)	22(21)	22(25)	20(26)	83(97)
Carnavalia ensiformis	17(27)	22(21)	24(26)	24(26)	87(100)
Telfairia pedata	18(27)	27(21)	24(26)	22(26)	91(100)
Solanum sp	15(27)	25(21)	16(26)	16(26)	72(100)
Saccharum officinarum	14(26)	23(21)	14(26)	22(25)	73(98)
Colocasia spp	12(27)	23(21)	18(26)	17(26)	70(100)
Passiflora edulis	12(27)	23(21)	17(26)	18(26)	70(100)
Ipomoea bataaus	18(27)	17(21)	23(26)	22(26)	80(100)
Curcubita maxima	13(26)	19(21)	18(26)	17(26)	67(99)
Dioscorea sp	16(27)	21(21)	25(26)	23(26)	85(100)
Dioscorea triphyla	16(27)	18(21)	18(26)	6(26)	72(100)

Source: Own field survey data (2002)

*Figures in parentheses are frequencies

As reported in Table 7, these crops are in the state of disappearing since they can be found in only very few homegardens and also less frequently. The following are percentage responses supporting the claim: *Phaseolus lunatus*, 83%, *Cajanus cajan* 83%, *Carnavalia ensiformis* 87%, *Telfairia pedata* 91%, *Solanum sp* 72%, *Saccharum ofisinarum* 73%, and *Colocasia spp.*70%. Others are *Passiflora edulis* 70%, *Ipomoea batatas* 80%, *Curcubita maxima* 67%, *Dioscorea sp* 85% and *Dioscorea triphyla* 72%. For some crops like *Dioscorea triphyla*, *Ipomoea batatas*, *Saccharum officinarum* and *Solanum sp.* the results of chi-square test showed that

there was a significant association between type of disappearing crop and the villages ($p<0.05$) while there was no significant association for other crops. This was because the survival of these crops was favoured by ecological, economic or social factors. Ecologically some crops thrive well in either high ecological zone or in low ecological zone depending on their requirement of rainfall, soil fertility and light. The *Dioscorea triphyla* and *Solanum sp* requires high rainfalls, fertile soils and are not affected by shade and therefore can thrive well in highlands than in lowlands ecological zone. On the other hand *Ipomoea batatas* and *Saccharum officinarum* thrives well in low than in highland ecological zones because it requires bright light. Generally, the disappearance of these crops is attributed to various reasons as is described in Table 8 below. According to FAO (1996), a survey of farm households in the Republic of Korea showed also that of 14 crops cultivated in home gardens, an average of only 26% of the landraces cultivated there in 1985 were still present in 1993. The retention rate did not exceed 50% for any crop, and for two crops it was zero.

4.5.5 Reasons for disappearance of crops

The following Table 8 presents the reasons attributed to the disappearance of some crops in the homegardens.

Table 8: Reasons for disappearing of crops

Reasons	Percentage
Climatic changes	82
Shortage of land	76
Decreasing soil fertility	64
Invasion of new crops and changing of eating habits	43
Lack of market	37
Poor management	21

Source: Survey data (2002)

Disappearance of some crops in the homegardens was associated with various reasons, Table 8. These included climatic changes 82%, shortage of land for cultivation 76%, decreasing soil fertility 64%, invasion of new food crops and changing eating habits 43%, lack of market 37% and poor management of homegardens 21%. Key informants asserted that they had noted a dramatic change of the amount of rainfall and its distribution. They associated this with disappearance of some crops like yams, cocoyams, taro, *Phaseolus lunatus* and sugar cane, which usually need long rains and fertile soils in order to thrive well. People in the study area had realised the importance of soil fertility and as a custom they applied animal manure together with their beddings and any other household refuses to their homegadens to control soil erosion and help restore plant nutrients. Due to the current shortage of land for livestock grazing and fodder collection, the households kept a small number of livestock, which could not supply enough manure and animal beddings to apply to the homegardens. As a result, the homegardens for households that did not keep livestock were in a state of losing their potentials of production and hence increasing vulnerability to food insecurity. Crawley (2002), reported similarly that, in Africa's highlands the soil fertility, crop yields, water supplies, forest cover

and biodiversity are all decreasing while crop pest and diseases are on the rise and farmers are consequently growing poor.

Invasion of new food crops which were traditionally not available like beans and maize and changes in feeding habits discouraged planting of local crops like *Carnavalia ensiformis*, *Phaseolus lunatus* and *Cajanus cajan* to mention a few. The mentioned crops were traditional/indigenous leguminous crops, which usually have very long cooking time, compared to other exotic grain legumes like beans. Their flavours are also not much preferred by children, as was reported during focus group discussions. However, these crops were reported to be very resistant to insect pest damage compared to the exotic ones.

Population pressure over land has caused reduction of the size of homegrdens and has resulted from a continuous fragmentation of land from parents to children. Some households had very small pieces of land that was not adequate for an extended mixture of crops and trees. As a result, some crops which are less valued like yams, cocoyams, pumpkins, sweet potatoes, taro, *Dioscorea bulbifera,* pigeon peas, *Phaseolus lunatus* and *Carnavalia ensiformis* are the first to be excluded. These crops in the study area were usually considered as poor people's crops. On the other hand they were considered as famine crops as they are usually used during famine or during any food shortage, and they are therefore food security crops.

Lack of market was another reason to be a cause of disappearance of some crops. Most of the indigenous crops like yams, taro, pumpkins, *Phaseolus lunatus* and

Carnavalia ensiformis do not have a reliable market. This discouraged their production when compared to other crops, which can sell easily.

Poor management was another reason given to causes of disappearance of some crops in the homegardens. They associated this with out-migration of males to urban areas for employment and business or to other rural areas for farming. As a result, women who remain at home could not afford managing the homegardens appropriately, as some activities are specific to men. These include activities like planting, pruning and felling of trees, planting banana seedlings and harvesting of yams. These are activities, which demand high physical energy thus for biological reasons women can easily not be able to perform. Homegarden managed by women alone may perform poorly also because women are less knowledgeable for male specific activities. This has influence to the productivity of the homegarden for household food security.

Different factors had combined effects in causing disappearance of some crops but replacement of some varieties could be the main cause of local crop varieties loss. It is also reported that the replacement of local varieties or landraces by improved and/or exotic varieties and species was the major cause of genetic erosion around the world (FAO, 1996). Disappearance of traditional crops sometimes implies a danger to food security in the area, which was previously food self-sufficient (FAO, 1996).

