THE ROLE OF WOMEN IN HOUSEHOLD FOOD SECURITY

IN MOROGORO RURAL AND KILOSA DISTRICTS

BY

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A THESIS SUBMITTED IN FULFILMENT FOR THE DEGREE OF DOCTOR OF PHILOSOPHY OF SOKOINE UNIVERSITY OF AGRICULTURE

1998

ABSTRACT

This study was conducted to assess the role of women in household food security in Morogoro rural and Kilosa districts. The study was conducted in six villages namely: Fulwe, Melela, Msufini, Kimamba, Kidoma and Dumila. It involved 484 respondents; (242 women and 242 men).

Data were collected using structured questionnaires. Field observations and secondary data supplemented the questionnaires. Descriptive statistics, chi-square and multiple regression were used in the analysis.

The results showed that: Household food security was inadequate in 63% of the households in 1995/96 and 1996/97, mainly due to inadequate production (77.6%), early sale of produce (17.2%) and storage losses (6.2%).

Males and females in the study area shared the same tasks on more or less equal basis, both in food and cash crop production and income generating activities. Women dominated in all activities of food crop production with the exception of site clearing (3.3%) transporting (42.2%) and marketing of crops (47.2%). Performance of household activities was dominated by females. Multiple regression analysis indicated that the contribution of women in household food securitywas quite outstanding. Their labour in processing (B = 2.964905), planting (B = 2.785432),

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weeding (B = 1.764507) and harvesting (B = 0.181580) associated positively with the total production and so were quantity of fertilizer application (B = 0.472789) and education (B = 0.147557).

Lack of access to capital/income (49.6%), drought (18.8%), access to time (12.0%), decision making power (8.2%), and agricultural knowledge (1.2%) limited women contribution to household food security. Lack of access to land (5.4%) was specifically important in Kimamba village (42.9%).

Reduction of meal frequency and of amount of food consumed (19.8%), casual labour (18.2%), petty business (17.8%) and buying of food (9.9%) were the dominant coping strategies during food shortages.

From the study the following recommendations are offered: There is need to improve women decision making power and accessibility to resources.

For improvement of food security in the study area, production of various foodstuffs need to be increased. Households need to be encouraged to stock enough crops after harvesting and early sale of food crops should be discouraged.

There is a need to improve storage methods. Communal granary could serve during the food shortages provided the pest problem is avoided.

Women should be encouraged to engage in income generating activities. Extension services to these women farmers need to be improved, reliable and timely.

Barter system between harvests and acquiring agricultural inputs need encouragement.

This study, identifies several possible research areas. It is therefore recommended that further research include more focused studies in connection with local brewing, food storage, sale of food crops and income generating activities with special emphasis on women who are the key actors.

DECLARATION

I, CHRISTINE GABRIEL ISHENGOMA do hereby declare to the Senate of Sokoine University of Agriculture that the work presented here is my own and has never been submitted for a degree award in any other University.

Signature ---------- CMGIshe ----------

Date ---------- 8/12/1998 ----------

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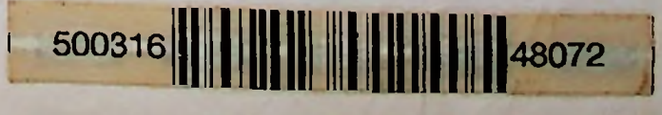

ACKNOWLEDGEMENT

I wish to express my heartful gratitude to my supervisors Dr. Z.S.K. Mvena and Dr. H.S. Laswai for their encouragement, patience and constructive criticisms throughout this study. Special thanks should go to Prof. A.Z. Mattee, Dr. B.P.M. Tiisekwa and Dr. J.I.B. Rugambisa for their assistance during the initial stages of this work. I would like to express my appreciation to Dr. N.S.Y. Mdoe, Dr. F.T.B. Magayane and Mr. J.S. Lugole for their assistance in data analysis. Deep and sincere thanks are expressed to Swedish Agency for Research Cooperation with Developing Countries (SAREC) and Research on Poverty Alleviation (REPOA) in Tanzania for providing financial support in this study. I would like to thank my employer the Ministry of Agriculture for granting me study leave to carry out this study.

The author extends her outmost thanks to the head of Agricultural Education and Extension department, Prof. D.F. D. Rutatora for his encouragement throughout the study. Also to the all enumerators in the study villages, who provided their valuable assistance without which it would have been impossible to obtain the requisite data for this study. To the respondents who volunteered so

generously their time and suffered great inconvenience so that I could collect the necessary information, I wish to extend my sincere thanks to them.

My special thanks and appreciation are due to my beloved husband Prof. Romanus Cleophace Ishengoma, my children Angela, Fredric, Lisa and Emma for their moral support, great patience and continuous encouragement throughout the study. Lastly, I would like to thank all academic members of staff of the Departments of Agricultural Education and Extension and Food Science and Technology and all those who in one way or another assisted in conducting this study.

DEDICATION

This thesis is dedicated to my parents Gabriel Lwamunana Bilaro and Felista Bananuka Bilaro, who laid the foundation for my education.

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ABBREVIATIONS

CFSP	-	Comprehensive Food Security Programme
CRDB	-	Cooperative and Rural Development Bank
CSD	-	Child Survival and Development
ERS	-	Economic Research Service
FAO	-	Food and Agriculture Organization
FSD	-	Food Security Department
FSP	-	Food Security Programme
GDP	-	Gross Domestic Product
GNP	-	Gross National Product
HFS	-	Household Food Security
ILO	-	International Labour Organization
IRA	-	Institute of Resource Assessment
JICA	-	Japan International Cooperation Agency
LICs	-	Low Income Countries
LIFDCs	-	Low Income Food Deficit Countries
MCH	-	Maternal and Child Health
NFS	-	National Food Strategy
PEM	-	Protein Energy Malnutrition
REPOA	-	Research on Poverty Alleviation
SADCC	-	Southern Africa Development Coordination Conference
SMEs	-	Small and Medium Enterprises
TFNC	-	Tanzania Food and Nutrition Center
TANU	-	Tanganyika African National Union
SUA	-	Sokoine University of Agriculture

TGNP	-	Tanzania Gender Network Programme
Tshs	-	Tanzanian Shilling
UNDP	-	United Nations Development Programme
URT	-	United Republic of Tanzania
UN	-	United Nations
UNICEF	-	United Nations Childrens Fund
UNU	-	United Nations University
WFP	-	World Food Programme
WHO	-	World Health Organization

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CHAPTER ONE

INTRODUCTION

1.1 Background Information

Many families in Africa continue to face problems in obtaining sustainable and adequate access to food. This food insecurity remains one of the most visible manifestations of their poverty and it has attracted considerable debate at both theoretical and policy levels (Corbett,1988; Wagao,1991).

1.1.1 The Concept of Food Security

The food security concept has been given different definitions and received varying interest in the past (Rukuni and Eicher,1987; Yongyout and Sakorn,1992). In the 1970s food security was mostly concerned with food supply, usually in the form of grain stocks and was being applied at regional or district levels (FAO,1983; Kavishe,1993).

In the 1980s, the focus shifted to questions beyond supply. It also included access to food at household and individual level (Maxwell and Frankenberger,1992). Emphasis was also placed on food chain as a component of food security analysis to encompass production, marketing and consumption (Wagao,1991).

Holmboe-Ottesen and Wandel (1990) refer to food security as access to food and define this as the process and extent to which the available and produced food can reach all members of the household all year round. FAO (1996a) states that food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life.

Food security is given by the following equation, where "hh" stands for "household": (hh food consumption requirement - hh food production) x price of food < = income and liquid assets available to purchase food. Food security is a set of dynamic, rather than static

(Milich,1997a).

The World Bank definition of food security, "access by all people at all times to enough food for an active and healthy life", has been widely accepted (Dearden and Cassidy,1990; Maxwell,1990; Holmboe-Ottesen,1991). This definition encompasses two elements:

(a) food supply and

(b) the access or the ability of a household to acquire food, either through their own production or purchase.

The question of access applies at two levels: access at the level of the household and consumption within the household (Ikpi *et al.*,1986; Jonsson,1986a; FAO,1987a; Rukuni and Eicher,1987; Tibaijuka and Feldestein,1990; FAO/WHO,1992a). It was argued that food security is dependent upon three factors: availability, stability and accessibility of food supplies (FAO,1996b; FAO,1996c).

The ultimate objective of this enlarged concept of food security is to ensure that all people at all times have

al.,1989; FAO,1990a; Lorri and Kavishe,1990; Mosha,1990a; Yambi *et al.*,1990; Missano,1993). Therefore, 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). There is evidence to suggest that household food insecurity is widespread and chronic in some areas, since there seems to be a certain degree of food deficit at one time or another during the year. This is especially prior to harvesting (Kingamkono,1987; Mosha *et al.*,1992).

To achieve national food security, a country must be able to grow sufficient food or have enough foreign exchange to enable it to import food. Similarly, households must have sufficient income to purchase the food they are unable to grow for themselves. The household is taken as the unit of analysis because it is assumed that decisions about production, investment and consumption are taken primarily at the household level (Kingamkono,1987; Corbett,1988; Monu,1993).

Kabeer (1991) has defined the household as " the bundle of relationships in a society through which reproductive activities are organized". Household food security concerns the microeconomics of the household. In particular, it describes the use of food in the house, access to it by various members in the household, household survival strategies, and the role of gender. In addition, household decisions concerning the use of resources, output and cash, income are some of the important critical variables in the overall household food security analysis (Hindle,1990).

Gender has assumed a central importance in the studies done by World Bank on household food security. Women's varying capacities for income generation, their generally lower access to education, their lack of control of resources, and their tendency to put high priority on family food security, means that an understanding of household economics and social dynamics of the household is crucial. Therefore, when analyzing food security at the household level, we are looking at food supply and distribution; effective access of food by households and

effective consumption by individuals. The role of women in food security is of paramount importance (World Bank,1985).

1.2 Justification

Food insecurity continues to be a big problem in different parts of Tanzania (Ringia,1990; Wagao,1991; Kavishe,1993). The World Bank (1985) estimated that about 6.6 million people in Tanzania were chronically food insecure. A number of isolated studies on food security and related issues, in Tanzania have been conducted (Mtebe *et al.*,1988; Killalea, 1990; Ringia,1990). In their studies, the emphasis has been on specific elements in community activities, such as food crop production.

Food security as an important factor in the community well being and national development must be considered in totality by assessing all factors involved in both qualitative and quantitative terms. Their interlinkages, also, must be considered. In the absence of a comprehensive study on the food security situation,

addressing important factors and influencing agents, it is not possible for the government to effectively assist in alleviating food insecurity problems.

Improving household food security means focusing on the role of women because they play a critical role as food producers and as income earners for their families (Mascarenhas,1983; Macquire and Popkin,1990; Kahurananga, 1980). Some policies of governments and development assistance agencies have actually increased the social and economic gap between women and men. By failing to recognise the central role of women as producers as well as household managers disregarding their association special needs, development efforts have often been misdirected resources to men (Gittinger *et al.*,1990; Holmboe-Ottesen,1991).

Therefore, a thorough understanding of women's role in a given community is a requisite towards the success of any intervention measures by actors. In order to achieve this, this study was proposed with the view to assess food security and its determinants, the extent of women's

involvement and limitations. The results of this study yields recommendations for incorporation in the measure for improvement of household food security by actors (Regional/District administrators and Agricultural officers who are directly or indirectly invoveld in food security issues).

1.3 Objectives of the Study

The primary objective of the study was to investigate the role of women in household food security in the study area. This will serve as a measure towards improvement of nutritional status of the household through increasing household food availability.

1.3.1 Specific Objectives of the study

i) To analyse the household food security situation in the study area (Food production and supply, stability and accessibility).

ii) To assess the role played by women relative to men in the household food security and determine the

extent of women involvement in household coping strategies during food shortages.

iii) To identify the main factors limiting the contribution of women to household food security.

iv) Based on the findings, to recommend ways of solving the problem in the area and their applicability to the rest of Tanzania.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

Most people in Tanzania depend on agriculture for their livelihood (Government of the United Republic of Tanzania and UNICEF,1985). Tanzania has about 36 million hectares of arable land, out of which only 6 million hectares are cultivated (Wagao,1991). FAO (1996a) argues that the country has 39.5 million hectares of arable land under rainfed conditions, of which 10 million hectares are potentially good land for agricultural production. Currently, 3.4 - 4.5 million hectares are cultivated intensively, in which 58 percent of the area is devoted to cereals. Almost all rural households grow food crops, which account for the bulk of the area cultivated. Surveys indicate that under the existing farming system and technologies, there exists an abundant cultivable land, which could be productively used.

In aggregate, therefore, land availability in Tanzania does not seem to be a limitation for food production.

There is ample land which could be used for the expansion of both crop and livestock production. This is indicative of the fact that agricultural land resource is not fully utilized (Wagao,1991). Also, agro-ecological conditions vary widely and so do the predominant patterns of agricultural development (URT and UNICEF,1990; Wagao,1991).

In Tanzania, the land is owned by the state and the majority of the communities have the right to own land for agricultural production. However, in some parts of the country, productive land is becoming scarce due to increasing population pressure. This is particularly so in areas where they practise permanent agriculture based on perennial crops, like bananas and coffee (Ministry of Agriculture,1996).

URT and UNICEF (1990) concluded that in aggregate terms, Tanzania does not suffer from food shortages. However, some parts of the country are prone to drought, flooding, marketing and transportation constraints that hinder the smooth transfer of food crops from surplus areas to

households with food shortages. Fig. 1 shows the National aggregate food production in Tanzania. Fig. 2 shows the Aggregate food production in Morogoro region and Table 1 shows the Aggregate food production in the study area, i.e, Fulwe, Melela, Msufini, Kidoma, Kimamba and Dumila villages.

As far as food production is concerned, Tanzania can be considered to be in a situation of "quasi self sufficiency". In general terms, the national food balance has been favourable, with food production exceeding the theoretical overall food requirements, even though nutritional energy requirements are far from being met (Tables 2 and 3).

During a normal agricultural year some parts of the country, usually the southern highland regions are able to produce sufficient food crops, while others are constantly in short supply (Ministry of Agriculture,1996).

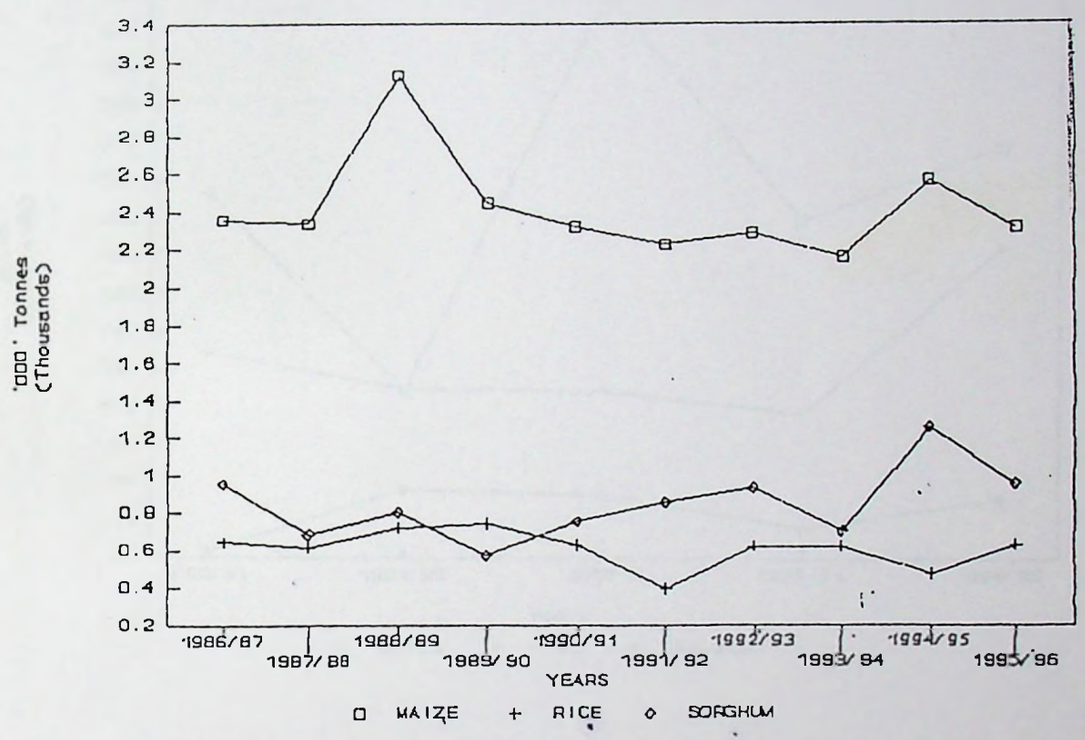

Fig.1 : National aggregate food production 1986/87-1995/96

Source: Adapted from Food Security Department (1996)