4.5.6 Common livestock reared in the Chagga homegarden

Livestock species plays a vital role in, food security and environmental protection as well as human health and welfare in most developing countries. They are critical for soil nutrient cycling, risk buffering, asset building and they constitute a sustained and irreplaceable source of macro-and micronutrients. In view of this, animal component is a common characteristic of the homegardens throughout the world although they may vary from one setting to another. In Chagga homegardens animals are traditionally reared indoors and very rarely few animals can be grazed freely along the roadsides. Animal component of the Chagga homegardens is usually composed of mainly cattle, goats, sheep, pigs and chickens in most households while few households keep ducks and rabbits, Table 9.

Table 9: Common livestock reared in the Chagga homegardens

Type of livestock	Percentages	Number kept		
		Minimum	Maximum	Average
Dairy cattle	10	2	4	2.7
Local cattle	49	1	5	2.1
Dairy goats	0	0	0	0
Local goats	95	2	15	5.9
Sheep	84	2	8	1.6
Pigs	50	1	10	2.5
Local chickens	93	3	30	9.5
Layers	0	0	0	0
Broilers	0	0	0	0
Ducks	18	1	12	4.5
Rabbits	12	1	6	3.8

Source: Survey data (2002)

From the surveyed households, it showed that very few households kept dairy cattle, that is only 10% with an average of 2.7 cattle per household, Table 9. Given the low

financial position of small scale farmers, it is difficult to afford high capital required to buy these animals, erect suitable shade, frequent medication as they are more susceptible to tropical diseases than local cattle and demand large quantity of fodder. Although they may not be able to compete with 'improved breeds in milk and meat yield, yet they fulfil a much wide range of functions and provide a large range of products. Being able to thrive even with low fodder inputs, their maintenance is ecologically more sustainable.

Table 9 showed that 49% of households kept local cattle with an average of 2.1 and there was no variation because most households were constrained with lack of enough fodder. This was because there is no open space for extensive grazing and each household owned an average of 1.9 hectare piece of land, Table 9. In almost all households of the surveyed population, 95% (Table 9) kept local goats. Each household kept an average of 5.9 goats. From focus group discussion it was argued that every household kept goats because in addition to economic value of the goat, they also have socio-cultural values such as traditional ritual and sacrifices. In relation to its economic and socio-cultural value, goats are easily converted to cash and therefore are considered very helpful to the farmers. Goats are also hard animals that can withstand environmental difficulties like shortage of fodder and water during dry seasons.

Table 9 also shows that 84% of the households kept sheep, with an average of one sheep per household while 50% households kept pigs with an average of one pig per household. Although pig rearing was considered economically viable enterprise

because the animals have short reproductive cycles and their ability to give birth to a litter, many poor households could not afford to keep pigs as they compete for food with the household members.

Local chicken was another livestock species that was kept by majority of the households, 93% (Table 9). Each household kept an average of 9 chickens. The local chicken breeds were better adapted to local diseases, pests and climate. They are usually raised in extensive systems, and in this system birds were reared with little land, labour or capital and can be accessed by even the poorest in the rural areas. They were of great importance to women and food security, especially in female-headed households. The study done in central Tanzania indicated that an average of 5 chickens enabled the woman to earn an additional US$38 per year or 9.5% increase in income with minimum inputs (Garces, 2002).

The results in Table 9 also showed that few households, 18% kept rabbits while 12% kept ducks with an average of 4 and 3 rabbits and ducks, respectively. It was observed during the survey that children usually kept small animals like rabbits, chickens and ducks as their source of income although adults, especially women also keep chickens and ducks. Keeping of livestock was also highly valued for their supply of manure to the homegarden and in some cases to open field farms in which they cultivated cereal and grain legumes. The study done in Kenya found also that the majority of farmers keep livestock for the purpose of obtaining milk while others keep livestock for the purpose of milk and manure (Njuki, 2001).

4.6 Food security situation in Chagga homegarden production system

4.6.1: Awareness about vulnerability to food insecurity

Table 10 presents the distribution of household according to awareness about vulnerability to food insecurity.

Table 10: Awareness about vulnerability to food insecurity

Awareness about food insecurity	Responses by villages							
	Kirongochini		Samanga		Msangai		Nayeme	
	%	N	%	N	%	N	%	N
Yes	91	91	89	89	68	68	72	72
No	9	9	11	11	32	32	28	28

Source: Survey data (2002)

Table 10 shows that majority of the respondents in all villages experienced food shortage, as follows: Kirongochini 91%, Samanga 89%, Msangai 68%, and Nayeme 72%. The chi square test showed that there was no significant association ($P>0.05$) between villages and awareness about vulnerability to household food insecurity. This means that there was no visible difference in awareness among villages.

4.6.2 Food security indicators

4.6.2.1 Duration (months) of food shortage in a year

It was reported in the questionnaire and supported through focus group discussions that many households in the study area were food insecure as indicated in Table 11 below.

Table 11: **Distribution of respondents according to duration (months) of food shortage in a year**

Months	Responses by sex					
	Male		Female		Total	
	N	%	N	%	N*	%
September-January	13	16.3	28	25.1	41	51.3
November-January	8	10	7	8.8	15	18.8
Nov.-December	8	10	5	6.3	13	16.3
Sept.-November	3	3.8	2	2.5	5	6.3
January-February	1	1.3	2	2.5	3	3.8

*Total N does not add up to 100 because 13 households were reported as food secured.

As reported in Table 11 most of the households, 51.3% experienced food shortage during the months of September-January. In other households, 32% food shortage occurred during September-December. Another households, 18.8% food shortage occurred during November-January while the remaining 10.2% households reported to experience food shortage in the period of January-February. The overall food-insecure situation in the study area was characterized by the "hunger period", which stretched from September-February for the majority of the households. The actual duration of the period varies, depending on the resources accessible to a particular household. According to the cropping cycles in the study area, September-January was a period just before planting and the start of harvests for short rains period, which usually during good years was between September and December. The key informants argued that at this period, some of the available crops like maize and beans were used as seeds and many households mostly lived on banana-based meals. This was also during peak period for farm activities, when households sold available crop to hire labour in order to assist in their farms and obtain cash for other household non-food needs, like paying school fees and medication.

4.6.2.2: Gender and number of months of food insecurity

Table 12 below summarises the distribution of respondents by sex of head of household according to number of months of food insecurity.