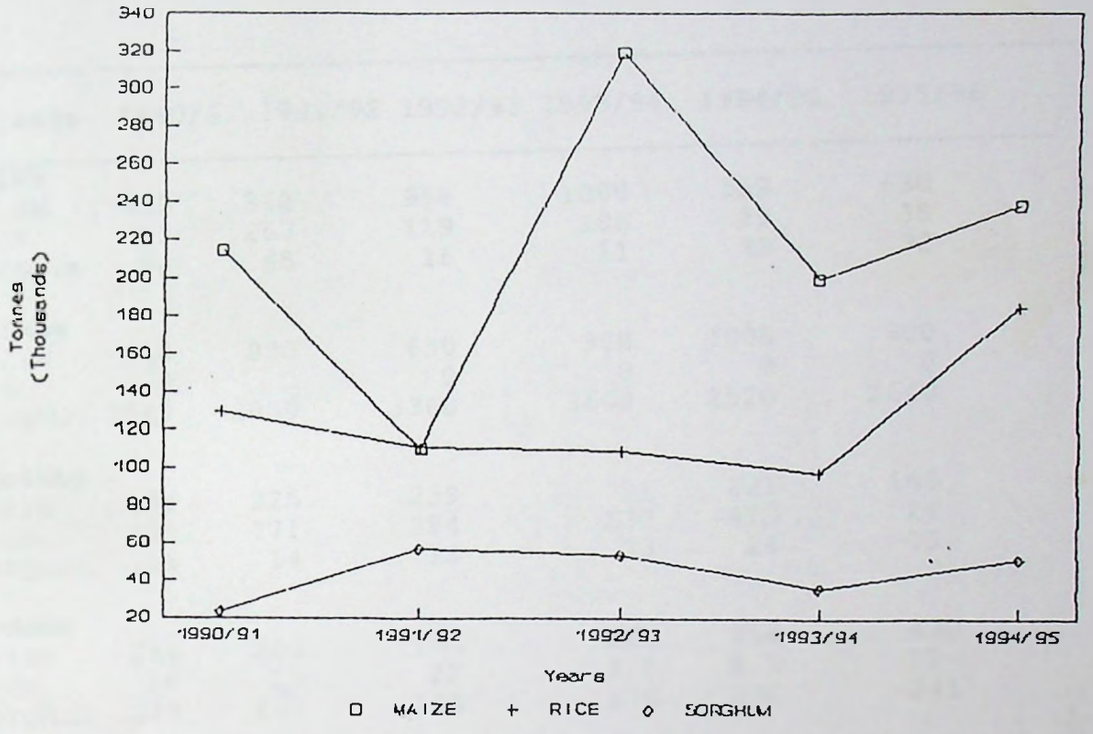

Fig. 2: Aggregation food production in Morogoro region 1990/91 - 1994/95

Source: Adapted from RADO's Office, Morogoro (1996)

Table 1. Food production in the study area 1990/91-1995/96 (tons)

Village	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96
Fulwe						
Maize	450	342	958	1080	558	630
Rice	50	257	119	106	25	35
Sorghum	26	65	16	11	32	32
Melela						
Maize	700	800	650	900	1000	800
Rice	0	0	0	0	0	0
Sorghum	2640	2000	3360	3600	2520	2640
Msufini						
Maize	194	225	239	91	221	166
Rice	424	171	284	130	419	24
Sorghum	19	14	13	33	24	15
Kidoma						
Maize	284	206	163	221	254	430
Rice	28	15	22	9.0	8.0	17
Sorghum	245	199	162	276	170	241
Kimamba						
Maize	261	967	857	863	1368	1227
Rice	347	1081	618	607	683	696
Sorghum	0	0	0	0	0	0
Dumila						
Maize	1800	2655	2250	2160	2250	2475
Rice	216	324	351	270	324	364
Sorghum	126	100	100	126	75	126

Source: Village agricultural field officer's office (1996)

Table 2. Relative inadequacy of food supply, 1969-71, 1979-81 and 1990-92

1969 - 71	1979 - 81	1990 - 92
Percentage		
24.1	7.7	11.1

Source: FAO (1996d)

Table 3. Per caput dietary energy supply (DES), 1969-71, 1979-81, 1990-1992

Population 1990-92	Recomended kcal/person/day	Per caput DES kcal/day			Annual growth rate
		1969-71	1979-81	1990-92	1969-71 to 1990-1992
26.9	2780	1740	2280	2110	0.9

Source: FAO (1996d)

Although there is an enormous potential for increasing agricultural production, this potential is not being exploited due to weather hazards, pest problems during the post-harvest period, factors pertaining to the national extension system like inefficient input and information delivery system, lack of relevant extension packages and unattractive working conditions for extension officers. In addition, gender issues like division of labour and decision making by gender are not considered (Gabriel,1989; Ringia,1990; FAO,1991; Wambura,1992).

Food insecurity exists when there is not enough food for the people who need it. This situation can arise either because of problems in producing adequate food and distributing this food to the people who need it or because the people cannot afford to buy the food that is available (URT,1992). Food security has sub-national and individual household dimensions. While the country as a whole may be food secure, different regions may experience varying degrees of security as a result of natural resource endowments, differences in purchasing power, logistic and infrastructure, access to markets, trade and imports. The same applies to different types of households (FAO,1990a; Bender and Smith,1997).

Household food security cannot be achieved from increased production alone. It is also necessary that the food be distributed and acceptable, that those concerned be given the time and facilities for its preparation, and that it can be converted into good diets (UNICEF,1985; URT,1992). Holmboe-Ottesen and Wandel (1990), emphasized that one-sided emphasis on production and methods to increase

production has proven inadequate or even erroneous as a strategy for alleviating hunger and malnutrition. Similar conclusions have been drawn on the basis of the numerous studies that have shown that agricultural development, which has led to increase in production, has had little or even negative effect on nutrition (Dey,1990).

In particular, food security will be achieved when the poor and vulnerable, particularly women, children and those living in marginal areas, have secure access to the food they want (Maxwell,1988; 1990; Dearden and Cassidy,1990). In the following sections a review of components and determinants of food security is made.

2.2 Food Availability

The question of food availability and food security at the household level is closely linked to women, who are traditionally the providers of food to their families. In fact, when there is a food shortage at the household level, over and above the security and peace of the family being disturbed, the women are more upset (Muro,1987).

Availability of food at the household level requires that food be available in the households and in the local or community markets (Holmboe-Ottesen,1991; FAO/WHO,1992b). FAO (1996c) added that adequate food availability means that on average, sufficient food supplies should be available to meet consumption needs. In the first place, the term refers to the extent to which there is enough food supply in a particular household to meet the food needs of all members over the whole year. Wagao (1991) concluded that this is determined by what the household is capable of producing, purchasing, storing, processing and preparing. Holmboe-Ottesen (1991) added that this requires adequate products from agriculture or smooth market operations, infrastructure and a free flow of information.

Missano (1993) pointed out that food availability and supply depend on local production, ability to import, and efficiency of the distribution systems. Food security is therefore concerned not just with the level and variability of food production, but also with the causes and dimensions of poverty and with the effectiveness of

public and private distribution systems (Clay,1981; FAO/WHO,1992b). Food insecurity is essentially a proxy for poverty (Hindleston, 1990; FAO,1996d). In the household, the food can be produced, bought or bartered by the household. This means that the security refers to the entitlement of food more than the food per se (URT and UNICEF,1990).

Food availability in the household can be determined by material and non-material resources that the household commands and the household's organization of the activities around food. Material resources include access to adequate land for agricultural production and for keeping animals, credit for buying inputs for production, equipment suitable for the household members daily work in the food chain and income for food and productive assets. The non-material resources include access to knowledge and skills for food production and related activities, such as nutritional knowledge. The organizational factors include household division of labour, allocation and use of resources and decision making related to food (Holmboe-Ottesen,1991; Wagao,1991).

At the household level, food availability is determined by traditional food crop production, food storage facilities and the food marketing system (Wangara,1988). Muro (1987) reported that most farmers have limited their capacity of production in certain crops only for their family consumption because of lack of a market and/or the low prices paid for such crops.

Food security at the household level is a function of many variables, such as ecology, socio-economic, basic resources and environmental factors (Goldman and Smith,1995; Bender and Smith,1997). The types of food crops produced would also depend on cultural tastes and the technology of the community. Most households in Tanzania are engaged in subsistence farming, who use simple production inputs and depend on unreliable climatic conditions (Wagao,1991; Missano,1993, Makundi,1996).

The food distribution procedure in the country is still inadequate and often contributes to food shortages in households in some districts and regions. Furthermore,

food prices are not commensurable with people's financial capability. Moreover, procedures for the various uses of food are also not satisfactory (URT,1992). Bantje (1981) documented that laziness and sickness among household members are some of the major causes of food insecurity since the victims do not participate in food production or income generating activities.

2.2.1 Factors Contributing to Household Food Insecurity

In most African situations, generally the countries are poor, productivity is low, weather is very unpredictable and therefore food security is very minimal (Sumaye,1993). The other factors which cause food insecurity in Tanzania are mainly due to climatic conditions, labour availability, a steep increase in the prices and poor availability of agrochemicals both at national and village levels, pest and diseases and under-utilization of local foods (Ministry of Agriculture,1996).

National, regional and local availability of food depends primarily on production, stock holding and trade

(FAO/WHO,1992b). Food availability is determined by levels of domestic production and the extent of storage losses and food transfer from one point to another. The major components of food availability are therefore domestic food production, food imports and exports and food aid (FAO,1996a). Shortfalls in food production and/or in food availability through trade lead to food insecurity due to price rises or a breakdown in distribution channels (FAO/WHO,1992a).

2.2.1.1 Environmental and Socio-economic Factors

Lugembe (1993) pointed out that at the household level, food security implies having physical and economic access to foods. In turn, physical and economic access to foods is influenced by environmental factors both natural and man-made in nature. Mosha (1990a) revealed that the environmental and socio-economic factors play a big role in food availability. Availability of adequate rainfall for crop production will be a natural parameter that would influence physical and economic access to food, man-made factors like macro- and micropolicies of a country would

also have direct bearing on efficiency of production, transportation, pricing and affordability of foodstuffs.

Mwaipopo (1994) and Mungodo *et al.* (1996) added that climatic factors contribute greatly to household food insecurity in the country. Also, sometimes floods is the other factor. Yambi *et al.* (1990) pointed out that farmers may suffer crop failure due to drought, floods or pests either individually or at the level of the village, ward or the district. Poor weather conditions and natural hazards such as drought and floods, contribute to low production (Rukuni and Eicher,1987; Ringia,1990).

2.2.1.1.1 Low Production, Low Incomes and Drought

The basic causes of food insecurity are low productivity in agriculture combined with fluctuations in food supply and low incomes (FAO,1996a; Makundi,1996). FAO (1996c) states that although Tanzania has large potential to produce more than enough cereals for domestic consumption, in 1995/96 Tanzania faced a deficit of 0.44 million tons of cereals that had to be imported. Some of the reasons as

to why the domestic supply has been unable to meet the demand are the low yields and limited cultivated land for food crops. The deficiency of domestic food production is also due to weakness in agribusiness management in production and marketing.

FAO (1996a) argued that food supplies have increased substantially, but constraints on access to food and continuing inadequacy of household and national incomes to purchase food, instability of supply and demand, as well as natural and man-made disasters, prevent basic food needs from being fulfilled.

Some factors affecting food availability have been identified as productivity and decision making (Mtebe *et al.*,1988; Mosha,1990a). These were found to vary with different communities.

Mtebe *et al.* (1988) writing on household food security in Child Survival and Development (CSD) programmes in Morogoro region, pointed out that crop acreage for most respondents was between 1 and 3 acres. The cultivated 1

acre or 3 acres coupled with inadequate crop management practices currently prevailing in most of the villages, does not guarantee availability of sufficient food for most households. The data (Mtebe *et al.*,1988) showed that in over 50% of all respondents surveyed, there was insufficient food all across the region over the two seasons (1987/88) and 1988/89). Figures for Morogoro rural district were almost alarming for which about 73% of the respondents expressed a situation of food inadequacy for the 1988/89 period.

About 93% of the respondents in Morogoro rural indicated drought conditions as the number one reason for the low food availability in their households (Mtebe *et al.*,1988). Other reasons included the problems of wild animals, selling the produce for the family income as well as food theft. Food preference and acceptability were the other reasons identified. Table 4 indicates rainfall distribution in the study area from 1991 to 1996, characterized by not much fluctuation over this period except for the year 1995.

Table 4. Rainfall distribution in the study area

Rainfall	Amount of rainfall (mm)
1991	698.3
1992	727.8
1993	821.2
1994	711.2
1995	1005.6
1996	770.2

Source: Morogoro meteorology station (1997)

In most countries of Africa, agriculture production is rainfed and therefore highly susceptible to drought (Makundi,1996). Food production is normally subject to fluctuations because of changes in weather conditions. The rain-dependent agriculture practised by most farmers means that there are good levels of production when there is adequate rain, and poor levels when there is not. The existing distressing food supply situation is further accentuated by reccurent spells of drought, a familiar feature in Sub-Saharan region (FAO,1980; 1985a; Laswai and Mrema,1987; Ringia,1990). Drought itself can be a cause of food shortage and hunger in the household (Jonsson,1986b; Sumaye,1993).

A study in Shinyanga indicated that poor and unreliable rainfall has had the most direct and pervasive effect on production. The other main reasons pointed out as the cause of the fluctuation of production are: shortage of land, soil exhaustion and soil infertility, lack of inputs both agrochemicals and appropriate seed varieties, lack of agricultural implements, labour constraints, pest problems, lack of financial resources and improper food planning, among others. Most farmers were limited to the use of seeds from their own food crops and commercial fertilizer was not frequently used in the study area due to low availabilty and high prices (CARE International in Tanzania,1995; Basheke and Kaijage,1995).

In a study done in Iringa region, the major reasons given by the farmers for food shortages were: excessive drinking, inadequate agricultural inputs and migratory labour, big family size and ignorance on credit. One other aspect of the household food security equation is the ability of the household to assess the amount of food which should be considered adequate for it to last until the next harvest (Lorri and Kavishe,1990). The same

authors indicated that a number of factors can affect food availability and accessibility at the household level. These factors are related to food production, crop husbandry, food use, food storage, behaviour, socio-economic factors, climatic conditions and household population.

In the same region, Kingamkono (1987) indicated that the harvest of the main crop averaged 9.3 bags of maize per household. This production was far below the estimated household food requirement of 21 bags per year in an average family size of seven.

Studies by UNICEF and TFNC have shown that food insecurity is a crucial problem for many households in Tanzania. A rapid assessment of food availability and consumption in about 500 rural households in Mtwara, Zanzibar and Shinyanga showed that for 63.8% of households in Shinyanga, 43.6% of households in Mtwara and 43.3% of households in Zanzibar, the staple food grains lasted only for six to eight months after harvest (Seenappa,1987; URT,1992). Nutrition surveys which have assessed household

food security have indicated that 60 - 80% of households suffer from indicative food insecurity in Mtwara and Morogoro based on the 1987 - 1989 harvests (Mosha *et al.*,1992).

The information from Mtwara for 1987/88 by Kingamkono (1987) is collaborated by low household food harvests in which less than 10% of 409 households examined produced more than 3 bags of each of the staples (maize, paddy, sorghum, millets and cassava). With an average household size of seven people, the households would require about 21 bags of the staple cereal and about 3.5 bags of legumes per year. That is 3 bags per person per year for the cereals and half a bag of legumes per person per year. A bag recommended by Mosha (1990a) is equivalent to 100 kg. If cassava is used, each household would require about 30 bags. The average acreage under cultivation was about one to two hectares. Thus, low food production is in the first place a constraint to household food security.

A study in Kilimanjaro indicated that farmers depended mostly on farming to obtain their food. The lowland

farmers indicated a state of decrease in their main staples for the past five years whereas the upland farmers indicated a state of fluctuation mainly caused by drought conditions. Other factors affecting food availability were availability of cash crops and animal husbandly activities, partitioning of the main food crops in the households for food and sale, the use of bananas and root crops, the amount of stored food and the storage and preservation methods employed (Makundi,1996).

In the survey areas (Morogoro region) per capita food production seemed to be fluctuating within different years (refer Table 5). The main reason of fluctuation in production are environmental factors such as drought.

Table 5. Per capita food production in the survey area sorghum, maize and rice (Kg)

Villages	Population			Per capita food production (kg)		
	1994	1995	1996	1994	1995	1996
Fulwe	1137	1170	1204	1053	526	579
Melela	800	823	847	5625	4277	3341
Kidoma	615	633	651	823	682	1056
Kimamba	850	875	900	1729	2344	2136
Msufini	388	399	411	654	1664	499
Dumila	1013	1042	1072	2523	2542	2766

Source: Village agricultural field officer's office (1996)

2.2.1.1.2 Low Technology, Early Crop Selling, and Under-utilization of Land

Food security for most rural families in Tanzania is dependent on food produced on small holdings with rain-fed agriculture and low technology. Pressure for cash means that families may sell food crops leaving themselves with inadequate stocks to last until the next harvest (Jonsson, 1986b; Muro,1987; URT and UNICEF,1990). According to FAO (1996a) in Tanzania, over 80% of the population practice rain-fed agriculture under subsistence conditions. The farm sizes are generally small, averaging about two hectares in area. All these contribute to food insecurity. Lack of adequate and appropriate agricultural implements and inputs also contributes to low food production. In such situations, farmers lose their only source of food and income (Rukuni and Eicher,1987; Ringia,1990; URT,1992a; World Food Programme,1993).

Technical packages adapted to Africa's agronomic and cultural conditions, which have dramatic effects on yield are largely unavailable. As a result, there is

considerable emphasis on agricultural production in food security strategies for Africa. In fact, this requires improved farmer support services (extension, credit and physical inputs). It also requires better and more appropriate research (WFP,1993).

2.2.1.1.3 Post-harvest Losses

Lack of assistance to the small subsistence farmers, together with high post-harvest crop losses, account for the food shortages in the country (Kavishe,1993). Self-sufficiency in food cannot be achieved solely by increasing production, prevention or reduction of post-harvest losses is also necessary. This means that the losses that occur between the field and the consumer should also be limited (FAO,1991b). Post-harvest handling and associated unit operations lead to more food losses, especially at the household level. Losses of cereals have been quoted at about 25 - 40% and sometimes higher (FAO,1983; Seenappa,1987; FAO,1990a; Mosha,1990b; URT,1992; Kavishe, 1993; FAO,1996c). This is caused by spoilage agents and improper handling and storage, thus

decreasing food availability and household food security (Mosha,1990b). Post-harvest food losses make farmers run out of food before the next harvest comes in (Rukuni and Eicher,1987).