Table 12: Number of months of food insecurity per year

Number of Months	Responses by sex of household head					
	Male		Female		Total	
	%	N	%	N	%	N
One month	2.4	2	0	0	2.4	2
Two months	12.4	10	4.4	4	16.8	14
Three months	12.7	11	28.3	23	41	34
Four months	13.3	10	26.5	23	39.8	33
Total	40.8	33	59.2	50	100.0	83

Source: Survey data (2002)

Many households experienced food shortage during a particular period in a year. The results in Table 12 showed that in the majority of surveyed households, 41% critical food shortage period took three months, in 39.9% households it took four months and then 16.8% households it took two months while 2.4% of the households food shortage period took only one month. The results further reveal that more of females than male-headed households had more months of food insecurity. These findings were indications that in the study area there was food insecurity as it might be obvious that during food shortage in the household is not possible all members of the households to have enough food to meet their nutritional requirements. Food-insecure households could meet their consumption needs only by intensifying their normal coping strategies such as reducing number of meals, selling of trees and livestock and engaging in casual labour. It entails therefore that these households are

vulnerable to any subsequent shock, either in the given or subsequent consumption period. Taking into account the aspect of gender the results shows that more female-headed, 58.2% as compared to 40.8% male-headed households are food insecure. This result implies that more female-headed households are food insecure because they usually have single parent while male-headed households have two parents meaning more household labour. Also female-headed households have less access to productive resources like land since in the study area women customarily do not inherit land.

4.6.2.3 Number of meals taken per day

Table 13 shows the distribution of respondents by sex of head of household according to number of meals taken per day

Table 13: Number of meals taken per day

Number of meals per day	Responses by sex					
	Male		Female		Total	
	N	%	N	%	N	%
One meal (supper)	5	5	8	8	13	13
Breakfast and supper	20	20	37	37	57	57
Two meals (lunch and super)	1	1	0	0	1	1
Breakfast, lunch and super	23	23	6	6	29	29

Source: Survey data (2002)

The results in Table 13 showed that most of the households, 57% took breakfast and one main meal (supper) per day. Twenty nine percent of the households took breakfast and two main meals, (lunch and supper) while 13% of households took one main meal (supper) and only 1% of the households took two meals (lunch and

supper) per day. It showed that more of female headed households 8% took one main meal (supper) and likewise 37% took breakfast and one main meal (supper) per day as compared to 5% and 20% of male headed households respectively. Concurrently more of male-headed households, 23% manage to have breakfast and two main meals (lunch and supper) per day as compared to 6% for female-headed households. The chi square test results shows that there was a significant association at ($P<0.05$) between sex of the head of households and the number of meals taken per day. It is also reported in URT (1992), that feeding frequency for Tanzania population has been seen to be low on average, twice or three times a day and that inadequate food resource in the household has consequences in feeding frequency.

Through focus group discussion and personal observation and interrogation it was argued that in addition to shortage of enough food to some households, many households did not take lunch. This was because during the day the adults spend most of their time outside home for various economic activities such as working in distant farms and petty business. On the other hand the children that remain at home might not be able to cook. As a result they lived on previous day foods and some fruits from the homegarden. It was further contended by women that they had many commitments in addition to household chores of cooking, maintaining cleanliness, fetching water caring for the young ones and as such cooking lunch was perceived as signs of laziness to a woman. The limited time especially that of women for food preparation was the main reason that affected feeding frequencies in the household. Time allocation study done in Rukwa Tanzania by Wandel and Holmboe-Ottesen (1992), also showed that competing demand for women's time due to increased

economic work reduced time they spend on cooking thus undermined the feeding frequencies in the households. Household reduced eating frequencies to two meals per day. In view of this, food might be available at the household but not accessible to the members of the household due to high workload of the woman. This was one of deleterious effects of gender division of labour to household food security.

4.6.3 Reasons for food insecurity to the households

The majority of households, in the study area depended on their own produced foods as they were small scale farmers and who their income depended solely on what was produced for food or for cash from their homegardens or from their open field farms. The study area had fairly suitable market infrastructure to ensure supply of food during food shortage, as it was reported by District Agricultural and Livestock Development Officer (personal communication, 2002). The contemporary reasons for household food insecurity in the study area are presented in Table14.

Table 14: Reasons for food insecurity

Reasons	Percentage
Over-selling of crops	89
Cultural rituals and taboos	68
Low production from homegardens	63
Land shortage	56
Large number of dependants	55
Low income and purchasing power	54
Gender division of labour	43
Lack of power over resources by women	24

Source: Survey data (2002)

The percentages do not add up to 100 because of multiple responses.

Food shortage in the study area, as reported in Table 14 was associated with various factors like over-selling of harvested crops 89%, cultural rituals and taboos 68%, low

production from the homegarden 63%, land shortage 56% and large number of dependants in the household 55%. Other reasons were low income and purchasing power 54%, household gender division of labour 43% and lack of power over resources 24%. Overselling of harvested crop was the main reason given to cause household food insecurity in the study area. This was attributed to various causes like high demand for cash to meet other household non-food needs like education for the children, medication and clothing to mention a few. Failure to estimate the required amount of food for the household to cover the whole cropping season until the next harvest was also associated to overselling of harvested crops. Cross border trade of crops due to good /attractive price in neighbouring country was also another reason to overselling of crops that led to food insecurity.

Food insecurity in the study area was also attributed to cultural rituals and taboos. These included dowry, funerals, wedding and religious ceremonies. These ceremonies involved use of food crops like bananas, maize and finger millet. It also involved use of money that more likely was obtained through selling of crops or animals. Ceremonies also consume a lot of time, which could otherwise be used in production.

Low production form the homegardens was another reason attributed to food insecurity in the study area. When production becomes low due to various reasons like soil infertility, weather especially unreliable rainfall and invasion of diseases they experience food shortage because customarily they used banana as their staple.

Land shortage was also attributed to food insecurity because as the land became small due to fragmentation the household possesses a relatively small piece of land compared to the number of household members. As the land became small, it also could not allow diversification of crops, which could act like a buffer during bad years.

Large number of dependant was another reason given to household food insecurity. It was observed that households were composed of mainly school children that were not very much productive at home because they had to attend school and aged people whom could not perform laborious work in the homegardens.

Household food insecurity was also attributed to low income and purchasing power of the household. This was associated directly with the decline of coffee prices, which was the only main source of income. This coupled with declining production due to various reasons as mentioned earlier, left the households unable to absorb shocks of crop failure.

Gender division of labour was another reason attributed to causes of household food insecurity. There were activities that were specific either to men or women. This means that if the husband or the wife was sick or was away from home as is the case especially for men, their duty might not be performed properly. As a result, it might affect the amount of production and consequently household food security.