Food losses are not only at home but also occur in the field. Although there are no exact statistics on the damage and loss caused by rodents and other pests on food crops, estimates indicate that the field damage by wild pigs, rodents and birds cause substantial losses. Studies done in Kilombero, Morogoro region (Tanzania), indicated that food losses at home were of the order of 35% and 16% for rice and maize, respectively, contrary to field losses of 38% and 20% of rice and maize, respectively. A similar study in Chunya district, Mbeya region showed that rodents account for about 35 - 40% of the damage of food crops annually (Kilonzo,1994). In Morogoro district, it was reported that about 30 - 40% of sprouting maize is routinely damaged by rodents. It is estimated that there are about 500 field rats per hectare, each consuming about 10g of grain per day. Thus, the grain lost to rodents per hectare is about 5 kg per day, which amount to 1825 kg in

a year (Ministry of Agriculture,1988).

Mosha (1990b) indicated that food processing methods further deplete food availability. Although food processing operations make food edible, palatable and more presentable, considerable physical losses also occur. For example, milling of cereals using the traditional pestle and mortar or the grinding stone leads to about 25% physical loss in grain content. The same would apply to other cereals, such as millet, sorghum, wheat and to a lesser extent rice. Obviously, all these operations decrease the overall food available for consumption and subsequently food security.

FAO (1996a) reported that a greater proportion of the total food produced in the country is lost after being harvested. Sources of such losses are associated with the process of handling the produce from the point of harvest to consumption. Storage pests, particularly larger grain borer as well as rodents are well known in the destruction of stored grains. According to available data, about 60 percent of maize and seed beans were lost to rodents in

Northern Tanzania in the early 1960's. Poor storage facilities also result in poor quality of the stored food resulting in the food becoming unfit for human consumption. In Tanzania, the extent of post-harvest food losses has been estimated to be in the range of 15 to 45% of the total production (FAO,1996a).

Makundi (1996) pointed out that in Kilimanjaro region, storage methods employed also affect food availability at the household level. On average storage losses as high as 19% are caused by rodents while losses as high as 33% are caused by other pests. Most of the losses originate from all the other methods of storage but rarely from hermetically sealed containers.

FAO (1991b) revealed that storage structures, whether traditional or modern, should maintain an even, cool and dry internal atmosphere, they should provide protection from moulds, insects, rodents and birds, should be easy to clean and should be waterproof and protected from flooding. New storage buildings should also be gas-tight to enable the fumigation of their entire contents.

2.2.1.1.4 Labour Constraint

Wagao (1991), FAO (1996b) and Milich (1997b) pointed out that the size of the holdings and the area planted increases with the number of the people in the household. With the low levels of technology in use, it is the labour constraint which is critical at selected points of the agricultural season. Indeed, labour profile per year or over years do provide an explanation for the pattern of declining yields per hectare as the size of the holdings increase.

2.2.1.1.5 Priority and Under-utilization of Food Crops

Seenappa (1987) reiterated that food insecurity, especially in Sub-Saharan Africa is due to little priority given to the highly potential and drought-resistant crops, such as sorghum, millet, sunflower as well as under-exploited crops like cassava, yams and sweet potatoes. The importance of cassava as a major source of energy to many Tanzanians has been underrated (Msabaha *et al.*,1986; Seenappa,1987). The crop is notably tolerant to drought

and locust attacks, produces marketable roots, even under poor soil fertility and provides famine relief against failures in cereals, like maize and rice. Cassava leaves, widely used as vegetable provide a potential source of the mineral iron, essential in controlling nutritional anaemia (Rostling, 1987).

2.2.1.1.6 Population Growth

Food Shortage is the result of inability of most countries in the region to produce, purchase and even stock enough food to satisfy demands due to rapid population growth (FAO,1980; Milich,1997a). For example in August 1988, the United Republic of Tanzania conducted a population census. The total population in 1988 was 23.1 million. Generally, the annual rate of population growth in Tanzania is 3.0% (Bureau of Statistics,1996). Table 6 shows the increase and projections in population in Tanzania.

Table 6. Population in Tanzania and projections (1980 - 2010)

Year						
1980	1985	1990	1995	2000	2005	2010
18.0	20.1	23.8	28.1	32.5	37.4	43.0

Source: Bureau of Statistics (1996)

The population is increasing dramatically. Agricultural production has more than kept up with population growth (Table 7) except for 1991 - 1995.

Table 7. Tanzania annual grain production and population growth

Grain production growth (%)		Population growth (%)		
1981 - 1990	1991 - 1995	1981 - 1990	1991 - 1995	1996
5.8	2.8	3.2	3.0	2.5

Source: Economic Research Service (1996)

The balance between population size and food supply is the most basic challenge humans face (Bender and Smith,1997). Tanzania has potential to expand food production. Any increase in the use of inputs, such as fertilizer could substantially improve production (Bureau of Statistics,1996).

2.2.1.1.7 Income Generating Activities and Per Capita Income

Mosha (1990a) explained existence of poor food situation in many households as a reflection of lack of income generating activities, which can provide some money to supplement the small amount of food produced. Dependence of food cropping on a single growing season, together with lack of income generating projects creates a long waiting period between the sowing and harvesting of the main crop. Economically, this slack period is a burden of unemployment, which increase the farmer's dependence on sale of his slender food reserves in order to obtain cash for other pressing needs. However, the author suggested that encouragement in growing of cash crops, together with combining agriculture with subsidiary productive projects like crafts (pottery, weaving, wood-work and brick-work) will probably give solutions to sale of staple foods for cash.

Tanzania is one of the Low Income Countries (LICs) with a predominantly agricultural economy. Real income per capita fell steadily in the late 1970s and early 1980s as population growth outpaced the increase in Gross Domestic Product (GDP). The World Bank (1992; 1993) gives a rather conservative estimate of Tanzania's real GDP per capita for 1990 as US $ 110. This ranks Tanzania only second from the bottom, after Mozambique, in the GDP per capita world listing for that year. Kashuliza's (1994) estimate (which takes into account the contribution of informal sector activities) puts the real GDP per capita at about US $ 240 for 1990, which is still 25% less than the recorded GDP per capita in 1980). The UNDP (1993) which uses a more realistic approach in estimating development indicators estimates Tanzania's real GDP per capita at US $ 572 for 1990, with an overall ranking of 138 from the bottom.

2.2.1.1.8 Food Crops as a Source of Income

Apart from food destruction by pests, food shortages in the households were also aggravated by the improper use of the little food available. Due to lack of specific cash

crops, people were used to selling their harvest in order to get some cash for other needs. Also, considerable amounts of food were given to friends and relatives while others were lavishly misused for traditional parties, marriages, funerals, dances and making local brews. Brewing is a useful contributor to off-farm income sources (Lorri and Kavishe,1990; Mosha,1990a). The study conducted in Mbinga district, showed that sale of local beer generated most of the income from off-farm activities (JICA,1994/1995).

Many of the households failed to estimate the exact amount of each food crop they required to feed the household members for the whole year. In this case, households sold their crops after harvest but purchased the same items at higher prices later in the year (Mosha,1990a). FAO (1985) cited lack of purchasing power and alternative sources of income as major factors compelling many farmers to sell part of their subsistence produce immediately after harvest, leaving an insufficient food stock for the family until the next harvesting season.

In a study conducted in Burkina Faso, it was shown that despite significant successes in food security, household level studies also revealed that seasonal food insecurity still prevails. This raises the issue of an interseasonal food arbitrage. Because of the need for cash, households typically sell grain at harvest and have to repurchase when prices are higher (FAO,1996e).

In many parts of Tanzania, the major food crop is also the principal cash crop. This is typical in certain areas in Iringa, Mbeya, Ruvuma, Rukwa, Kilimanjaro and Arusha regions (Kingamkono,1987; Makundi,1996). Estimates from Iringa region indicate that farmers sell up to 20% of the food produced to meet immediate cash needs, and that 75% of the overall cash income may be derived from selling food crops (Yambi *et al.*,1990; Mngodo *et al.*,1996).

In Mtwara, between 10 - 45% of the farmers sell their food crops even though they know that the balance will not be sufficient to meet their annual food needs (Kingamkono, 1987; Wagao,1991; Mngodo *et al.*,1996). The agricultural survey done by the Bureau of Statistics in 1988 found that

as high as 41% of the rural households had their main source of income from sale of crops, especially food crops while only 31% of the income was from non-agricultural source (URT,1989; Mosha *et al.*,1992).

2.2.1.1.9 Other Factors

A study conducted by Makundi (1996) in Moshi rural, Kilimanjaro region, pointed out that the main causes of food insecurity was drought and dependence on rainfed agriculture. Other causes were, limited access to productive land, lack of agricultural extension, local beer brewing and drunkardness, large families, witch-craft, poor storage facilities, lack of education/training, lack of employment opportunities, laziness and poor rural transportation.

Food insecurity is attributed to poverty, deforestation, environmental degradation, over fishing, refugees, migration, concentrated resource ownership and/or management, and the heavy workload of women (Malima,1993; FAO,1996f; Ministry of Agriculture,1996). Food supply in

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rural households (Tanzania) is inadequate, resulting from crop failures, lack of access to or unavailability of crop inputs, improved varieties of seeds, credit, dependence on high proportion of food consumption needs from household production and insufficient supplementary income earning opportunities. Women farmers in particular lack access to applied inputs and credit and decision making (URT and FAO, 1992; Makundi,1996; Mngodo *et al.*,1996).

2.2.2 National Food Availability

In Tanzania, the national food availability depends on local production, ability to import and the efficiency of the distribution systems, storage losses and population growth (Wagao,1991; WFP,1993; Ringia,1990). Food aid has a role in maintaining food security. It is a necessity for many low-income food-deficit countries (Tanzania included, see Table 8). From Table 8 it is clear that per capita food production is generally on the decline.

Most households in rural Tanzania consume the food they produce and on average, rural families produce 42% of the

food they consume (Wagao,1991). The consumption pattern in Tanzania consists mainly of one staple food, supplemented with beans or peas, green leafy vegetables and occasionally meat (Kavishe,1990).

Table 8. Tanzania food production, aid, and per capita food use

Year	Supply	Food availability and use				
	Production	Commercial imports use	Available net of food aid	Food use	Population	Per capita food use
	----------000 tons----------				million	(kg)
1986/87	3666	130	2780	2836	22	127
1987/88	3807	60	2862	2950	23	128
1988/89	3531	0	2450	2514	24	106
1989/90	4470	70	3785	3808	24	156
1990/91	3565	128	2968	2992	25	119
1991/92	3540	197	3186	3201	26	124
1992/93	3390	180	3002	3037	26	114
1993/94	3700	176	3060	3079	27	113
1994/95	3350	77	2732	2871	28	103
1995/96	4320	80	3370	3390	29	118

Source: Economic Research Service (1996)

The problem of food insecurity is country wide, with great variation among regions, districts and even households in the same geographical location (Kajumulo,1993). Food production varies among the regions. The large surplus areas are usually in the fertile south (Iringa, Rukwa,

Mbeya and Ruvuma) whereas the drier central (Dodoma and Singida) and north western regions (Shinyanga, Arusha and Mwanza) are the deficit areas (Msabaha *et al.*,1986). Food shortages are therefore still experienced in the country, particularly at household level, where food production is far from the anticipated demand (Kajumulo,1993).

Wagao (1991) pointed out that agricultural production in Tanzania relies on rain-fed and hand-tool technology. Most peasants have limited use of improved seed, fertilizer or irrigation. Of the total seed planted in the country, only 10% represents improved cereal seeds. Only 14% of total rural households used chemical fertilizer in 1986/87 and 12% used insecticides. Less than 10 percent of the households had access to advice from extension staff. Ox-ploughs and tractors are rarely used.

The hand tool technology used by most of the farmers in Tanzania and the amount of time required for production alone can be very large under present circumstances. UNICEF,1985; Jonsson,1986b). Table 9 shows estimates of

the number of hours required for traditional hand cultivation of one hectare of maize.

Most of the time goes to ploughing and harvesting and shelling which take more than 50% of the total time spent in getting a crop out of an hectare of ploughed land. Time allocated to weeding in this table relative to ploughing seems to be under-estimated especially when it involves two or more weedings.

Table 9. Time used for cultivation of one hectare of maize

Operation	Number of hours
Ploughing	200
Harrowing	40
Planting	40
Weeding (2-3 times)	96
Harvesting and shelling	100
Transport (internal)	25
Total	501

Source: TFNC (1983)

Malima (1993) grouped the reasons for food unavailability, hence food insecurity, into five groups:

(a) Food production: Environmental factors, that is climate, temperature and rainfall affect food production. These are mostly affected by environment degradation. For example, deforestation and burning of natural vegetation and soil erosion are typical such examples.

- Inability to adopt new technology and affordability to innovate modern farming methods. For example, intercropping, use of tractors and inputs affect food production.
- Most rural women who are the main producers lack enough capital to purchase farming inputs that would increase the food yield.
- Post-harvest losses during harvesting, storing, transporting and processing of food contribute to food insecurity.
- Reliance on one crop, which is practised by many African women causes food insecurity in case of drought, infestations and failure of the crop.

(b) Sociological factors: Traditions and customs in the division of labour overload women who are food producers and thus have less time is devoted to food

production.

- Lack of agricultural education to women make them ignorant in matters concerned with food production.
- Culture and social aspects, which influence the distribution of food and consumption patterns in the household with gender discrimination.

(c) Land law policies: Sex discrimination in land entitlements favour males over females who are the main tillers of the land.

- Poor infrastructure, existing in many African countries, and the existing system of distribution hinder food availability and demoralises farmers.

(d) International level: This mostly involves trade balances. The government has to ensure that cash crops are grown to cater for the foreign exchange.

(e) Population growth: The rapid increase in population and low income in most African countries has outstripped the food production and thus caused food insecurity.

FAO/WHO (1992a) concluded that in rural areas, household food security is most often determined by food

availability and prices which are commonly related to agricultural production and by incomes which are determined by both on-farm and off-farm employment opportunities. The number of food insecure people is at present higher in rural areas.

The majority of poor people in developing countries live in rural areas and depend on agriculture for both food and income. Unfortunately, many developing countries have neglected the rural sector, giving priority instead to urban areas and the drive for industrialization. Whatever little attention agriculture has received has focused, more often than not, on cash crops for export rather than staple food crops for local consumption. In recent years, the developed world has also paid less attention to helping developing countries to increase agricultural production. Between 1980 and 1990, the share of development assistance directed to agriculture dropped from 20 to 14%. Yet, in many cases, the most effective way to strengthen food security and improve the lives of the poor is by helping the agricultural sector. Increased agricultural production can raise the incomes of farmers

and agricultural workers, providing them with the money to purchase agricultural inputs, services and consumer goods. This, in turn, increases employment opportunities in rural areas and helps slow down migration to urban centres. In this case poverty will be decreased, food will be available and hence improved food security (FAO,1996b).

In Tanzania, about 40% of the population is food insecure (URT and FAO,1992). The most vulnerable people are likely to be found among the following "poverty prone" groups:

- Rural households with holdings too small to provide sufficient subsistence food (about 700 000 households throughout the country)
- Rural households estimated to earn income below the absolute poverty line (about 2 million people)
- Rural minimum wage earners working on the state farms and estates (about 150 000 persons)
- Urban low-income workers, mostly engaged in informal sector activities (about 600 000 persons)
- Food growers living in "drought or flood prone pockets" that face "regular transitory" food

insecurity

- Elders who are dependent for their food and economic affairs for their living
- Pregnant women (estimated at around 1.5 million)
- Toddlers from six months to three years old who are already past breast feeding age but are not old enough to secure their access to enough food

Based on food insecurity aspect, the food security programme (FSP) is designed to help low-income food deficit countries (LIFDCs), like Tanzania, to increase and stabilize food production and productivity as soon as possible, in a sustainable manner. Its primary objectives are the widespread adoption of available improved production technologies and enhanced water control and the formulation and implementation of conducive policies. These LIFDCs do not produce enough food to meet all their needs and may not have sufficient foreign exchange to make up for the shortfall by purchasing food on the international market, especially when faced with loss of crops and livestock caused by disasters of natural or human origin or exceptionally high food prices on the

international market (Diouf,1996).

2.2.3 Tanzania's Efforts to Achieve Household Food Security

The Government of Tanzania is determined to provide food security for all households under all circumstances including the shortage periods (Seenappa,1987). The Ministry of Agriculture in collaboration with the Party and Government have historically launched several vital campaigns to augment food production at the household level (Mrisho,1987). These include the Arusha Declaration of 1967, which emphasized producing more food and generating more household income, food self-sufficiency and improved nutrition of family members. A declaration also was made at the party, Tanganyika African National Union (TANU), Conference in 1969 with the aim of providing sufficient and better food for everybody.

The Iringa Declaration (Politics is Agriculture) noted lack of clearly stated policy in food production among peasants. Supply and modernization of all agricultural

systems was pronounced as a priority in this declaration. The campaign on "Farming as a Matter of Life and Death" of 1974 emphasized semi-urban and town dwellers to make use of every single piece of land available around their houses to grow crops in order to support food production for the family. In 1975, the "Food is Life" campaign was launched to make people give highest priority to food production and consumption and alleviate food deficiencies in the society. The "Human Resource Deployment Act" of 1983, which demanded every able bodied person to be engaged in productive activity was one of such efforts by the government to achieve household food security. Under this act, youths were argued to go back to the rural areas to engage themselves in food production (Mrisho,1987; Kajumulo,1993).

The Government of Tanzania's concept of food security is contained in the Agricultural Policy of 1993. The policy with regard to food security is achieving national self sufficiency and raising the nutritional standards of all Tanzanians; earning foreign exchange for the nation, by using methods of scientific husbandry and technology, size

of operation and national resources (Malima,1993).

The government has also established a National Food Strategy (NFS), which has three important objectives:

(a) To achieve national food self-sufficiency by improving production of under-utilized and drought resistant crops, such as sorghum, millet, cassava and sweet potatoes.

(b) To raise the nutritional standards of the population to levels where all individuals can obtain at least the minimum recommended daily calories and dietary protein.

(c) To improve national food security basically at the village and household levels (Mrisho,1987; Kajumulo,1993).

As emphasized by FAO (1982a; 1985; UNICEF,1985) on the role and importance of animals in the household food security, an emphasis is put on keeping livestock, such as cattle, goats, sheep, chicken, pigs, rabbits, guinea pigs, ducks and others. In addition, the government is

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encouraging agro-forestry in villages, traditional processing and preservation, establishing home gardens, household food and nutrition planning and improving weaning foods.

Lyimo (1993) pointed out that the Comprehensive Food Security Programme (CFSP) summarizes the major food security problems in Tanzania as being contributed by:-

(a) Insufficient marketing system

(b) Poor transport network

(c) Matching food demand with supply

(d) Insufficient food crisis management

(e) Lack of credit

(f) Resource degradation and post-harvest losses

A poor economy, bad agricultural policies, lack of research training, lack of incentives to farmers and extension services have caused a decline in crop production in some years. Unfavourable weather has materially contributed to failure to get high yields. However, this can be supplemented by drought resistant food crops, such as cassava (Seenappa,1987). Kavishe

(1993) revealed that the major problem which seems to account for the discrepancy between food crop cultivation and food supply is extremely low yields per area cultivated. Therefore measures to increase yield seem an appropriate attempt for increasing food production and availability that can ensure food security.

The problem of hunger and food insecurity have global dimensions and are likely to persist and even increase dramatically in some regions, unless urgent, determined and concerted action is taken. This is with respect to the anticipated increase in the world's population and the stress on natural resources (FAO,1996e). Adequate food production does not amount to food security. It is simply a sub-component of the many determinants of food availability. But, adequate food availability in itself is not food security. Food accessibility is the most crucial aspect of security because the most deprived families suffer from food insecurity due to lack of accessibility (Wagao,1991).

2.3 Food Accessibility Within Household Members

At the household level, access to food may be understood as a process whereby food reaches people (Holmboe-Ottesen, 1991). Lorri and Kavishe (1990) defined the access to food as the process and extent to which the available food can reach all the members of the household during the whole year. In the final analysis, it is this accessibility to food that determines who eats what, when and how much. Household food accessibility is also determined by factors such as storage, distribution and marketing, cultural behaviour, transport network, real income and pricing policies (Wagao,1991; Michael,1995). Other factors are demographic characterristics especially household size and education of the spouse as they influence the consumption aspects of the household (Kurwijila,1993 personal contact).

2.3.1 Accessibilty of Food and Household Income

The purchasing power which is dependent on income largely determines the degree of access to food at the household

level (Mosha,1990b). Poverty is a major cause of food insecurity and sustainable progress in poverty eradication is critical in improving access to food (FAO,1996e). The vast majority of those who are undernourished, either cannot produce or afford to buy enough food (FAO,1996g; Bender and Smith,1997).

Seventy percent of all poor in developing countries are women. They have inadequate access to means of production such as land, water, inputs, improved seeds and appropriate technologies and farm credit (FAO,1996d). Yambi *et al.* (1990) reported that a household may not have access to food either as producers because they have not succeeded in securing enough food for long enough, or as consumers because they cannot afford to pay for the food available on the market. Household income is an indicator of the potential access to food security. It is well established that households with greater risk of food insecurity are the resource poor ones (Wagao,1991; Missano,1993). Poverty is a major determinant of chronic food insecurity. The poor do not have adequate means to secure their access to food even when food is available in

the local or regional markets (FAO/WHO,1992b).

In other words, access to food is dependent on income, whether in cash or kind. This includes food produced through agricultural production or hunting and gathering as well as through cash income. Access to food may also be acquired through transfers in the form of food, subsidies or cash (Holmboe-Ottesen,1991). Households will have stable access to food if they have viable means of procuring food (either produced or purchased) that do not lead to environmental degradation (Maxwell and Frankenberger,1992).

Kavishe (1993) argued that among the low income groups, food access (apart from the problem of distribution) is dependent mainly on the ability to buy or produce their own food. In most households food security is achieved through great expense, by using a large proportion of their resources. A household that uses almost all of its human or economic resources to achieve its food security is highly vulnerable or at risk of becoming food insecure compared to a household that uses a smaller proportion of

its resources to achieve the same goal. In times of scarcity people tend to make more efficient decisions on food purchase. Poor households who depend on food crops for their income are at greater risk of food insecurity than those who have alternative sources of income.

In an increasing number of households in the rural areas, cash income is necessary to ensure access to food (Kapunda,1989; Mosha *et al.*,1992). In rural areas, the main sources of income are sale of cash crops and in part food crops, including livestock and fish. However, incomes earned through crop sales, off-farm employment and other related activities do not suffice to obtain adequate family foods, especially when households own production is affected by unfavourable weather conditions (Ministry of Agriculture,1996).

Studies by Kurwijila (1993 personal contact) in food security and intra-household relations, in two villages of Morogoro and Arusha regions, indicated that altenative ways of obtaining household income were used in both villages, because household income was an important facet

for household food security in order to bridge the gaps between own production and household food requirements, especially during periods of food shortage and periods of uncertainty. A related study done in Kilimanjaro region, (Makundi,1996), concluded that food availability was affected by availability of extra income and the role of that income in securing food, the household and child care and food shortages in the households.

The Government of Tanzania, too, has been making efforts to improve food accessibility through increase of salaries to civil servants and producer prices to farmers. However, each wage increase, effective wage or producer price increases have not been felt (Kajimbwa,1992). Increase in prices may not influence agricultural production due to unavailability and high costs of inputs and unreliable markets. The income received by farmers from sales of cash crops is normally in a lump sum. The chances of misusing such money by the heads of the household, (who are mostly men) are high. Although the income from food and cash crops sales per household might appear high, it is not distributed equally among the family members all

year round.

2.3.2 Accessibility of Food and Food Production

Seenappa (1987) revealed that increased food production does not by itself achieve anything unless associated with equitable distribution to last until the subsequent main harvest at household level. A gross overall adequate food supply situation means that all households will have adequate access to adequate amounts of food. In any event, from the accessibility point of view, identification of food surpluses and deficits may not provide the true position. Many of those regions, which might be considered to have adverse ecological conditions, for example, Singida, Tabora, Dodoma, Arusha have lower than the average infant and child mortality rates (WFP,1993).

Wagao (1991) concluded that about 87% of the households in Tanzania produce food crops. However, nearly 60% of these confront food shortages for three to four months before harvest. They have to rely on household income to have accessibility to food during this period. The resource

poor households estimated at 20% - 30% in every village face severe food insecurity for over six months in a year. This is largely due to problems of both in food production and household income.

2.3.3 Accessibility of Food and Food Erosion, Preferences, Beliefs and Taboos

The erosion of food security determines the degree of access to food at the household level. Many families now rely on too few food types (such as maize and rice). Some traditional foods (such as millets) have been abandoned due to changes in eating habits (FAO,1996e). In rural areas, however, where and when food is available and affordable, utilization patterns are determined by consumer preferences, some of which may be embeded in cultural norms and taboos (Missano,1993).

Generally, in rural households in Tanzania there is a distinct hierarchy of preference for different kinds of food depending on their ability to have access to them (Wangara,1988). There is also a tendency of all members of

a household to eat from the same plate making it difficult for the smaller ones to compete adequately for food with the older children (Yambi *et al.*,1990).

Zeitlin and Brown (1992) revealed that food beliefs in Southern Nigeria and other countries of Coastal West Africa restrict access of animal protein foods to infants and young children in the belief that meat, fish and eggs cause moral degradation of the child. In some parts of Tanzania, beliefs and taboos include restricting consumption of certain foods. Such foods include eggs and fish by young children or women (FAO,1982b).

2.3.4 Accessibility of Food and Family Size and Composition

Findings from the study carried out in 13 survey areas in Africa, Asia and Latin America reported that food insecure households tended to be larger and to have a higher number of dependents and tended to have a younger age composition (FAO/WHO,1992b).

2.3.5 Accessibility of Food and Food Maldistribution

Several other factors, such as intrahousehold distribution of food may determine accessibility (Lowenson,1992). A sex bias favouring males has been documented by some in South east Asia and the Middle East. This is supported by FAO (1996h) that because of their low status in some societies, women may receive less food than men from early childhood through to their adult life. Kurwijila (1993 personal contact) concluded that there was however no gender bias in food consumption in two studied villages in Morogoro and Arusha regions in Tanzania.

Zeitlin and Brown (1992) concluded that in general, it is rare to find food discrimination against adult women in intra-family food allocation. It is slightly more common to find it with girls aged below four years though even this appears to be typical only in the Indian subcontinent. A sex bias in food distribution is often related to other factors such as age, and sex of child relative to siblings, maternal education and family income

or to demands and perceived value for female labour. Katona-Apte (1975) described how women from Southern India fed their husbands first, then the children (boys before the girls) and only did they think of themselves. The best and most nourishing portions of the food are served to males. Maletnlema *et al.* (1974) summarized the results from food consumption surveys in five villages in different regions of Tanzania and concluded that "food was made by women for men and often the better share in quality and quantity was given to men".

Kavishe (1993) concluded that a variety of ethnic social systems in Tanzania tend to favour men to have the choicest access to food. Moreover, men control most of the household resources, especially income, which they may use for their own purposes. The purchasing power of the household varies greatly, with very low ability to purchase food prior to crop harvest. Therefore, food access could be a problem in many rural households.

2.3.6 Accessibility of Food and Frequency of Meals and Diet Components

Frequency of meals per day is an important indicator of food accessibility and nutritional status (URT,1992; Wandel and Holmboe-Ottesen,1992). For those who have less access to food, they can seldom afford more than two meals per day and under severe food shortages even one meal may not be assured (URT and FAO,1992). According to the Food and Nutrition Policy of Tanzania, eating frequencies for Tanzania are generally low, on average twice or three times a day (URT,1992). Diets of most people are characterised by a single or few components: for example, maize diet supplemented with a relish of either vegetables, beans or meat (WFP,1993). There are slight differences in content of meals between households (Wangara,1988).

Access to an adequate supply of food is the most basic requirement of human needs and rights (FAO,1996b). To achieve national food security, a country must not only produce, store or import the food it needs but also take

measures to ensure equitable access to it. This means that nutritionally adequate and safe food supplies must be available to meet each person's daily energy and nutrient needs. The supplies must be stable and accessible to everyone and the kinds of food supplied must be culturally acceptable (FAO,1996h).

2.4 Food Stability

Stability refers to minimizing the probability that in difficult years or seasons, food consumption might fall below consumption requirements (FAO,1996h). Factors related to food supply stability as pointed by FAO (1996a) are as follows:- Agriculture produce marketing:- Agriculture produce marketing is an important factor which influences stable food supply at consumer points. Though there have been numerous changes in agricultural produce marketing since independence, most of them were centered on market arrangements and reallocation of marketing facilities and pricing. There has been limited attempts to improve market efficiency through investment in infrastructure and market information systems. The cost of

transport and the poorly developed rural roads significantly limit the level of food transfers from food surplus regions to deficit areas. The existing infrastructure including trunk and regional roads, railways and water transport is inadequate in terms of quality and accessibility to remote areas (FAO,1996a).

FAO (1996a) pointed out that post harvest losses are among other important factors affecting food stability supply. These losses result mainly from inadequate/poor storage facilities both at the household level and whole sale traders' sites in both urban and rural markets. The other factor which has a negative effect on the household food security in Tanzania is the refugees situation. The present refugee (about 1 000 000) crisis is an example of the spill over effect emanating from problems of neighbouring Burundi and Rwanda.

2.5 The Role Played by Women Relative to Men in Household Food Security

2.5.1 Women's Role Relative to Men in Food Production

Women constitute over half of the economically active population of rural Africa. They share responsibility for sustaining their families by participating in all aspects of rural labour. Women have traditionally participated in farming and other rural development activities. However, their contributions have remained largely unaccounted for and underrated (Uwakah *et al.*,1991). Almost all the attention given to women has focused upon their roles as mothers (Kennedy and Haddad,1992).

Women are especially vulnerable to the human consequences of these practices since they are frequently responsible, not only for collecting firewood and domestic water but also play a large and indispensable role in food and agricultural production and marketing (Pellet,1991). Women are involved in preplanting operations, such as clearing land, tilling by hand, and ridging. They are also involved

in planting, weeding, harvesting, and processing crops (Igben,1980; Holmboe-Ottesen *et al.*,1990; Uwakah *et al.*,1991; TGNP,1993). In all agricultural tasks, women perform more than half of the work except in land preparation and application of pesticides (Makundi,1996). Women are the world's farmers, they grow crops, gather the firewood, tend the animals and bring in water (Dankelman and Davidson,1988).

Women play a significant part in food security (Gittinger *et al.*,1990; Missano,1993). They play a critical role in the provision of food security as food producers, processors and income earners (FAO,1990a; Gittinger *et al.*, 1990; FAO,1996a; CARE International in Tanzania,1995). Basically, women play a central role in the provision of household food security. Where food is gathered women are the main gatherers (Missano,1993).

The fundamental contribution to food security by women, particularly in rural areas of developing countries, should be acknowledged (FAO,1996d). Women in developing countries play significant roles in maintaining the three pillars of food security: food production, economic access

to available food and nutritional security. But, they play these roles in the face of enormous social, cultural and economic constraints (FAO,1990c; Quisumbing *et al.*,1995).

In Tanzania and most of Sub-Saharan Africa in most low income households, men and women have double and triple roles, respectively. Men are involved in productive and managerial roles. Women are involved in productive, reproductive and managerial roles. Of this, only productive roles are recognised as work. Reproductive and community managing work are both seen as natural and so are not valued (Agarwal and Anand,1982; Mosha,1992; Kavishe,1993; Mngodo *et al.*,1996). Women play a major role in producing food, generating household income, child bearing and rearing and in overall production (Zeitlin and Brown,1992; Lugembe,1993).

URT and UNICEF (1990) pointed out that women and men are equal before the law, but in practice women still have to take responsibility for most of the work in agriculture and for all household and child rearing activities. In rural areas, men tend to be responsible for cash crop

production and such tasks are clearing land for cultivation while women are primarily responsible for food crops, fetching fuelwood and water and taking care of the family. Kagera region and other places in the country where men fetch firewood are exceptions.

Women's responsibilities vary according to the customs of the different regions and also their social and economic status within the household setting (FAO,1989; Ministry of Agriculture,1996). It is very well known that women play the decisive role in the production of food crops and also contribute a large amount of labour to the production of cash crops (FAO,1990c). Women however, through the chain of food production, have carried on their role of food production in order to fulfil their traditional obligation of ensuring means of subsistence to their families. Women's role in food production is a contribution to the peace of their families and to that of the community at large for they create positive conditions for peace (Holmboe-Ottesen *et al.*,1990).

Ousmane (1996) revealed that in analyzing the essential role of women in food security in the most systematic way, agricultural activities have been subdivided into the following components: preparation of soil, sowing, cultivation, harvesting, processing and marketing. Apart from the actual tilling of the soil which requires physical strength. It had been observed that women's work predominates. This leads to a state that improvement of the status of women in rural development is a key factor and is the easiest and most effective way to achieve food self sufficiency in the family and nationwide. The role of women in agriculture is sometimes mentioned as the main labour force in staple food production.

Nikoi (1990) pointed out that, women engage in poultry farming, pig rearing and horticultural activities. In the fisheries sector, women generally process, preserve (smoking), market and distribute food/fish. Also, collection of water and fuelwood, cooking and taking care of children, and collection of fodder for animals are all activities traditionally performed by women.

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Second, women's contribution to food security is being able to provide purchasing power with which to purchase food for the family. Increasingly, many women in Africa are becoming heads of households. The ability of women to earn an income to provide food for the family touches on the whole question of the economic role of women and, consequently, on measures that can help them maximize this role.

On the other hand, another aspect of the role of women in the improvement of food security is their contribution to the family income through paid work, generally in the informal sector, thus increasing their purchasing power for indispensable food items (Ousmane,1996). Women generate about 35% or more of all household income mainly through small scale agro-industry, trading and craft work (Ministry of Agriculture,1996). Equally, experience has shown in Africa and in Asia, women are better equipped to administer financial and natural resources and they are the ones who still know about wild species of food crops (Ousmane,1996). Despite this generality, there is sexual

division of labour (Gittinger *et al.*,1991; Malima,1993; Nkoma *et al.*,1993; Swantz *et al.*,1995) refer (Fig.3).

Dey (1983) conducted a study relating the gender division of labour and production of irrigated rice in Gambia, Senegal, Mauritania, and Burkina Faso. The findings showed that women specialized in transplanting, weeding, harvesting, threshing and winnowing, while men performed other operations, such as land preparation and irrigation maintenance. The author concluded that in most African countries there are distinct divisions of labour among men and women based on the nature of farming operations during crop production.

Studies in Sierra Leone and Gambia, concluded that both men and women play equal roles in agriculture. However, fruits and vegetables are collected from the wild by women and children. Men are concerned with cultivation and preparation of mounds for planting while women have major roles in planting, weeding, harvesting, processing and storage (Burfisher and Horestein,1985; Longhurst,1985).