4.6.4 Copping strategies for food insecurity

Copping strategies for household food security refers to what the households do in response to threats to their food security. Diversification of crops and having farm plots in different areas were the traditional coping strategy for food insecurity in the study area. This was manifested in the traditional crop mixture of the homegaderns, where minor corps like yams, cocoyams, cassava, sorghum, 'mashomba' and variety of local fruit, which were commonly, called "famine crops" were mixed with banana and coffee which they were their major crops. Women usually played an important role in maintaining a wide diversity of crops and animal breeds that were adapted to the local environment. The following are contemporary copping strategies for food security in the study area as was reported in Table 15.

Table15: Copping strategies for food insecurity

Coping strategies	Responses	
	Number	Percentage
Reducing number of meals	84	84
Selling livestock and trees	74	74
Casual labour	67	67
Remittances	12	12
Support from relatives	12	12
Government support	4	4

Source: Survey data (2002)

Majority of households, 84% reduced the number of meals per day as a coping strategy, Table 15. Most of the households took two or one main meal per day. Although reduction of number of meals was also associated with other factors, it still could be an indication of a coping mechanism.

Selling of trees and livestock was reported by 74% of respondents, which was another major coping mechanism. The sale of livestock for food entails the disposal of assets that were held primarily as relatively liquid stores of value that could be used even for other sustenance, like emergency medication and production investments. In view of this, the households that disposed their assets might consequently become more vulnerable to food insecurity.

Another commonly reported cooping strategy for food insecurity was selling of casual labour, 67%. This strategy could have adverse effects on future household food security since production in subsistence farming is usually labour intensive. This implies that any rural household in this homegarden system needs to utilise nearly the whole of its family labour force in order to be self sufficient in food production. The household that sells its labour for food as a coping strategy was likely to suffer food shortages in the following year. This phenomenon implies a vicious cycle, hence chronic food insecurity.

Some households, 12% depended on remittances as coping strategy against food insecurity. These were households that had one or more of their members in urban or other rural areas for employment, business or farming and remitted some support in term of cash money or food commodities. In the study done in Shinyanga by Mhinte (2000), reported similar observation that remittance was identified as an important coping strategy for rural households.

Government support was only reported by 4% of all households. This was in the form of food aid that was distributed to households, which were identified as the poorest in the village. As was reported by the village executives (personal communication), the majority of them were female-headed households and helpless aged people. This type of coping strategy was reported only in Kirongochini village, which is found in the lowlands agro-ecological zone, which it repeatedly, experienced food shortage. Food aid was also identified as an important coping strategy in Shinyanga Region (Care International, 1995). It was argued by the District Agricultural and Livestock Officer that the households in the lowlands were usually more vulnerable to food insecurity because together with other factors rain season was very short and unpredictable.

4.7 Socio-economic factors influencing household food security

4.7.1 Regression analysis for the socio-economic factors influencing household food security

Table 16 shows association between food security indicator, which is the number of meals taken per day and socio-economic factors including sex, age and education level of head of household. Others are size of homegrden, household income, main occupation, number of household members and size of open field farm.

Table 16: Regression analysis for the effect of various socio-economic factors (Independent variables) on number of meals taken per day (Dependent variable)

Variable	B	Beta (b^*)	Sign. t	Remark
Size of homegarden	.110	.963	.347	ns
Sex of the head of household	.179	-2.219	.049	*
Main occupation	.398	4.396	.000	***
Level of education	.153	2.013	.037	*
Number of household members	.101	.682	.503	ns
Size of open field farm	.144	2.107	.047	**
Household income	.375	4.411	.000	***
Age of the head of household	.184	2.324	.050	*

Source: Survey data (2002)

R^2=67.7%

*=Significant at 0.05 level

**=Significant at 0.01level

***= Significant at 0.001level

ns= Non significant

b^*= beta weight

Results from regression analysis (Table 16) show that influence of main occupation of the head of household and household income on the number of meals taken per day as an indicator for food security were highly significant ($P<0.001$). Meal frequency tended to increase with increase in household income and likewise when main occupation moves from being a mere small scale farmer to small scale farmer and petty business and finally to combining small scale farming, petty business and employment in formal sectors. Furthermore households that engaged in other activities other than agriculture for income generation consumed food more frequently compared to their counterparts. It therefore implies that off farm activities plays a major role in increasing income for the household and consequently ensures

household food security. Other socio-economic factors such as size of open field farm, level of education, sex and age of the head of household and number of out-migrants also influenced number of meals taken per day significantly at ($P< 0.05$) (Table 16). The results show that meal frequency tended to increased with increase in size of the open field farm, level of education and age of the head of household meanwhile male headed households had more meal frequency than female-headed households. Households with large open field farms had probability of harvesting more food and if properly managed they were likely to have more food than their counterparts with small or no open field farm at all. Education level usually determines the type of occupation of a person. Better-educated people can improve their methods of production by using inputs like fertilizers, pesticides and improved seed that increase the chances of increasing production. As the level of education increases it also increase the chance of an individual for employment and also to secure better paying job and thus high income. With having high income the households can hire labour to increase their food production and are able to purchase food when there is deficit. The results show that food security for the households increases as the age of household head increases probably because as the house hold head grow in age their children tend to grow to adulthood and thus increase the house hold labour force. Also the adult children who are employed either in formal or informal sectors tend to send remittance back home. Further more increase in age of the household head can match with the age of homegarden that old homegrdens tend to have higher crop diversification than their counterpart immature homegardens.

The results show however, that size of homegarden has no significant (P>0.1) influence to household food security. This implies that size of homegarden was more or less similar among households in the study area. It might also be that ability of the homegarden to influence food security does not depend on the farm size alone, but rather with a combination of some other factors like crop mixture and appropriate management.

4.7.2 Off-farm activities to supplement household income for food security

Table 17 presents the distribution of the respondents according to type of off-farm activities to supplement household income for food security.

Table 17: Percentage distribution of the respondents according to type of off-farm activities

	Percentage responses		
Off farm activities	Male	Female	Total
Casual labour	15	31	46
None	19	2	21
Local brewing	2	8	10
Petty business	2	6	8
Employment	6	2	8
Masonry	4	00	4
Carpentry	3	00	3

Source: Survey data (2002)

The households engaged in off farm activities aiming at supplementing household income in order to reduce the risk of food insecurity. Main off farm activities identified in the study area as shown in Table 17 included casual labour 46%, local brewing 10%, petty business 8%, formal employment 8%, masonry 4%, carpentry 3%, while other households, 21%, did not have any specific off-farm activity to

generate income. These results show that majority of households engage in casual labour followed by local brewing. These activities had negative effect on household food security, because as it was reported during focus group discussion, that casual labour became available mainly during peak period of either planting or weeding. The households, which engaged mostly in casual labour, became more vulnerable to food insecurity because they did not get enough time to work in their own farms. On the other hand, local brewing increased chances of food insecurity because it involved use of food crops such as bananas, maize and finger millet and it encouraged early or over-selling of food crops as a means of earning cash for other household needs. The chi square test showed however, that there was significant association ($P<0.05$) between sex of the head of household and off-farm activities performed by the head of household (Table 17). More women than men were involved in casual labour and local brewing while more men than women showed that they had no off farm activity to supplement household income. This indicated that women were more concerned in ensuring household food security than men.