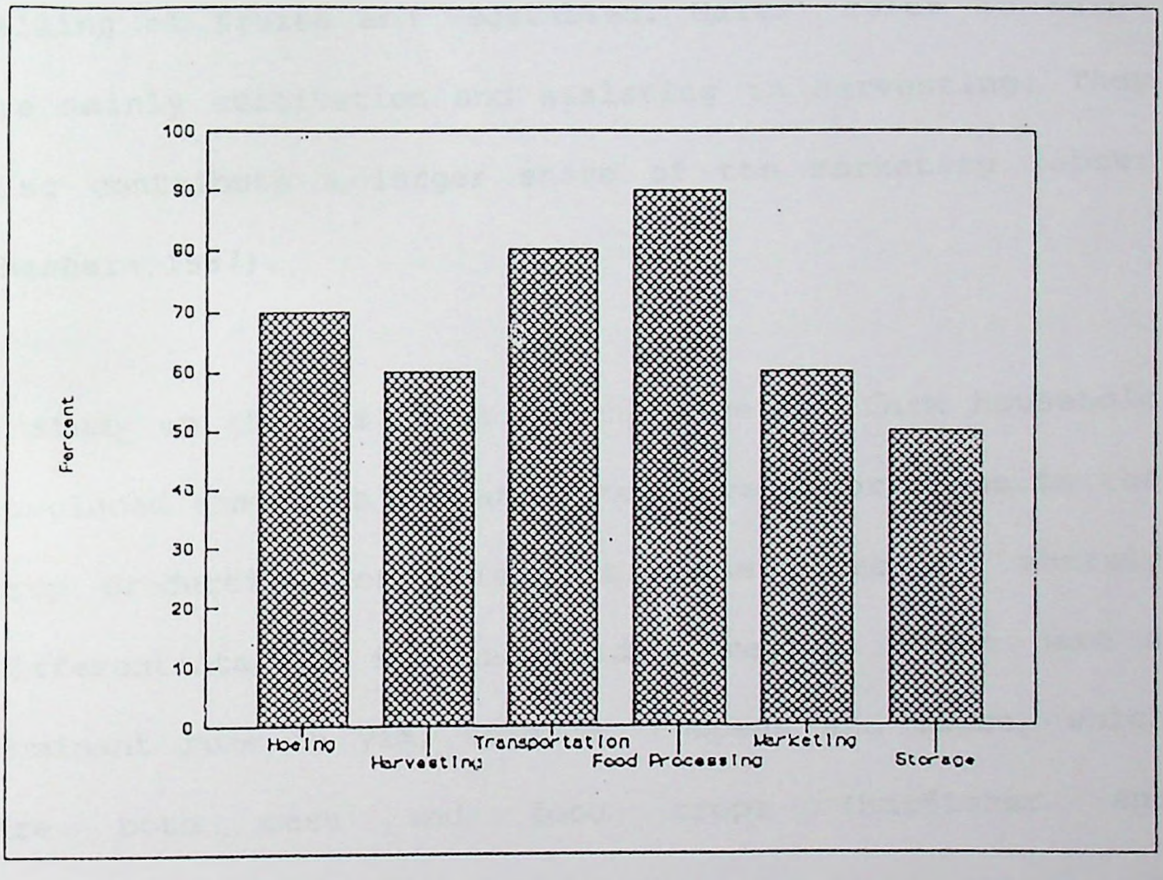


Fig. 3: Sexual division of labour (women) in Tanzania in agriculture

Source: Gittinger *et al.*,1991; Malima,1993; Nkoma *et al.*,1993; Swantz et al.,1995

In Egypt, women played a significant role in agriculture, their main activities being planting, weeding, hand removal of pests, harvesting, processing and retail selling of fruits and vegetables. Males' roles in Egypt are mainly cultivation and assisting in harvesting. They also contribute a larger share of the marketing labour (Beshara,1987).

A study on the sex roles on the Nigerian farm household concluded that both men and women have major roles in the crop production activities but these roles are sharply differentiated by sex and seldom overlap. Women have a dominant role in yam, sorghum, cowpeas and maize, which are both cash and food crops (Burfisher and Horestein,1985).

A study on household labour allocation and the sexual division of labour in a Hausa Moslem village in Northern Nigeria by Longhurst (1985) concluded that Hausa women do not participate widely in farm tasks, except in harvesting of cotton and groundnuts. However, they participate in

farm work inside the compound due to the moslem culture. Men are involved in food crop (sorghum and millet) and cash crop (groundnuts and cotton) cultivation. In practice, this takes only 60% of the time, the rest being spent on off-farm activities.

In Malawi, tobacco and cotton (cash crops) are often considered to be crops that are totally managed by men. Women contribute significantlly to various operations (Spring *et al.*,1983). Rice, groundnuts and smallholder coffee and tea production are more variable in terms of sexual division of labour. In some places, men are responsible for rice production, in others, whoever is the head of the household takes care of the rice crop. In some areas, groundnuts are grown by both men and women, who perform different tasks but contribute equal amounts of work. In other areas, groundnut is considered as a crop that women grow and do most of the work. In smallholder coffee and tea production, tasks are shared between sexes except that only men are responsible for pruning (Spring *et al.*,1983).

In Mbozi district in Mbeya region, Tanzania, production of food crops is mostly the responsibility of females while that of cash crops is for males (Mwanyika,1993). The other example from Bukoba in Kagera region, is that men control coffee and banana fields while women take care of beans, maize, bambara-nuts, yams and potatoes. In this case, control does not necessarily imply doing the actual work, because in many households women frequently worked on the coffee and banana plantations. Older girls, who were not in school helped their mothers (Swantz,1985).

Similarly, in Kilimanjaro, the Chagga culture is that coffee management is men's business, and men are forbidden by taboos to touch the food crops except when they were ready for eating (Swantz,1985). In the same region, Mwaipopo (1994) pointed out that men concentrate on the planting, pruning and actual marketing, while women are obliged to do the weeding, picking, washing, dehusking and pulping of berries. The women also have the main responsibility for farm work, particularly working in the banana plantation and other food crops. The difference

here is thus on the nature of the tasks and the frequency that each is done, in which case women's tasks are more tedious and onerous.

Studies by Due and Anandajayasekeram (1982) in contrasting farming systems in Morogoro region, Tanzania, found that there was a clear division of labour in agriculture, in Kilosa district. In the same district, men were found to put more labour in all major crops except beans and rice. Percentage-wise, females contributed 48% of labour for maize production, 67% for rice and 59% for beans. The allocation of labour for sunflower, sorghum and cotton were approximately 40%.

A study conducted in Pawaga village in Iringa concluded that households in Pawaga are dominantly still under peasant form of agricultural production. There is strong patriachial relationship between men and women through which different positions and duties are allocated to men and women. However, it was observed that women play a greater role in household management and providing the basic needs such as food (Musoke *et al.*,1988).

Among the tea growing areas of Rungwe district, Tanzania, it was found that while men do land clearing, women are responsible for sowing, weeding and harvesting of the basic staples, for example, maize. Women are responsible for all processes in beans and vegetable production. The management of tea plantations is a men's task, often with the help of hired labour, except picking tea. Picking tea, a tedious and tiresome task done for five days each week, is a women's domain. Most men prefer picking tea at the nearby privately owned tea plantations in which they work as hired labour on semi-permanent basis (Mwaipopo,1994). The author, pointed out that in female headed households, particularly in the absence of a male head due to divorce, death, single parent unit or migration, women perform or manage all the tasks. This is so even in some cases of polygamy when men cannot offer sufficient labour on women's spheres of production.

In Inyala village, Mbeya rural, the crops which women are solely responsible include beans, finger millet and cassava. Men participate in the preparation of farms and

tilling the soil for maize, millet and irish potatoes and sometimes in weeding maize. Weeding maize is done by women. In between major crop production, women tend gardens of green vegetables, peas and cabbage. Both men and women also produce tomatoes on a large scale basis (Tripp,1989).

Among the various ethnic groups, Zaramo women have total responsibility for farm work. Gogo women grow grain. Meru and Iraq women do most of farm work (Fortman,1980; Bay, 1982). Raffert (1988) stated that women spend six to eight hours a day planting, weeding and harvesting and that during peak season their hours in the field may even be longer.

A study conducted in two villages in Morogoro and Arusha regions, concluded that there was unequal division of labour in both villages, with women carrying the heaviest burden in farm production and household production (Kurwijila,1993 personal contact). In Kilimanjaro region, Makundi (1996) revealed out that labour was gender differentiated from the process of food and cash crop

production to the final procurement of food at household level.

Studies conducted in some parts of the country have shown that changes in social patterns and the introduction of technology seem to have affected women's responsibilities and their workload has increased dramatically. Women are involved in cash crop production and doing tasks that were previously done by men (Ministry of Agriculture,1996).

2.5.2 Women's Role Relative to Men in Domestic Sphere

Within the domestic sphere, women work for the family not only to ensure its reproduction, but also its maintenance and survival (Mies,1985; Keregero,1991). Women are in charge of all domestic tasks: food preparation, management of food stocks and supply of fuelwood and water. They are also the main contributors to farm work and in most cases they decide on what and how much to sell and what to buy for household daily needs (FAO,1992/93).

In Tanzania, in almost all rural households, women spend a great amount of time on household chores without any remuneration in return. The experience from Tanzania is such that both water and firewood collection as well as food preparation are effectively obligatory. To the extent that activities of this nature exhaust or monopolize women's available time budget or physical efforts, then their ability to undertake additional optional activities is severely limited (Wagao,1991).

The Haya women of Bukoba, Tanzania, do all the house work. Haya men do not do any house work in pretence that they are busy with matters of greater significance (Swantz,1985). On the other hand the Chagga women of Kilimanjaro in Tanzania are involved in all domestic work with the assistance of children (of both sexes up to the age of 12 years). Above 12 years of age only female childen assist in the domestic work (Polomack,1989). In the same region, Makundi (1996) concluded that child and family care is the domain of women. Women are solely responsible for the household chores except in some cases where they are helped by girls and boys. Further studies

in eight villages in Morogoro region in Tanzania indicated that women do practically all of the domestic work while assisted by daughters (Oomen-Myin,1980).

Mtenga (1993) on the gender roles in domestic and farming systems in Tchenzema ward, Mgeta in Morogoro region, established that women and men shared the same tasks on more or less equal basis, except in processing and storage, which were predominantly mens' task. It was also concluded by Lassale and Marquet (1991) that in Mgeta, Morogoro region, according to tales and beliefs narrated by elders regarding past Luguru culture, it seems that daily activities, roles and tasks were rather balanced between gender. There is no doubt that the matriarch culture conferred big roles to women in the society. Igben (1980) stated that the role and participation of women in agricultural development differs among localities and regions depending on religious, economic and other socio-cultural factors.

The study conducted by Musoke *et al.* (1988) in Pawaga (Iringa region) in Tanzania, indicated that there is

strong patriachial relationship between men and women through which different positions and duties are allocated to men and women. However, it was observed that women play a greater role in household management and providing basic needs such as food than men.

In parts of the developing world, such as East Africa, women work up to 16 hours a day doing household chores, preparing food and growing 60 - 80% of the family's food, in addition to caring for the children, the elderly, the ill and the disabled in their families (Himes *et al.*, 1991). Statistics from the African and the Asian regions indicate that on average, women work at least 12 hours more than men per day (United Nations,1991). This implies that on average a man works only 4 hours per day.

Lijongwa (1981) reported that women, especially of Sub-Saharan Africa, did all the house work as well as a big proportion of agricultural activities. This author's findings are also supported by a study of 112 rural families and 30 families living in market areas in three provinces of Zambia. Of the respondents, females

contributed 82% of domestic labour while males contributed only 18% (Due *et al.*,1982).

A similar study in Hausa land in Nigeria by Longhust (1985) revealed that women's chief productive work is food processing for family consumption as well as for sale. Other domestic duties included: sweeping the compound, washing and food processing (pounding and winnowing). In the case of higher class households, women hired other women to do the manual work, while they carry out income generating activities with higher returns like petty trading. This is similar to observations made by Burfisher and Horenstein (1985) in a Nigerian farming household, where women were solely responsible for all the domestic work.

Women in Egypt do more than just domestic work. Together with men, they build their houses out of sun baked mud bricks, build baking ovens and also they build silos for grain storage (Beshara,1987). Poley (1991) reported that East African women do all the food processing and cooking, fetching water, securing firewood as well as caring for

the children. This is further documented by Bulow and Sorensen (1988) writing on gender dynamics in contract tea farming in Kenya, where women play essential roles in producing both cash and food crops while also taking most of the responsibility for family welfare. Doyal (1995) adds that women mostly do domestic work: cooking, cleaning and caring for children and other dependants. Food production and other items to meet their families' needs as well as carrying out a variety of economic activities to earn extra income are responsibilities borne by women.

In Africa, where the number of trees felled outpaces new trees planted by a ratio of 29 to 1, women must spend more time and travel farther, to gather firewood. They often have to walk up to 10 kilometres and spend 5 - 8 hours every 4 - 7 days to collect wood or fuel (Himes *et al.*,1991). Nkonoki (1994) concluded that the time spent on fuel wood collection and ferrying is estimated to average 16 to 24 hours per week, which is about two to three working days (a working-day is eight hours per 24 hours).

Ishengoma (1994) pointed out that firewood is the main source of energy and heating in the rural areas of Tanzania. Most of the villagers get their firewood outside the village boundaries, hence they have to walk considerable distances. It is estimated that in some cases villagers walk a total distance of 5 to 10 km per trip to collect firewood. Kessy (1988) estimated that an equivalent of 173 man-days of walking per year are spent by each household in Legho Mulo village in Kilimanjaro region Tanzania, on collection of firewood. The time spent on collection of firewood could be spent on other productive activities if fuelwood availability was not a problem.

According to Monsen and Townsend (1987), Dankelman and Davidson (1988), and Sen and Grown (1988) it is usually women who have to manage the consequences of poverty for the whole family. This often means performing physically heavy work, even during pregnancy and lactation, activities that are strenuous and thus need to be discouraged.

In the richer parts of the world, most women can take for granted the existence of a constant supply of clean water. In developing countries (DCs), many women walk miles every day for a few pots of water, and where wells are deep, raising the water may be extremely difficult to obtain. Research has shown that for some women, water collection depletes more than a quarter of the energy gained from their daily food intake (Rodda,1991).

Besides, the increasing burden with regard to the time and effort spent in fetching water, gathering fuel wood and fodder, cooking and taking care of children and others also lead to low productivity and exacerbate the fatigue factor. The work women do is invisible and does not enter national accounts (Nikoi,1990). Women tend to work much longer hours in home and economic production than men in their families (FAO/WHO,1992b; Wichterich,1995). They normally work 14-16 hour working day (Kahurananga,1980; Becker,1995; Wichterich,1995).

Traditional economic and social concepts and indicators for measuring work grossly underestimate, and undervalue women's work. These indicators do not, for instance, bring out women's full contribution in the informal sector activities, in agricultural production, in the household, and as unpaid family workers. These activities are usually small scale, sometimes casual and mobile, they are not assigned any economic value and therefore do not show up in national accounts (Nikoi,1990).

2.5.3 Women's Role Relative to Men in Livestock Sphere

Within the livestock sphere, studies conducted in Bukoba in Tanzania, concluded that men are responsible for livestock in general, including stall feeding, milking, taking them out and feeding the calves. Women's roles include cleaning the shed and spreading the manure on coffee and plantain farms. The trend is somehow different in Kilimanjaro. The Chagga women and girls are involved in milking, shed cleaning, fodder harvesting and carrying on the head to the animals, which are zero grazed. They also supply water as well as bedding material to the animals.

Men's role include cutting and chopping banana stems as well as fodder trees and transporting of fodder by car (Polomack,1989). In Mara region, women engage in all activities relating to animal husbandry (Tobisson,1980).

Women have important labour roles in animal production, which vary according to the type of animal, cultural factors, economic constraints and production system (Dey,1988; URT,1989). For poultry, goats, pigs and rabbits, women have substantial responsibilities (FAO,1984b). Women's predominant role has been one which involve waking up before sun-rise to milk cows, feed cattle, process milk products and collect animal wastes for fuel and manure (Tobisson,1980; FAO,1984b; Dey,1988).

Studies in household labour allocation in an intensive crop/livestock farming systems in Western Kenya by Conelly *et al.* (1987) concluded that the burden of managing livestock fell heavily on women and to a lesser extent on female children. Women contributed 40% of labour for the day to day care of livestock and 70% of labour for producing forage. Men and children contributed the

remaining labour. Women's activities included: milking, watering, cleaning the animal shed, making compost piles with the dung for later use, cutting and carrying forage and cultivation of forage crops. The role of men and/or male children in the same study was to tether the animals in the compound, and during the dry season to herd them along the paths, at road sides and/or in scattered patches of scrub bushes.

In Egypt, certain activities of livestock production, like harvesting of fodder and taking the animals to the field are shared by men and women. Women also build pens for small animals (poultry) from mud and thatch and it is most likely that men build pens for large animals (cattle). Milking and processing of milk to cheese and butter is females' work. They are also involved in the marketing of these products (Beshara,1987).

Studies in Chile, Pakistan and Swaziland show that 80% - 100% of village women keep poultry. In Pakistan, 60% - 80% of women feed and milk cattle. In Chile, 80% of women in families with medium sized holdings, 54% of the small

remaining labour. Women's activities included: milking, watering, cleaning the animal shed, making compost piles with the dung for later use, cutting and carrying forage and cultivation of forage crops. The role of men and/or male children in the same study was to tether the animals in the compound, and during the dry season to herd them along the paths, at road sides and/or in scattered patches of scrub bushes.

In Egypt, certain activities of livestock production, like harvesting of fodder and taking the animals to the field are shared by men and women. Women also build pens for small animals (poultry) from mud and thatch and it is most likely that men build pens for large animals (cattle). Milking and processing of milk to cheese and butter is females' work. They are also involved in the marketing of these products (Beshara,1987).

Studies in Chile, Pakistan and Swaziland show that 80% - 100% of village women keep poultry. In Pakistan, 60% - 80% of women feed and milk cattle. In Chile, 80% of women in families with medium sized holdings, 54% of the small

holders, and 7% of the poorest peasants take care of cattle and 10% of women in landless peasants keep pigs (FAO,1984b). In Egypt and Jordan, it has been estmated that 70 - 75% of women own the majority of goats (Dey,1988; FAO,1984b).

In Burkina Fasso, livestock are an integral part of the farming system and most of the households own cattle, sheep, goats and poultry. Small ruminants and poultry are owned by women but are cared for mainly by children, while cattle are herded by men, sons or contract herders (Nagy *et al.*,1989). In Thailand, women are specifically concerned with rearing small ruminants and poultry while the care of cows and buffaloes is shared between men and women. Many women have demonstrated their expertise and skills in livestock production and provide their families with a major share of income (Natpracha,1991).

2.5.4 Women's Role Relative to Men in Off-farm Income Generating Activities

In addition to their different labour roles, men and women in developing countries households have different sources of off-farm income and financial responsibilities. Women secure supplementary income from beer brewing and retailing of processed food while men concentrate on crafts like carpentry (Saito and Weideman,1990). Brewing of local beer from cereals, cereal by-products, fruits or honey is done by women in most societies (Baker and Feldstein,1989; Kajimbwa,1992). Processing of food for sale is the most important income earning activity for the Hausa tribe of Nigeria (Longhurst, 1985). In Egypt, rural women take part in many cottage industries and small scale manufacturing. This includes; cheese and butter making, spinning, weaving and dyeing clothes; making clay products, making sun-baked mud bricks and weaving of baskets and different products of palm leaves (Beshara,1987).

In Tanzania, Mbughuni (1993) noted that about 90% of the rural women are increasingly turning to micro-enterprises to fill the income gap by engaging either in group or individual projects or in multiple projects. What is interesting is the non-recognition of this important contribution by women to economic agricultural development as well as household food security. Women income generating activities include beer brewing (50%), food processing projects (41%), retail selling of petty commodities such as charcoal or kerosene as well as selling agricultural products (40%) (Fig. 4).

Furthermore, women are frequently responsible for their family food and clothing while men are responsible for house construction and/or repair, purchase of luxury items like radio and other status maintenance strategies (Burfisher and Horenstein,1985). Women tend to work much longer hours in home and economic production than men in their families (FAO/WHO,1992a; Wichterich,1995). They normally work 14-16 hour working day (Kahurananga,1980; Becker,1995; Wichterich,1995).

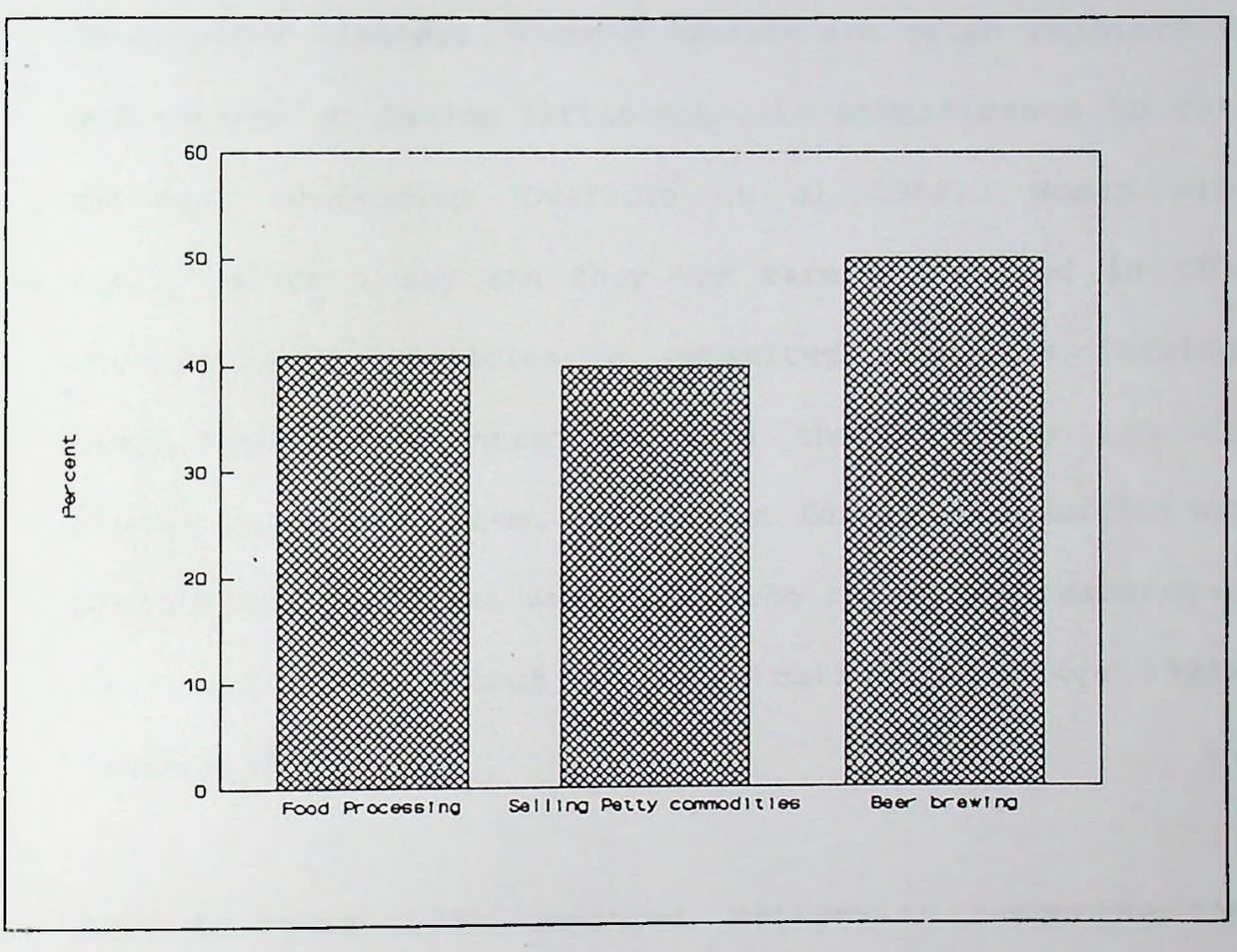


Fig.4: Women's income generating activities in Tanzania

Source: Mbughuni (1993)

In spite of women being key contributors to the economic system, they have been constantly marginalized by development planners. Women's spheres are often relatively undervalued as having little economic significance to the national well-being (Overholt *et al.*,1984). Women are rarely given a say and they are rarely involved in the elaboration of policies or consulted when new farming technologies are introduced even though these are of direct concern to them. The reason for this insufficient participation is that women lack the necessary resources, land and credit, lack decision making (Mwaipopo,1994; Ousmane,1996).

But, as Lewis (1984) reminded, failure to recognise the important role of women will undermine their status, their well being, and government efforts to increase agricultural production and improve household food security through small farmers.

2.6 Women in Agriculture and Time Allocation

Women make up 60 - 80% of agricultural workers in Africa and Asia and more than 40% in Latin America. The work they do depends not only on where they live but on their work place within the rural economy (Feldstein and Poats,1989; Polomack,1989). The International Labour Organization estimates that 78% of women in Africa are active in agriculture compared with only 64% of men (ILO,1984; Gittinger *et al.*,1990). Since official government data have often seriously underestimated the number of women active in agriculture, the importance of increasing their production and productivity has not been fully recognized (Mascarenhas,1983; Omari,1994).

Women's time constraints and the other constraints on their productive activities have major implications in food production and family nutritional status (Lewis,1984). Rural women spend more time compared to men in an agricultural production set up (UNECA,1975; Lewis,1984; Tripp,1989; Gittinger *et al.*,1990; FAO,1996f)

(Table 10).

The observations by UNECA are further supported by results of a specific study by Killalea (1990) on rural women's contribution to agriculture and factors influencing it in selected villages of Morogoro Region. Results of this study, showed that women's role as agricultural producers was limited by the additional demand on their time (on average 6.75 hours per day). The results also supported by an independent study by Rwambali (1990) indicated that on average 6.75 hours per day are spent on agricultural work.

Table 10. Time spent by men and women on agricultural and subsistence-related tasks in Africa (percent)

Task	Men	Women
Clearing forest and staking out fields	95	5
Turning soil	70	30
Planting seeds and cuttings	50	50
Hoeing and weeding	30	70
Harvesting	40	60
Transporting crops home from fields	20	80
Storing crops	20	80
Processing food crops	10	90
Marketing surplus crops	40	60
Carrying water and fuel	10	90
Caring for domestic animals	50	50
Hunting	90	10
Feeding and caring for family	5	95

Source: UNECA (1975)

It is apparent from the above that women spend more time on agricultural activities and approximately equal time for other domestic activities.

A study on women's contribution to farming systems and household income in Zambia was conducted by Due *et al.* (1982) on 112 families living in the rural areas and 30 families living in the market areas. Females were found to contribute more to agricultural production than males. While females spent a mean of 8.5 hours per day, males spent 7.4 hours per day in agricultural work during the farming season. This is equivalent of 53.5% and 46.5% for females and males, respectively. Despite all this, rural women still receive little attention regarding resources, input and information (Swantz,1985).

Due and Mudenda (1986) carried out another study in Zambia at three levels of agricultural development from traditional to more commercial farms, which showed that women contributed 52% of the agricultural labour in the most traditional areas, 51% in the most commercial, and

58% on the intermediate small holder farms. These Zambian studies were undertaken in areas in which food crop production was primary but there were some cotton, sunflower and other crops grown only for market.

In Malawi, women are responsible for most subsistence production and contribute the most labour to food staples, such as maize, cassava or rice, depending on the crop grown in the area (Spring *et al.*,1983). In Cameroon, food and cash crops are grown by women and men, respectively (Dixon,1980). In terms of labour expended by women on agricultural production, the same FAO statistics show that women form 47% of the agricultural labour force in Sub-Saharan Africa (FAO,1984b).

In Pakistan, a village study reports that 50% of women are involved in wheat production, hoeing and harvesting. Up to 85% thresh and 95% clean the grains (FAO,1984a). In Asia, women provide much of the labour for the staple crop, rice. An in-depth study from Nepal reports that women contribute 66% of the labour involved in planting, 75% of that required for weeding and all of the cleaning and

storage of rice. In the production of wheat, they contribute 66% of the work, for maize 94% and for oil-seeds 85% (FAO,1984a).

Women's daily activities include a variety of tasks in addition to crop production. The crops produced by women farmers are not sufficient to meet all the household food and other requirements. The need for cash income to meet other basic needs is obvious. Where there is surplus in the food crops produced for household use, this is sold to get cash income. More often though, rural African women have to supplement their crop production by engaging in income- earning activities. Examples of income supplemental earning activities by rural women are keeping of small animals, bees, making handcrafts, brewing and others. These women operate at the lowest stratum of the informal sector. Therefore, women are caught up in vicious circle of low income and low productivity despite long hours of toil (Elias,1990).

One of the most frequent requests of African rural females is the provision of labour-saving devices in agriculture,

to provide relief from the enormous burden of work (Anandajayasekeram and Due,1984; Cloud,1986). Although rural development policies in Tanzania are egalitarian and have recognised the role of agriculture in transforming rural areas and the nation as a whole, the agricultural policy has not specifically recognised and appreciated women as key elements in rural production (Rwambali,1991; FAO,1988).

Since women in the rural sector play the major role in agricultural production, any effort or programme aimed at increasing the productivity of women would automatically contribute greatly to agriculture and food production. Conversely, any development plan or strategy which neglects to recognise the role and contribution of women would run the risk not only of marginalising women and even worsening their situation but would also in fact be doomed to failure (FAO,1984b).

2.6.1 Policy with Regard to Women as Food Producers

Rural women are mostly self-employed entrepreneurs. Their activities do not come under the official definition of Small and Medium Enterprises (SMEs). Programmes for helping SMEs do not reach the women. Their activities are in the informal sector. They are not in an employer/employee relationship with anybody. Communication with the authorities and policy makers is non-existent. This retards the identification of problems of concern to women. Women's activities are small-scale, mostly mini-enterprises, and do not, therefore, derive much benefit from these policies (Nikoi,1990).

The author concluded that domestic policies reflect the consequences of monoculture and excessive dependence on commodity exports. African economies are primarily geared to serving the raw material needs of industrialized market economies. This led to distortions in agricultural economies, where emphases and resources are placed on production for export crops to the detriment of food production agriculture. Other distortions have included

regional and gender inequalities as well as urban enclave development with few linkages to the rest of the economy. This lead to stagnation, which encourages rural-urban drift and the concentration of social amenities in urban areas. This policy has led to food insecurity.

Increased producer prices for cash (export) crops may affect negatively women who will be forced to spend more of their time on the cash crops and less of it on their own crops, such as fruits, vegetables and other food crops. The study carried out by Nkoma *et al.* (1993) in Mwanza on the Impact of Structural Adjustment Programmes on rural women in Tanzania, observed a deliberate policy to emphasise the production of cotton and de-emphasise the production of other crops.

2.7 Constraining Factors on Women's Full Participation in Food Security

While it is important to recognize women's multiple roles in food production, it is even more significant to identify those factors, which prevent them from being

efficiently participating in food security programmes. It is often the lack of crucial productive resources, such as land, labour and capital, which render the image of women farmers as being marginal and inefficient producers. This being the perception, they are neglected by external agencies in their allocation of agricultural resources and services to the farm household. All of these lead to low productivity, low production, low incomes and hence food insecurity (FAO,1988; URT and UNICEF,1990; Nikoi,1990). Other factors include, decision making power, time for child and family care and knowledge of food and agriculture (Holmboe-Ottesen *et al.*,1990).

Furthermore, Weidemann (1987) concluded that some of the constraints to women are: limited women's access to extension services, inability to travel to extension centres, lack of land, limited income to purchase recommended inputs, inconvenient scheduling of demonstrations and meetings or locations, gender bias in extension staffing, lack of improved technology on traditional food crops, and political structure that favour male farmers. Yambi *et al.* (1990) added that the

lack of technical know how, due to the high level of illiteracy and, above all, to the low level of access to extension services and, more generally, to production support services.

Mwanyika (1993) in her study on economic analysis of the role of women in traditional farming system in Mbozi district (Tanzania) found that the factors which affect women's productivity and accessibility to resources are economic and social constraints. Lack of access to land, labour, capital, agricultural information and credit facilities hinder women from achieving their maximum productivity levels.

FAO (1996b) and Doorenbos and Haverkort (1987) documented that women's uncertainty in access to land and decision making, outdated farming methods, primitive tools, lack of access to inputs and credit are among the major factors constraining women's full participation in food security. Factors constraining women's effective participation in household food security are likely to vary both in type and magnitude. Therefore, an appropriate approach to

effect women's contribution to household food security must identify and study these factors and find ways of improving the situation.

2.7.1 Accessibility of Women to Resources

Mosha (1992) noted that in most developing countries, there are problems of a stereotypical model of society, where men are conceived to be dominant over women and therefore their needs and roles are different. The difference is, however, based on the intensity of work, decision making and control of resources. Men control most resources and decision making is vested in them. FAO/WHO (1992c) states that control of resources may be greater if the women earn the income, although this is not always the case.

Despite their important roles as producers and household managers, women are often marginalized when it comes to allocation of resources and decision making. They lack direct access to resources, such as land, capital and credit, and information which in the end reduce their

productivity (FAO,1990c; Dankelman and Davidson,1991; FAO,1996a; Mngodo *et al.*,1996). The general sub-ordination of women in Tanzanian society is reflected in the lack of control of resources among women (Jonsson,1986b; URT and UNICEF,1990; FAO/WHO,1992c).

Traditional conceptions of access to resources in most communities were determined by the patriarchal system of male dominance. In these communities, inheritance of resources such as land, or assets such as houses and trees passed through male hands, except in matrilineal societies whereby land was inherited by women, although the overall overseer of those resources was the maternal uncle. But these are very few cases compared to patrilineal societies. In many matrilineal societies, women have rights to land and relatively more economic independence and autonomy over its proceeds, particularly food crops (Mwaipopo,1994).

Historical analyses of the development of the social relationships in Tanzania suggest that colonial economic policies and the commoditization of indigenous economies

(particularly with the introduction of export crops), capitalised on existing patriarchal systems of dominance in facilitating indirect rule at the local level. At the household level, it meant establishing male dominance and ownership of property relations as being the head of the household (Mascarenhas and Mbilinyi,1983). There is unequal possibilities of access to resources between men and women (Becker,1995).

Access to and control of resources is the main constraint to the efficient performance of activities in the household for food security by women. This is because decision making and control over the resources is mainly by men (Makundi, 1996).

2.7.1.1 Accessibility of Women to Land, Labour Time and Agricultural Inputs

Under the law, women of Tanzania have equitable access to land, livestock and productive assets but in practice such access, is more often through males. Generally in the mode of agricultural production, women suffer exploitation

under patriachal relations of production perpetuating the control of land and women's labour time by men. Even when married women have access to land through husbands, this is an interest of relatively limited scope for they (women) have no power to sell the land (Muro,1988; Ministry of Agriculture,1996). Access to land is not just a question of acreage but also the distance, which has to be covered to get to the fields and the quality of the soil (Aarnik and Kingman,1991). Generally, the agricultural labour force, mainly women, if deprived from land access leads to a serious constraint on improving women's productivity and on the access of households to the important foods, which women produce (Dey,1988).