4.7.3 Possession of open field farm

According to the Chagga settings as dictated by the highland landscape and thus land scarcity, it is usual for the household to have open field farms in the lowlands where they produce mainly cereals and pulses. This is in addition to their homegardens, which are dominated mainly by banana and coffee as well as a variety of other minor crops. It is a result of population increase that has caused fragmentation of the available land. It might also be a mechanism developed as response to change of weather and unreliable rainfall distribution whereby farmers try to increase chances

of harvesting by allocating farms to different areas. The following Table 18 shows the distribution of respondents by possession of open field farms.

Table 18: Percentage distribution of households according to possession of open field farm

Whether they possess open field farm	Responses by gender		
	Male	Female	Total
Yes	34	20	54
No	17	29	46

Source: Survey data (2002)

The survey results, Table 18 showed that 54% households possessed open field farms in addition to the homegarden while 46% did not possess open field farm. This means that they depended only on their homegardens for food production. It was revealed through focus group discussion that the households could no longer depend only on banana staple because of various reasons. These included lack of enough bananas from the homegarden and change of eating habits and preference. Also, due to land shortage, the homegardens were not large enough to produce enough food for the households. It was however, observed that, in villages near Rongai Forest plantation the respondents were sceptical in telling whether or not they possessed other farm plots. This was because if they say that they don't possess other farm plots they might be given a plot in the forest plantation in order to produce cereals and potatoes in addition to bananas. In view of these, the number of households having open field farms might be higher than reported.

Table 19 shows the distribution of respondents according to size of homegardens, number of household members and distance to open field farm.

Table 19: Size of homegardens, number of household members and distance to open field farm

Parameters	Responses			
	N	Minimum	Maximum	Average
Size of homegarden (hectares)	100	0.5	3	1.9
Number of household members	100	1	13	6.7
Distance to open field farm (kilometres)	51	0.5	13	4.7

Source: Survey data (2002)

4.7.4 Size of homegardens and number of household members

It was found that the households possess an average size of 1.9-hectare homegardens, Table 19. This size of homegarden fall under the range of between 0.25 and 2.0 hectares reported also in (URT, 2000). The households have an average of 6.7 people, Table 19. This number was slightly above 5.6, the one reported by 1988 census. The size of the homegardens was relatively small to produce enough food for an average number of 6.7 people per household, Table 19. This necessitated the households to have some means of increasing production by intensifying production especially through application of organic manure, diversification of crops and animals, possessing other farm plots in addition to their homegarden or engage in off-farm activities that generate income for food security.

4.7.5 Distance to open field farms

The results in Table 19 showed that the farmers had to travel a distance between 0.5 to 13 or an average of about 4.7 kilometres, from their homegardens, where they live to open field farms, which are usually located in the lowlands. This increased drudgery to the farmers and reduced efficiency at work as they reach their farm place

already exhausted. Regarding this, it was argued during focus group discussion that many farmers tended to sell part of their harvested crops at farm at very low prices. This was because it was difficult to carry all crops home if they could not afford to hire transport. This had negative effect on household food security.

4.7.6 Household labour force

The Table 20 shows the distribution of male and female-headed households according to labour force (number of people able to work).

Table 20: Household labour force

Sex of head of household	Labour force (number of people able to work)		
	1-3	4-6	Above 6
Male	37.4(37)*	12.1(12)	1.0(1)
Female	48.5(48)	1.0(1)	0(0)
Total	85.9(85)	13.3(13)	1.0(1)

*Figures in parentheses are frequencies

Source: Survey data (2002)

The results in Table 20 show that majority of households, 85.9% had active labour force ranging between 1 and 3 while 13.3% households had labour force between 4 and 6 people and only 1% of the households have labour force of above 6 people. It further showed that more of female than male-headed households fell under the group of having labour force between 1-3 people. It further showed that more of male than female-headed households fell under the group of labour force of between 4-6 while there was no female-headed household with labour force of above 6 people. This implied that female-headed households had low labour force and thus,

were more vulnerable to food insecurity. Food-insecure households would not be able to meet their consumption needs. They would be forced to reduce consumption and dispose off their productive assets, thereby undermining their future food security.

4.7.7 Labour out-migration

The Table 21 shows distribution of households according to number of out-migrants.

Table 21: Household labour out-migration

Parameter	Percentage responses			
Number of out-migrants	One	Two	Three	Five
Male-headed household	30.3(10)*	35.7(5)	28.6(2)	0
Female-headed household	69.7(23)	64.3(9)	71.4(5)	100(2)
Total	100(33)	100(14)	100(7)	100(2)

*Figures in parentheses are frequencies

Source: Survey data (2002)

The results in Table 21 showed that 30.3% male headed and 69.7% female-headed households had at least one out-migrant. Around 35.7% male and 64.3% female-headed household had 2 out-migrants, 28.6 male and 71.4% female-headed households had 3 out-migrants while there was no male-headed household with 5 out-migrants. Although it appeared that there was slight difference in number of out-migrant between female and male-headed households, the results of chi-square test showed that there was no statistical association ($P>0.05$) between number of out-migrants and the sex of the head of households. This implied possibly that both male-headed and female-headed households were subjected to similar factors that caused

labour out-migration. Through in-depth probing, it was revealed that the out-migrants were usually the male and the youth that were productively active. Pressure from the rapidly growing population and low returns from agriculture contributed to a growing male and youth rural-to-urban migration (FAO, 1989). While such migration could increase remittances to rural areas and strengthen market linkages between urban and rural areas, it left rural women increasingly responsible for farming and for meeting their households' immediate needs. Labour out-migration had detrimental effect to household food security because it reduces the household labour force needed in production since production in homegardens is usually labour-intensive. However, as a result of labour out-migration women had now been found to perform some duties that were previously specific for men in that homegarden system like tree planting and thinning in banana plantation. According to FAO (1989), a survey of over 200 rural families in Egyptian Delta found also that nearly one half of all women interviewed were engaged in ploughing, traditionally a male task in that country.