Mwanyika (1993) in her study in Mbozi (Mbeya district), pointed out that different problems associated with access to land were given by female respondents. About 62% of women in the sample complained that the existing traditions and norms inhibited their land ownership rights. Women are considered completely ineligible for land ownership. Land ownership in this sense usually refers to lifetime, heritable rights independent of

marital status. Land ownership rights are assigned only to men. Apparently, this land ownership pattern limit women's access to sufficient land for farming. In the same study, about 70% of married women complained that they do not have a control of their own labour because they have to work on their husbands' fields.

It is not often that women can mobilize other sources of labour, especially men's or hired labour on their own farms, due to this imbalance in power and resources. But their labour is spent in the production of household crops, usually under men's control. In many cases, they may not necessarily benefit directly. For example, men do not often participate in gardening of vegetables, but both men and women work in other farms for food and cash. This is because women's work in agriculture is often viewed as a productive obligation and a wifely duty (Mwaipopo,1994).

In addition, there are constraints arising from their heavy workload, caring for children and other numerous tasks that these women have to perform every day (FAO,1988; Elias, 1990). Therefore, there is need to find

ways of easing the work of women in the household activities so as to release their labour for other development activities (FAO,1988). Kurwijira (1993 personal contact) proposed greater male-female labour substitution as a means to alleviate women's labour constraints, especially during the cropping season in farm households in Tanzania.

A study conducted in Shinyanga, Mara and Mwanza Districts (CARE International in Tanzania,1995) found that: womens' constraints were based on limited access to resources, infrastructure, social services and the means of production. To an even greater degree than men, women lack access to land. The pressure on land has compelled the most resource poor households to either rent land or seek wage labour on other farmers' lands in order to purchase food and provide for other livelihood needs. Access to other agricultural inputs including implements for cultivation, mineral fertilizers and pesticides, are either inaccessible or too expensive, a result of inefficient marketing mechanisms and poor infrastructure within communities.

Laws governing women's rights to land vary widely. Some religious laws forbid female land ownership. Even when civil law gives women the right to inherit land, local custom may rule otherwise. In Sub-Saharan Africa, where women have prime responsibility for food production, they are generally limited to use rights to land, and then only with the consent of a male relative (Quisumbing *et al.*, 1995).

Land is mostly inherited by men while critical inputs for agricultural production tend to be provided through males. They also remain dominant in the question of the control over the proceeds from the sale of crops, which all adults and children produced. In these circumstances, Tanzania is confronted, whether one likes it or not, with the reality that one of the basic cause of household food insecurity is women's lack of control over family resources (Wagao,1991).

2.7.1.2 Accessibility of Women to New Technology

Women's disadvantaged access to resources impinges on their ability to respond to new economic opportunities. They often do not have enough cash to hire or buy new technology such as ploughs, oxen or chemical fertilizer. Their productivity is often low and are sometimes left out in development planning for lack of new technological input (Mwaipopo,1994). Kajimbwa (1991) in his study in Kingolwira, (Morogoro Rural), found out that women were engaged in rainfed agricultural production, and with little access to improved tools or inputs.

Women are still working with traditional and rudimentary tools (such as hand hoe and mortar and pestle in food processing), while the new devices and equipment have been benefiting men (Lamming,1983). The introduction of modern or improved technology in developing countries basically had the intention of reducing drudgery in farm operations as well as improving production. Despite such good intentions, it has been observed that modern technology

has done little to improve the welfare of women (Lamming,1983; Lewis,1984; Trenchard,1987; Rwambali,1991).

2.7.1.3 Accessibility of Women to Capital and Credit

The advancement of women in different fields of development has been constrained by lack of direct access to resources, such as capital and credit (Virji and Meghji,1989). Women need credit to purchase agricultural production assets as well as working capital. They also need to expand their economic activities so as to earn more money to support their families (FAO,1996a).

In Tanzania, public credit programmes depend on physical collateral and so are heavily biased towards male headed households. Women have received very little credit from the banks, a situation which has had a negative impact on women's productivity. Commercial and development banks have provided loans to sectors where the majority of women are not involved; for example, provision of credit technological services have been biased to crops which are dominantly controlled by men and export types. This has

meant denial of such services to women (Virji and Meghji, 1989; FAO,1996a).

Efforts have been made by the Cooperative and Rural Development Bank (CRDB) in conjuction with international organizations to work out special credit facilities to women on concessionary lending terms to enable them establish small scale income generating projects. In implementing the credit programmes, however, the bank has encountered problems, such as lack of property ownership by women, lack of guarantees to women economic units by village leaders, enterpreneurship on the part of women, and others. In any case, only few rural women have benefited from the bank's credit programmes. If women were to receive the same kind of assistance and incentives as men, their agricultural productivity would increase and consequently household food security would improve (Virji and Meghji, 1989; FAO,1996a).

Lack of access to resources and particularly capital has limited women's abilities to accumulate assets that would serve as collateral when in need of credit. At the same

time, women's relatively lower education levels has limited them to apply for credit even when it is available because of the failure to present project proposals or lacking information of institutions that offer credit (Virji and Meghji,1989).

Nevertheless, very few credit facilities do cater for the small amounts of money often needed by women (Tripp,1989; Kafanabo,1991; Mbughuni,1993). Currently, a number of projects have initiated programmes for addressing rural women within this category. However, the facilities are yet to reach a significant number of the rural women due to poor resources and infrastructure to facilitate easy access to such facilities (Nkoma *et al.*,1993; Mwaipopo,1994).

The weakness of women's land rights results in an inability to use land as collateral to obtain access to credit. Social and cultural barriers, women's lower education levels relative to men and their lack of familiarity with loan procedures may also limit their mobility and interaction with predominantly male credit

officers or money lenders (Quisumbing *et al.*,1995).

In a study on the role of the rural women as farmers in Eastern Nigeria, by Uwakah *et al.* (1991), the following constraints to women's productivity in agriculture were identified: lack of capital was the most crucial limiting factor, other major constraints identified by the surveyed women included processing, transporting and marketing problems, lack of incentives from government, shortage of farm labour, strenuousness of farm work, unavailability of programmes, shortage of land, lack of basic education and training and lack of infrastructure in the villages, such as good roads. In order to reduce this problem of capital, women should engage in income generating activities, such as, growing fruits and vegetables, keeping small animals and weaving/hand craft work.

2.7.1.4 Accessibility of Women to the Market

The other constraint stated by FAO (1988,1990c) is the limited access to market. Uwakah *et al.* (1991) in Eastern Nigeria pointed out that transporting and marketing

ploblems were among the women constraints in food production. Esminger (1983) cited by Gladwin and Staudt (1983) tested the effect of Galole Orma women's access to the market economy on their economic and political "status" with two sub samples of households in Kenya. One set of Galole households is settled and strongly integrated to market economy. Esminger (1983) demonstrated that although nomadic women engage in fewer domestic tasks and have greater prospects for maintaining ownership of cattle and producing ghee for sale, their lack of access to markets and political forum prevent them from taking advantage of these conditions.

2.7.2 Accessibility of Women to Decision Making Power

The pattern of decision making varies from one society to the other. Occasionally, household members make independent decisions on different aspects of the form either directly or inderectly. Thus, it is possible to find households where men, women and children have wholly separate spheres of decision making affecting production and income expenditure. Women span of manoeuvres in

household decision making is drastically curtailed by customs and patriarchal power (Aarnink and Kingma,1991). Many of the daily actions to improve living conditions at the household level are expected to be taken by women, but they usually have limited control and decision making over resources for effective action (FAO,1990c; Wagao,1991).

In some parts of Africa, women traditionally have considerable decision making and managerial power on food production, processing, storage, marketing and in their domestic roles of food preparation and budgeting (ILO,1984; Dey,1988). Women also, participate in cash crops production process, but they do not control the end results (FAO, 1989).

Poor women have limited access to the cash earned by themselves or by their men (Agarwal and Anand,1982). So, whatever has cash value is in the domain of men. A good example is in the value attached to milk in some societies in Tanzania. For example, in traditional Chagga society, milk was under women's control. Men were not supposed to touch or know the disposal process of the milk. Now that

the milk has gained cash value, men are gaining control of it. It is no longer in the domain of women (Omari,1994). In developing countries, in Columbia, women influence production decisions through their part in managing consumption. They have significant influence on what food-stuff should be eaten and thus influence indirectly what should be planted. In addition, they influence decision making in resource allocation indirectly by insisting on certain resources of cash to be devoted to specific areas, for example on children education or on medical care. Decision on the management of the farm is made by consultation and negotiations including bargaining between spouses and sometimes involving extended family members (Ashby,1989).

In Nepal, women make 42% of the agricultural production decisions and are most influential about seed selection and fertilizer use (Ashby,1989). In Zambia, decision on crops to be grown is mainly done by men, in most cases, decision on the sale of farm produce is done jointly between men and women. Decision on the expenditure of income is made jointly between spouses (Due *et al.*,1982;

Phiri,1990). It appears from a survey in Brazilian cities that the effect of the income controlled by the women on family health lies 4 to 8 times higher than the effect of the income of the man and in terms of the survival of the child the effect is almost 20 times as high (Christiaensen,1994).

In Botswana, decision making vary in different tasks. For example, in male headed households, men have the sole decision on time to start ploughing and planting and whether or not to use draft animals. Women on the other hand decide on what kind, amount of seeds to sow and on weeding (Baker and Feldestein,1989).

Decision making in Tanzania depends on tradition (matrilineal or patrilineal). In patrilineal societies, where women are accustomed to subordination, they play very little role in desicion making. Generally, at all levels of decision making women are not provided equitable voice. In decision making bodies in village governments, in local councils, there are few women members in the legislature. Most are there because of affirmative

legislation, which allows for election and appointment of additional women members. Many crucial decisions, which affect women are made by men with little or no input from women (URT and UNICEF,1990).

In Igunga district, Tabora region, Tanzania, it was observed that in 65% and 91% of the sampled households, men made all decisions concerning expenditure of income from farm produce and livestock sales, respectively. Only in nine percent of households did women make decisions. In addition, women were rarely found in village councils; the decision making body of the village (Mung'ong'o *et al.*, 1990).

Due and Anandajayasekeram (1982) observed that in Kilosa district, husbands and wives jointly made desicions on crops to be grown. Lijongwa (1981) reported that in Malinyi (Morogoro region), women decide on what crop to grow in order to feed and maintain the family. In this society men were rarely involved in agriculture.

In Tchenzema ward, Morogoro region, Mtenga (1993) observed that decision making is gender dependent. Decision on production process, for example, the choice of cash and food crops to be grown, time for land preparation, sowing, weeding, processing and storage method is made by both men and women. Decision on income expenditure was divided according to items to be purchased, and Kitchen utensils purchases were dominated by women alone. Purchase of luxury items and house repair were dominated by men alone.

In Tanzania, women's participation in decision making at both the household and community level is minimal as shown by a study in Iringa and Kagera regions (Nkoma *et al.*, 1993). In the seven villages surveyed, men dominated in decision making. They were the ones who decided on how much land should be allocated to the growing of different crops, how much money should be spent on the purchase of tools of production and farm inputs and how much labour should be invested in the different crops grown. Decision on the application of fertilizer, insecticides, sale of farm produce, acquisition of loans, and issues related to money were made by men. On the other hand decisions on

farm activities like planting, weeding, harvesting and food preservation was shared by both. Decisions related to food and the kitchen like what and how much to cook, the frequency of cooking could be made by women as long as they did not ask the husband money for buying the staple or other ingredients.

The authors concluded that in most of the households studied, almost all use of household income had to be approved by the husband (Wagao,1991). FAO (1996h) states that because cash crop production is generally considered to be a male domain, women rarely have any say over how to spend the income their crops provide. Also, women are not permitted to decide how much of their food crops is sold and how much is kept for the household.

As pointed out by Mwaipopo (1994) a wife had very little freedom to decide even on slaughtering of a chicken for a family meal. In many households, even chicken may be a source of quarrels. Even sending a sick child to a paying health unit had to get the approval of the husband who may not be around at the time the child is sick. This tight

control of money by the husband is not surprising because all major means of production including land and livestock from which cash can be generated were owned by men.

Wagao (1991) revealed that it is possible to identify four stages of the management pattern of household resources in Tanzania. First, in the allocation of men's time to work on the household land or to work for pay elsewhere, men's decisions are decisive. Secondly, the question of allocation of land and labour to different crops is primarily based on men's decisions. When it is decided to cultivate non-food crops, all produce must be sold and the money collected is usually controlled by men. Thirdly, when crops are harvested a decision on how much should be spared for household use is usually the domain of women. When women bring food crops to the local market they sometimes end up controlling the money. Finally, when decisions have to be made in the way money is spent, it is the person who controls the money who matters.

In rural sector, most of the household income is controlled by the husband (Wagao,1991; Mwaipopo,1994).

This sub-component of the household resource base is rarely made available for household use. This implies that men who exercise most control over resources have limited direct access to first hand information about the pressing day to day needs of the household. As was also shown in the Iringa Nutrition Programme, when the household income was controlled by the women, the food availability and the nutritional status of children improved (Wagao,1991).

Muro (1988) pointed out that household decision making power and authority in agricultural production implies the extent to which decisions on the nature of the production process are made and the control, management and distribution of household resources is affected. The decision on land use patterns, what crops to plant and where, is often a man's choice, and in some cases it has affected women's ability to provide food crops for household consumption. In areas of land shortage, men have preferred planting cash crops at the expense of food crops thereby forcing women to walk great distance to produce food crops or provide labour in exchange for food. Koda (1994) revealed that much as women are found in all

spheres of life, they largely remain implementors of decisions made by men due to their limited participation in politics and public life.

Although decision making powers are often shared between male heads and their wives, husbands have more power, especially when it comes to allocation of land to crops. Decisions about allocation of household members'labour may be shared between husband and wife. Wives can influence decision making by discussing, suggesting and by carrying out the work. Some women however, have a large share in decision making. This is so when a woman has her own property including land, cattle or house. Property ownership increases the decision making powers of a woman (Aarnink and Kingma,1991).

Despite their number and contribution, women hold only a small fraction of professional positions at the planning and policy levels. Increasing the proportion of women planners, decision makers, managers and extension workers is therefore critical. Human resource is a major input in economic development. Utilizing the entire resource would

automatically increase productivity and efficiency. It is therefore only rational that development focuses on the entire resource. Because women form over half of the African population, it is important that they participate in decisions that affect their lives (Winrock International,1996). Food security in Tanzania and in Africa in general will be realised if constraints facing women farmers are removed. This would include improving their decision making authority both at household, village and national levels (Missano,1993).

2.7.3 Accessibility of Women to Education, Innovations and Extension Service

2.7.3.1 Accessibility of Women to Education and Innovation

The systems of rural education and training, have not taken into account the importance of women in agriculture hence in household food security. Women have limited access to innovations, training, information and other basic resources that could facilitate their tasks and increase their productivity (Agarwal and Anand,1982;

Collier,1989; Uwakah *et al.*,1991; Mngodo *et al.*,1996).

Wiley (1984) revealed that despite Tanzanian women providing over 60% of all required farm labour, agricultural and developmental-related information has largely by-passed them. Women lack information and opportunities for further training. Even agricultural extension programmes have traditionally concentrated more on educating males and hence women still largely depend on their husbands for access to such information (Rafferty, 1988).

Whatever extension education that exists in the villages, is passed on to men, not women, who are busy working on the fields or preparing the food or collecting firewood or water (CARE International in Tanzania,1995). Women's source of information remained to be husbands and neighbours rather than extension agents (Shayo,1991; Wambura,1992). However, the effectiveness of husbands as source of information have been questioned by Weidemann (1987); Van Den Ban and Hawkins (1988); Gabriel (1989), who observed that the trickle down of information from men

to women have been shown to be impracticable.

2.7.3.2 Accessibility of Women to Extension Service

Rwambali (1991), in his study of women and agricultural extension in Morogoro district, observed that 45.4% of the women did not get information on inputs at all and that only 33%, 35%, 33% and one percent had used improved seeds, insecticides, storage pesticides and fertilizers, respectively. Also, Wambura (1992) working in the same district observed that women appeared to have received untimely extension advice due to a number of factors including inadequate number of extension agents and unreliable transport for the village extension officer.

Agricultural information and extension work are seldom directed to women's domains, for example in vegetable gardens from which supplements for household food security are achieved. Thus, these spheres remain left behind in agricultural development. In most cases, extension work targets the household farms which are under male heads. Taking under consideration women's many responsibilities,

they are often not available for training on new technologies and agricultural innovations. Men therefore benefit most from extension work (FAO 1987b; Nikoi,1990; Malima,1993; Mwaipopo,1994; Nkonoki,1994; FAO,1996b).

Baba (1980) in a study of the Kano River Irrigation Project and women's participation in the labour force in Hausaland, concluded that official policies have not recognized the need to integrate women into on going development projects as a means of achieving greater balance in rural welfare. Many African countries still have their agricultural extension services designed to favour male farmers. The design, timing and location of training programmes do not consider women's agricultural roles or their multiple responsibilities for food processing and storage and caretaking within the family (Collier,1989; Gittinger *et al.*,1990). Quisumbing *et al.* (1995) pointed out that despite women's prominent role in agriculture, they do not get an appropriate share of agricultural extension advice and other services.

Women are discriminated against in terms of provision of extension services, despite their significant contribution to agricultural production in developing countries (FAO,1988; Mwaseba *et al.*,1991). The practice, which has been followed for many years in Tanzania is that extension workers normally go to men and not to women who are the actual producers (Omari,1989). This system also fails to address women's interests or constraints or roles in agriculture and household food security (McGregor,1989).