4.8 Socio-cultural factors influencing household food security

4.8.1 Household gender division of labour

Division of labour by gender determines the type and amount of workload performed by each sex. Gender division of labour has created gender specific activities among members of the household and imbalanced workload among members of the household, which have adverse effect to the productivity of labour and consequently food insecurity. Table 22 presents some of the household activities in the homegarden that show household gender division of labour.

Table 22: Household gender division of labour

Type of activity	Mc	Ma	Fc	Fa	All	Fc+Fa	Ma+Fa	Mc+Fc+ Fa
Food preparation	0	1	5	51	5	34	4	0
Fetching firewood	0	0	0	29	0	57	0	14
Fetching water	9	1	0	29	0	48	0	13
Milking	0	2	1	82	8	7	0	0
Transporting crops	0	14	0	12	60	0	4	10
Land tilling in homegardens	0	19	0	0	11	0	70	0
Planting bananas	9	79	0	0	6	0	6	0
Planting Coffee	4	71	0	6	7	0	12	0
Planting fruit trees	4	67	0	11	5	8	0	5
Planting maize	0	5	0	9	61	0	0	25
Planting beans	0	2	11	9	46	8	0	24
Planting yams	1	63	0	1	6	0	19	0
Weeding in homegardens	0	1	3	55	14	9	0	18
Manure application	0	0	3	78	0	19	0	0
Fodder collection and livestock feeding	0	0	0	2	60	5	10	23

Source: Survey data (2002)

NB Mc-male child, Ma-male adult, Fc-female child, Fa-female adult, All means all Mc, Ma, Fc and Fa.

The results in Table 22 showed that in the study area there was a markable gender division of labour. This was manifested in the day-to-day social and economic activities. Fifty one percent of the respondent reported that female adults did household chores like cleanliness, fetching firewood, food preparation, fetching water, and child rearing while 34% reported that both female adults and female children do that. These results showed that these activities were specifically done by females. In addition to that females also were reported in Table 22 that they do productive activities like milking 84%, manure application 78%, weeding in the

homegardens 55% and planting beans and other minor crops for food 46%. Hoskins (1983) and Molnar (1985). argued similarly that, the division of labour in many societies places on women the responsibility for obtaining food and fuel wood.

Some activities in the homegardens were also specific to men and may be assisted by male children. As reported in Table 22 these included planting banana seedlings 79%. coffee 71%. yams 63% and fruit trees 67%. These gender specific activities had adverse influence to household food security especially where conventional setting was affected by external factors like out-migration of males and youth to urban areas in search for employment, casual wage labour and petty business. Women and old people who remained at home could not manage doing heavy tasking homegarden activities like planting coffee and banana seedlings. which required preparation of pits as well as harvesting of yams.

Other activities were not specific for any sex, and can be done by both male and female, Table 22. These included transporting crops 60%, planting maize 61% and beans 46%. fodder collection and animal feeding 60%. Through in-depth probing it was revealed that. fodder collection and feeding animals although mentioned as an activity that was not specific to any sex women claimed to be more involved than men are. especially when it had to be taken from distant places. Men customarily were involved in cutting fodder from trees and banana pseudo-stems. which were usually available within the homegardens. Where it involved transporting fodder head-loads. men mostly used bicycles to assist while women carried it on their heads. This gender division of labour subjected women to high workload such that it

influence household food security by being more pre-occupied by other activities than preparing food for their family even if food was available.

4.8.2 Decision-making at household

Some cultural and social norms exist in many communities in Africa that have not only created a division of labour on gender lines but have institutionalised some prohibitions to ownership, access and management of some farm resources and products among members of the household based on their sex. Table 23 shows some household gender-based decision making that influences household food security.

Table 23: Gender based decision making in households

Parameter	Percentage responses			
	Men	Women	Both	Total
Type of crop to plant	48	0	52	100
Type of trees to plant	68	4	28	100
Type of livestock to keep	51	1	48	100
Amount of crops to store	57	18	25	100
Amount of produce to sell	52	4	44	100
How to spend the money accrued	78	1	28	100

Source: Survey data (2002)

It is reported in Table 23 that decision on various household issues related to production or expenditures were whether done by a man, a woman or by both in some households. It was reported by 52% of the respondents that decision on type of crops to plant was done by man and those said was done by both were 48%. This means therefore that decision on type of crops to plant is either done by man or both man and woman but not by a woman alone. Decision on type and amount of trees to plant was done by man was reported by 68%, by woman 4% and done by both was 28%. Decision on type of livestock to keep done by man was reported by 51%, by

woman 1% and by both 48%. Decision on the amount of food crop to store and sell done by man was reported by 57%, by woman 18% and by both 25%. Njuki (2001), found differently that decision on whether to sell the crop (maize) was done by woman was 42%, by man 20% and by both 38%. Decision on how to spend the household money reported to be done by man was 78%, by woman 2% and by both 20%.

These results generally, showed that in majority of households, decision on production and expenditure of household resources was done by man. Similar observation is reported in FAO (1996), that, the essentials of grain or root crop supply (decision on production, choice of crops, storage or sale), were controlled by the man. It was argued during focus group discussion that, type of decision about production and expenditure of household resource like income or harvested foods had direct influence on the household food security. This was because it might determine the amount and type of food crops to be planted and then stored for household food demands. During focus group discussion it was further found that in households in which the woman could not participate in decisions about income and food management were more vulnerable to household food insecurity because men were not usually aware about household food requirements. Customarily, women were responsible for ensuring food availability to all members of the household. Similarly, it was argued that food self-sufficiency strategies at household level could not be effectively sustained without the full involvement of women who manage food at the micro-level, and also the children (FAO, 1996).

CHAPTER FIVE

5.0 CONCLUSION AND RECOMMENDATION

5.1 Conclusions

It was concluded that all homegarden components including tree plants, food crops and livestock jointly had important role in household food security since homegarden crops contribute 67.7%, livestock 29.0% and homegarden trees 3.6% of the income from homegardens. In total the homegardens contributed 53.1% of the average household income while other source were from off-farm activities 35.9% and from open field farm was 11.0%. The study found that there were about 46 dominant tree species in the homegardens of which 42 were identified species while 4 were not identified scientifically. There were also about 26 food crops of which 24 were identified and 2 unidentified species. Some homegarden food crops were in danger of disappearing.

It was also concluded that in the study area there was wide-spread food insecurity since majority of households in all villages reported to experience repeated food shortages as follows: Kirongochini 91%, Samanga 89%, Msangai 68% and Nayeme 72%. The households had about one to four months of uncertain hunger that stretches form September to January. There was no significant difference among villages in awareness about vulnerability to household food insecurity. Most of the households took only one main meal. There was a significant association between number of meals taken per day and the sex of the head of households. Male-headed households were more food secure than female-headed ones. This was because more of female-

headed than male-headed households took one meal while more of male-headed than female-headed households managed to have breakfast and two meals that is lunch and supper. The study also concluded that the households took mainly one meal per day due to either food shortage or much commitment, especially of women to other economic activities like working in farms and petty business away from home.

The study concluded also that the influences of socio-economic factors like income and main occupation of the head of household on household food security were highly significant ($P<0.001$). Other factors like size of open field farm, level of education, sex and age of the head of household were significant at ($P<0.05$). It was concluded also that size of homegarden and number of household members has no significant influence to household food security ($P>0.1$).

Similarly socio-cultural factor like gender division of labour and decision-making between women and men affect household food security. Gender division of labour governs most of activities in the Chagga homegarden system. Due to this there were activities that were specific for women while others are specific for men. This gender division of labour subjects' women to high workload that could influence household food security by being more pre-occupied by other activities than preparing food for their family even if food was available. Decisions on various production and expenditure of household resources were mostly done by men and in only few cases by women. In some households these were done by both through bargaining. Decision making at the household level influenced household food security since it

might determined the amount and type of food crops been planted and then stored for future' household food demands.

5.2 Recommendations

- Importance of gender to household food security should be emphasised in order to promote the role of women as producers and providers of food to the household and the nation at large. This could be facilitated by the government through its policy makers and the development planners.

- Analysis of food security situation and type of production system need to be carried out in various regions in order to suggest mechanisms for improving food security over time.

- The problem of land shortage and its contribution to household food insecurity was evident in the study area. Therefore government assistance may be needed to sensitise people to shift to areas with plenty of land for crop cultivation.

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3 Marital status

1 Single 2 Married 3 Divorced

4 Widowed 5 Separated

4 What is your religion?

1 Christian 2 Moslem 3 Traditional

5 What is your highest level of education?

1 No formal education 2 Adult education 3 Primary education

4 Secondary education 5 Diploma colleges 6 University

6 What is your main occupation?

1. Small scale farmer
2. Employee (specify) .....
3. Petty business

7 Give the total number of your household members .....

7.1 Children (below 18 years).....

7.2 Adults (above 18 years) .....

8 Which off-farm activities do you engage yourself to increase your income?

1 Masonry 2 Carpentry 3 Casual labour 4 Local brewer

5 Kiosk 6 Petty business 7 Others, (specify)

9 On average how much money did you earn from your farm activities (2000/2001)?.....T.shs per year

10 How much money did you earn from off-farm activities during the (2000/2001) season?.....T.shs.

11 What is your average annual income in a household? (T.shs.)

1. Below 30

APPENDICES

Appendix 1

QUESTIONNAIRE FOR HEADS OF HOUSEHOLDS

Food insecurity has been one of the big constraints to our well-being, economy and consequently the development. It is our responsibility now to fight it if possible by using our own initiatives. This questionnaire to the households is aimed at acquiring some information on homegarden components, food security indicators and socio-economic and socio-cultural factors that influence household food security. The study will provide information that will be useful for the improvement of the homegardens to ensure household food security.

Please give correct answer to the following questions.

Date of interview.....

Name of Ward.....

Name of Village.....

Part 1

Background information

1 Sex

1. Male 2 Female

2 Age (years)

1. Below 30 years
2. 31-45 years
3. 46-60 years
4. Above 60 years

2. 31 000-100 000
3. 101 000-150 000
4. Above 150 000

Part 2: Components of homegarderns and their uses

12 What type of crops do you have in your homegarden

1. Cash crop
2. Food crop
3. Both food and cash crop

13 What type of cropping system you practice in your homegarden

1. Monocropping
2. Intercropping
3. Both monocropping and intercropping

14 What is total area under monocropping .....(hectare)

15 What is total area under intercropping .....(hectare)

16 What are the main food crops do you produce

1. Banana
2. Maize
3. Beans
4. Fingermillet

17 What are other food crops do you produce

1 Yams	2 Cocoyams	3 Irish potato	4 Sweet potato
5 Cassava	6 Sunflower 7 Sorghum	8 Pigeon peas	
9 Pumpkins	10 Vegetables	11 Others	

18 Please give a list of tree and shrub species that are found in your homegarden and their uses (fill in the table below)

Table 1: Tree species found in the chagga homegarden

Local name	Scientific name	Uses

19 Please give list of food crops found in your homegarden

Table 2: Food crops found in the chagga homegarden

Local name	Scientific name	Uses

20 Which crops were previously available in your homegarden but now have disappeared?

1 .....

2 .....

3.....

4 .....

5 .....

6 .....

21 What do you think is the reason for their disappearance?

1. Climatic change
2. Poor management of the homegarden
3. Loss of soil fertility

4. Land shortage
5. Invasion of new crop and changing eating habits
6. Lack of market

22 What type and number of livestock do you have (indicate whether used at home or sold and revenue obtained)

Table 3: type and number of livestock kept by the household

Type of livestock	Number kept	Number used at home annually	Number sold annually	Revenue obtained
Cattle				
Dairy				
Beef				
local				
Goats				
Dairy				
Local				
Chicken				
Layers				
Broilers				
local				
Sheep				
Pigs				
Others (specify)				

Part 3: Food security indicators

23 Have you ever experienced food shortage in your household at least in the past two years

1. Yes 2 No

24 If yes give reasons for that

1. Low production from the homegarden
2. Lack of enough land for cultivation of food crops.
3. Large number of dependants

4. Low income and purchasing power
5. Overselling of crops
6. Household gender division of labour
7. Cultural rituals and taboos

25 Indicate months of food shortage in a year

1 January 2 February 3 March 4 April 5 May
6 June 6 July 8 August 9 September 10 October
11 November 12 December 13 September to December
14 September to January 15 November to January
16 September to November 17 January and February
18 November and December 19 October and November

26 Indicate total number of months in a year you do experience food shortage

1 One month 2 Two months 3 Three months
4 Four months 5 Five months 6 Six months

27 How did you cope with that food shortage?

1. Sell assets and buy food
2. Got support from the Government
3. Engage in casual labor and buy food
4. Got support from relatives
5. Reduce number of meals
6. Others specify

Part 4: Socio-economic factors influencing food security

28 What is your labour force (Number of adults able to work) in your household? .....

29 Do you face labour constraints in your production system?

1 Yes 2 No

30 Do you have any member of your household who stay away from home?

1 Yes 2 No

31 If yes indicate the number of adults able to work who stay away from home .....

32 Do you possess another farm different from your homegarden

1. Yes
2. No

33 If yes what is the size of another farm? .....(in hectare)

34 How far is it from the home place? _____(Km)

Part 5: Socio-cultural factors influencing household food security

35 Household gender division of labour

Among members of the household who does the following activities.

Use the following key to fill in the table below using (v mark): M= male F= female MA= male adult FA= female adult MC= male child, FC= female child

Table 4: household gender division of labour

Activity	M		F	
	MC	MA	FC	FA
Land preparation				
Transplanting banana seedlings				
Weeding in homegarden				
Manure application				
Fodder collection and livestock feeding				
Milking				
Planting: bananas Planting coffee Planting maize Planting beans Planting fruit trees Planting yams				
Fetching firewood				
Fetching water				
Food preparation				

35 Does gender division of labour gives more efficiency utilisation of labour at household?

1. Yes
2. No

36 Household gender based decision making

Between man and woman who decides on carrying out the following activities. Indicate in the table below (use v mark)

Table 5: Household gender based decision-making

Activity	Decision maker		
	Man	Woman	Both
Type of crop to plant			
Type of tree species to plant			
Type of livestock to keep			
What and amount to sell			
How to spend the money after selling the produce			
Amount of food crops to be stored			

37 Does the type of decision-making at household affect food security

Yes

No

THANK YOU VERY MUCH FOR YOUR GOOD COOPERATION

APPENDIX 2

CHECKLIST FOR KEY INFORMANTS: VILLAGE LEADERS, EXTENSIONISTS, ELDERLY PEOPLE AND DISTRICT AGRICULTURAL STAFFS

Village.....
Ward.....
Division.....

What are the main sources of food in this village?

What are the main sources of income in your village?

What is the average income of this village?

What type of trees, crops and animals do you manage in your homegarden?

Which are some examples of food crop plant species which were previously available in plenty in the past but now have disappeared or in state of disappearing?

Which are some examples of plant species which were previously available in the past but now have disappeared.

Do you think these plants which have now disappeared were important to be retained

What do you think is the reason for their disappearance?

In a household homegarden what activities are specific for either men only or women only?

Which are the some socio-cultural factors like beliefs. norm and taboos that govern management of homegardens.

At household who decides on various production activities.

Do you think homegardens have a role in household food security? Explain.

What problems do you think can cause household food insecurity?

Generally what are the weaknesses of homegarden production system?

What do you think should be done to improve the homegardens for food security?

What are the main problems facing the sustainability of the homegarden.

Appendix 3

PERCENTAGE DISTRIBUTION OF TREES AND SHRUBS IN THE CHAGGA HOME GARDENS

Local name	Scientific name	Uses	Percentage	Availability
Mweresi	*Grevilea robusta*	Fw, Ti, Sh	83.8	Plenty
Mringaringa	*Cordia africana*	Ti, Fo, Fw, sh	12.1	Rare
Mruka	*Albizia schimperiana*	Fw, Ti, sh	2	Rare
Msonobari	*Eucalyptus spp*	Ti, Fw	10.1	Rare
Msindano	*Pinus sp*	Ti, Fw	8.1	Rare
Mfuruvanje	*Albizia gumifera*	Ti, Fw, sh	16.2	Rare
Mlera	*Acacia seyal*	Fw, sh	22.2	Rare
Mtarakwa	*Juniperus procera*	Fw, Po	7.1	Rare
Mseseve	*Rauvolfia caffra*	Lb, Fo, St, Sh	63.6	Plenty
Mfurufuru	*Croton macrostachyus*	Fw, Fo, Sh, Me	5.1	Rare
Msineu	*Olea africana*	Fo, Wh, Po, Me	41.4	Moderate
Mtamioi	*Olea europea*	Fo, Wh, Po	71.7	Plenty
Mwarie	*Bridelia micrantha*	Ha, Fo,Fw	62.6	Moderate
Mwolo		Ha, Fo, spoon	56.6	Moderate
Mring'onyo		Spoon St, Sh	20.2	Rare
Mtokoviri	*Tarbonantana sp.*	St.	8.1	Rare
Ilaka	*Tetradenia riparia*	Fe, Fo,Me,	69.7	Plenty
Ishunga	*Citrus sinensis*	Fr, Fw	19.2	Rare
Mjohoro	*Senna spp*	Sh, Fw, Me	18.2	Rare
Mkuyu	*Ficus sycomorus*	Sh, Fo,	57.6	Moderate
Mhesi	*Trema orientalis*	Fo, Fw, Me	71.7	Plenty
Mmbira	*Manihoti glziovii*	Fo, Ve	72.7	Plenty
Mmmbino	*Morus alba*	Fo, Me, Fe	34.3	Moderate
Iwonu	*Ricinus communis*	Fo, Me, St	13.1	Rare
Imomo	*Kigelia africana*	Sh,	4.0	Rare
Mfifina	*Commiphora zimmermannii*	Fo, Me, Fe, Sp, Cu	84.8	Plenty
Msuki	*Toderia asiatica*	Fo, Me, Fe	75.5	Plenty
Isale	*Dracaena spp.*	Fo, Me, Fe, Cu	83.8	Plenty
Mtangawisi	*Eriobotry japonicaa*	Me	3.0	Rare
Indimu	*Citrus limon*	Fr, Fw	13.1	Rare
Ibabai	Carica papaya	Fr, Me	28.3	Rare
Ibera	*Psidium guajava*	Fr, Fw	16.2	Rare
Imwembe	*Mangifera indica*	Fo, Fr, Fw	43.4	Moderate
Ibarisheshe	*Percea americana*	Fo, Fr, Fw	55.6	Plenty
Pichesi	*Prunus persica*	Fr, Fw	13.1	Rare
Itobetobe	*Annona sp*	Fr, Fw	17.2	Rare
Itowo	*Azanza garckeana*	Fr	6.1	Rare
Utupa	*Taphrosia vogelii*	Rodentscide	2	Rare

Utupa	*Taphrosia vogelii*	Rodentscide	2	rare
Injekere		Me,	10	rare
Mwanaboru	Aloe spp	Me	18	rare
Ihitihiti	*Erythrina abyssinica*	Me	15	rare
Kivale	*Arundinaria alpina*	St, Po	8	rare
Msafurasi	Cupressus lusitanica	Wh, Ti, Fw	5	rare
Mlulu		Wh, Fw,	9	rare

Ti	Timber	Me	Medicinal	Sh	Shade
Wh	Whithies	Sp	Support	Fr	Fruits
St	stacking	Po	Poles	Fo	Fodder
Fe	Fence	Fw	Firewood	Ve	Vegetable

Source: Survey data (2002)