Nkoma *et al.* (1993) reported that one peasant in Mwanza, remarked that the field and extension officers are tourists in the village. Similarly, in Arumeru one farmer complained that for the past ten years he had not seen an agricultural expert in the village. This explains why their presence in the region is not making a difference. And, in case they make an input at all, they essentially focus on export oriented crops, which are also dominated by men, such as cotton and coffee. Very little attention is given to the food crops most of which are controlled by women. In addition to that women were complaining that they were neither being supported by agricultural experts

nor were they being given knowledge to enable them to improve productivity of vegetables. The study conducted in Shinyanga, Mara and Mwanza districts (CARE International in Tanzania,1995) pointed out that the extension service has almost completely by-passed women as potential village extension workers.

2.7.4 Accessibility of Women to Politics

The neglect of women in economic politics has tended to exacerbate the subordination of women and thereby diminishing the impact of policies designed to raise households output and incomes. The male bias of most agricultural and rural development policies, which invariably target the male heads of households has worked against women farmers who constitute a large percent of the crop producers particularly food crops. Most of the published data on rural economic activities has tended to underestimate the role of women in farm work, food processing and other productive activities (Ministry of Agriculture,1996).

In spite of efforts to increase women involvement in policy and decision making level, for example appointing women to high ranking positions in the government, little progress has been made. Their influence on policy issues is still negligible as they represent only a small fraction of the total women population in the country (Ministry of Agriculture,1996).

2.8 Coping Strategies During Food Shortages

Coping strategies are measures for dealing with food scarcity situation. That is the mechanisms communities adopt when faced with food shortages before receiving/seeking external assistance (Kajumulo,1993; CARE International in Tanzania,1995). These strategies will vary by region, community, social class, ethnic group, household, gender, age and season. The types of strategies employed by household also will vary depending upon the severity and duration of the potentially disruptive conditions (Maxwell and Frankenberger,1992).

2.8.1 Coping Strategies at Household Level

Households adopt a variety of coping mechanisms and strategies, which are not always efficient or effective, due to lack of resources, inadequate institutional support, and other factors, to offset the impact of production shortfalls and market uncertainties. These stages take a household from loss prevention through crisis damage containment (loss management) to, at the extreme, household collapse. The first stage involves elements of risk minimization such as savings, investments, accumulation of assets and diversification of income sources. The second stage involves divestment of assets, calling in of loans, and searching for new credit. If adverse conditions persist and adequate external help is not forthcoming, households may have no choice but to sell all their remaining assets, subsist on unusual collected famine foods and migrate to other areas for relief (FAO/WHO,1992b; Milich,1997b).

2.8.2 Coping Strategies recorded from Severe Food Crisis and Famine Countries in Africa

There are a number of individual case studies, which record how people have responded to severe food crisis and famine in Africa, chiefly drawn from the Sahelian and Eastern African countries. The kinds of coping strategies that are commonly observed are as follows: dispersed grazing, change in cropping and planting practices, migration to towns in search of urban employment, collection of wild foods, use of credit from merchants and money lenders, migration to other rural areas in search of employment, rationing of current consumption, sale of productive household assets (livestock, land), consumption of food distributed in relief programme, sale of possessions (for example, jewelry), break up of the household, increased petty commodity production and trading and distress migration (Corbett,1988).

Many of the African case studies confirm that risks to food security are frequently anticipated at a household level and that strategies are carefully planned to cope

with them. For example, de Waal and el Amin (1986) in their study in Darfur, Sudan, found that once it has become evident that a harvest failure is imminent, people know that they have to make their resources cover a full twelve to fifteen months and husband them accordingly. The way in which households decided to cope was determined after consideration of the resources available to them, current and expected food prices and seasonal opportunities for wage employment and the collection of wild foods. A common strategy was to collect wild foods, bury it together with grain stocks near the house and then go off in search of seasonally available wage employment, returning to the stored grain after six months or more.

The same authors conducted a study in pastoral and farming populations in Northern and Southern Darfur during 1984/1985. De Waal and el Amin (1986) divide the strategies they observed into three distinct groups or stages:

(a) First stage of destitution: gathering of wild foods, selling animals which are surplus to requirements, borrowing money or food from relatives, forms of

interhousehold assistance, one or more family members working as a day labourer, sale of possessions and migration with herds to distant pastures.

(b) Second stage of destitution: sale of animals which are required for subsistence, borrowing of food, sale of possessions and migration with herds to distant pastures.

(c) Third stage of destitution: depending on charity, in this case coping strategies may be planned to offer equal protection to all household members or may either deliberately or inadvertently, safeguard some members at the cost of others.

Cutler (1985) in his survey in Red Sea province in Sudan identifies a clear sequence of coping strategies which fall into three distinct stages:

(a) Adaptive strategies: sale of livestock, labour migration, self-employment (through petty commodity production and trading) and use of credit from merchants.

(b) Sale of key productive assets: sale of tools, sale of prime breeding animals, sale of sundry household belongings and sale of land.

(c) Mass migration to towns and road side in search of charity.

In a study conducted in Nigeria by Watts (1983) peasants coped with food insecurity by various approaches. These included: collection of wild foods, sale of labour power (migration), engaging in dry season farming (migration), sale of small animals, borrow grain or money from merchants /money lenders, sale of domestic assets, mortgage farmland, sale of farmland followed by permanent migration.

Rahmato (1987) in North-East Ethiopia observed that there are four stages for coping with food insecurity.

Stage one: reduction in variety and quality of foods cansumed, collection of wild foods, reduction of number of meals per day, inter-household transfers of food and

livestock, barter exchange with neighbours and relatives and credit arrangements with relatives.

Stage two: temporary migration by adult males (in search of wage payment).

Stage three: sale of animals, sale of personal effects for example, jewelry and hand weapons, sale of housing and building materials.

Stage four: migration of entire household in search of food relief.

The survey data from Western Sudan shows that farmers adopt multiple coping paths and responses that involve substitutions in production, income, assets and consumption. Households vary in their emphasis on the choice of coping responses. In general, they try to avoid action that would endanger their future survival. Their success in coping, however, is unequal across households because of unequal income and asset based and unequal access to community risk-sharing networks and public support. In general, the burden of coping fell heavily on low income households with a very small protective income

source or asset base (Teklu *et al.*,1992).

Eide *et al.* (1986) reported that a large number of households in developing countries, experience food shortages at certain times of the year to such an extent that, the house wife has to cut down on the number of meals per day or deliberately cook less for each meal than needed. In this case, the household members are forced to take inadequate foods both qualitatively and quantitatively. According to research findings (FAO,1985a; 1987a; Eide *et al.*,1986) the households experiencing food shortages spend an average of 80% of the household income on food. This is an extremely high figure, considering all the other expenses that have to be met, such as shelter, clothing, fuel, schooling and medicine.

2.8.3 Coping Strategies reported in Tanzania

Wagao (1991) pointed out that in Tanzania, residents in rural areas, had devised strategies to lessen the adverse effects of the crisis. Household members cope with food shortages by reducing the frequency and changing the

content of meals consumed daily, undertaking more income earning activities and buying or borrowing from either relatives or friends. Wagao (1991) reported that coping strategies vary over time and space. Responses may follow sequential trends such as:

(a) Asset (productive or non-productive) depletion: As long as assets last and are tradeable, food security is not adversely affected. Depletion of assets is the onset of poverty.

(b) Breakdown of community reciprocity: Female-headed households are more prone to loss of entitlements mainly due to reduced claims from parents or from husbands, or relatives.

(c) Non-farm coping strategies: It has been recognized that households tend to rely more on off-farm income-generating activities than on agricultural means.

According to Mngodo *et al.* (1996) poor households have difficulties in meeting their food requirements from own production. To bridge the gap, especially in the pre-harvest period, they rely on off-farm enterprises, reduce

their food consumption as well as meal frequency, sell some assets, borrow food or cash from relatives and friends and migrate. A study by CARE International in Tanzania (1995) have revealed that 500 households in Mwamoto village in Bariadi migrated during the past five years as a result of pasture shortage, food scarcity caused by drought and landlessness. In some villages in Meatu, they lost 100 to 500 households during the 1993/94 drought.

The study in Shinyanga indicated the strategies taken by households as follows:

(a) Adjustments to meals and food substitutions: A downward adjustment in the number of meals eaten per day and the quantity prepared per meal, was the most commonly adopted coping strategy utilized by most households. Then, the other commonly used strategy is that of food substitution.

(b) Sale of assets: Many households have reported to selling important productive and non-productive assets to meet food requirements in times of scarcity.

(c) Borrowing from relatives/friends and credit.

(d) Alternative employment and distress migration: Wage labour, constitutes one of the most important coping strategies available to chronically food insecure households. Out migration in search of employment is a much less common phenomenon.

(e) Wild foods: Most wild foods (wild green vegetables and fruits) are not collected and consumed as a coping strategy, but continue to constitute important contributions to the diet. Wild vegetables and fruits can contribute vitamins, other micronutrients and roughage to the diet. Women were key informants regarding wild foods. It is their responsibility to gather and prepare such foods.

(f) Food aid.

(g) Other minor coping strategies: Redistribution of children: Many poor households send their children to be looked after by relatives over a period of time when the household is experiencing difficulties meeting livelihood needs. Redistribution of livestock: This is done by rich families to poor families (CARE International in Tanzania,1995).

The studies in Iringa and Kagera regions by Nkoma *et al.* (1989) revealed that women were increasingly adopting strategies to earn independent incomes, which they at least control although husbands could be consulted or informed where large sums of money were involved. The major strategy women adopted was to engage in economic group activities or in horticultural activities. Studies in Pawaga village in Iringa (Musoke *et al.*,1988) indicated that women were forced to be preoccupied in different informal and on income generating activities.

Acording to the Ministry of Agriculture (1996) some of the strategies used by the Government to make food more accessible to the household include:

(a) Increasing production and income.

(b) Promoting simple models of household food requirements through cultivation of resistant crops, home gardens and simple technologies for food preservation.

(c) Intensifying farmer training programmes in production and post-harvest handling.

FAO (1985a) pointed out that if a true solution to the food shortage is to be obtained, the efforts must start at the household level. Emphasis must be put on tackling the existing food crisis by utilizing all the available resources more effectively in order to achieve the immediate objective of eliminating hunger and ensure food security. Therefore, all the economically active household members must engage fully in food production or any other multiple income generating activities (Eide *et al.*,1986). SADCC (1987) insisted that governments must try to raise the real incomes of poor households so that they can afford to buy enough food. It is the responsibility of the governments to help the farmers acquire the resources, such as land and credits to enable them produce enough food for their families.

Makundi (1996) indicated that household food security can be improved by buying food during peak season and store it, selling less food at harvest, spending less on alcoholic drinking, women being given more power to decide on matters related to food and through provision of

credits to help farmers improve crop and animal husbandry.

FAO (1987a) pointed out that more efforts should be put on the households facing food shortages and must be given the opportunities to earn adequate income and attain sufficient domestic food production. The author advised that households must produce large quantities of food crops to boost food security and generate some income. The major solutions to household food insecurity must involve combined efforts and strategies. These may include mobilizing and assisting the farmers to enable them produce and store enough food for their families (Amartya,1981).

Some of the strategies to eradicate chronic food insecurity are extensions of those used when transitory insecurity occurs, by increasing (rather than stabilising) food supplies or real incomes and command over food. But tackling chronic food insecurity is not a matter only of increasing production. Food security is not synonymous with food self-sufficiency or only of subsidising consumption, or both (Dearden and Cassidy,1990).

Dearden and Cassidy (1990) state that poverty alleviation is a long term process, so it is important that poverty alleviation programmes are as sustainable as possible. Sustainability of poverty alleviation efforts has a number of aspects. One is that the emphasis should be on interventions designed to enhance the income generation capacity of the poor. Important elements of this are ensuring provision of essential infrastructure services and creation of policy environment enabling private small enterprises to flourish and for the long term human resource development investment through effective health and education service expenditure. A second aspect of sustainability is an emphasis in food production on conservation oriented technologies, and a third aspect is that services helping the poor must be designed to be highly cost effective.

The problem of rural food insecurity is essentially a problem of poor rural households. The overall strategy to reduce food insecurity must be to increase the opportunities available to low income rural households.

For many of these households, that will mean to assist them to produce more, of both food and cash crops, so that they can both feed their families and provide cash for household needs (Mngodo *et al.*,1996).

2.9 Nutritional Status and Food Security

In many societies women are the main producers of food. They also play a key role in the socio-economic development of rural areas. Women are also the main providers of meals, nutrition information in the household and through their caring function have a fundamental role in assuring improved nutritional status for all (FAO,1996a). Women dominate the nutrition process in communities as they are involved in food processing, preservation and preparation (Markey,1990). Also, ensuring the nutrition security of the household, through the combination of both food and other resources, is almost the exclusive domain of women (Quisumbing *et al.*,1995).

Food security is about a life free from the risks of malnutrition or starvation and as such, forms the pre-

requisite for good nutrition. Household food security is a process in which there is an aggregated balance between food availability and accessibility to satisfy the nutritional measurement of a particular household. The ability of the household to meet its requirements for the whole year is considered as a precondition for household economic stability and good household nutritional performance (Lorri and Kavishe,1990). It is clear that women are the central players in the provision of food and nutrition in the households. Women also take a key role in the distribution process at the micro-economic level (Heptonstall,1996).

Food security is a fundamental problem facing the world today and it is one of the main problem related to nutritional status (Kabeer,1990; Missano,1993). One of the best indicators to understand whether or not the society has no problems of food security is by looking at the health and nutritional status of its population. Good nutritional status is an indication that the society is self sufficient in food, whereas poor nutritional status is an indication of either lack of enough food or disease

(Lorri,1990; Mosha *et al.*,1992). Food insecurity is one of the major problems related to nutritional status. The households which face food insecurity seem also to be the same ones at greater risk of experiencing higher mortality and malnutrition rates (Kavishe,1993).

Food security cannot be said to have been achieved in the presence of malnutrition attributable to the inadequacy, instability or inaccessibility of food. Malnutrition then becomes a manifestation of food insecurity (Hindleston, 1990; Lorri and Kavishe,1990; Missano,1993). The consequences of food insecurity include undernutrition, which over a sufficiently long period results in life threatening malnutrition (Kajumulo,1993).

Malnutrition is broadly defined as a pathological state general or specific, resulting from a relative or absolute deficiency of one or more nutrients (Robson,1987). Malnutrition describes lack of adequate nutrition either quantitatively, qualitatively or both and can be in acute or chronic terms (TFNC,1980; Aquillon *et al.*,1982; FAO,1983). The underlying causes for this situation are

multiple and include poverty, poor agricultural practices, frequent occurrence of droughts, post-harvest problems, lack of economic and political development, unbalanced ecosystems, overpopulation and high incidence of infectious diseases (Thilsted and Hautvast,1993).

Food shortages have widely been recognised as a serious problem in low income countries (FAO,1980). As discussed during the "International Conference on Nutrition" in Rome, held in 1992, the lack of adequate food access and food and nutrition security in the African continent still persists (FAO,1996e). According to Kennes (1990) food security can be defined most simply as the absence of hunger and malnutrition. For this to be possible, households, villages or countries must have enough resources to produce or otherwise obtain food.

A lot of efforts have been made by national governments and international agencies towards eradication of hunger and malnutrition but it remains a fact that between 400 and 849 million people in the world are suffering from hunger that leads to malnutrition and ill health

(FAO,1980; Shaba, 1983; FAO,1996e). Today, there are over 800 million people in developing world alone, figures that include 200 million children, who are chronically undernourished and unable to enjoy healthy and active lives (Quisumbing *et al.*,1995; FAO,1996e; Bender and Smith,1997; Brown,1997). Most of these people live in the low-income food deficit countries (LIFDCs), countries which do not produce enough food to feed their people and cannot afford to bridge the gap with imports (FAO,1996b; FAO,1996e; Ousmane,1996).

Millions of people suffer from specific nutritional deficiencies of one form or another. In Sub-Saharan Africa in particular, the agricultural sector will have difficulty feeding the population, which is expected to increase from 550 million in 1995 to 1200 million by 2025, unless much more is done to accelerate the growth in staple food production and, particularly, to increase yields (FAO, 1996i).

Malima (1993) states that hunger and malnutrition problems are more serious in the developing countries where 765

million people are expected to be in hunger by the year 2000. FAO (1980) pointed out that women and children were most vulnerable to undernutrition. These poor people lack either the means to produce enough food for themselves or the income to buy it. The food they get is often of low quality or fails to provide the variety necessary for proper nutrition.

The problems of hunger and malnutrition have for centuries challenged man and have remained the most devastating problem facing the majority of the world's poor (WFP,1993). Kavishe *et al.* (1990) pointed out that inspite of all efforts being made, malnutrition continued to be an outstanding problem among the communities. The existence of malnutrition in Tanzania is indeed a serious national problem (Wagao,1991). Household food insecurity has often been implicated in the causation of malnutrition in many regions in Tanzania including Morogoro (Mosha,1988).

Evidence related to family food security suggests that nutritional problems (at moderate levels or worse), may affect between 40 - 60% of the population (Mngodo *et al.*,

1996; Ministry of Agriculture,1996). The difficulties in measuring the extent of hunger and malnutrition incidences are such that year to year fluctuations cannot be analysed with any confidence. However, in Tanzania, it is estimated that at any time 52% of the children under five years are malnourished, of whom 5% are affected severely due to mainly food inadequacy. Since children under five years make up 4.4 million of the total population, there are approximately, 2.3 million cases of hunger striken malnourished (UNICEF,1985; TFNC,1985; TFNC,1987; TGNP, 1993).

In many cases, hunger and malnutrition are strongly correlated to food insecurity and poverty and hence with economic and social development (FAO,1982; Mohmoud,1983; FAO,1985b). It has been established that malnutrition is caused by food shortages as well as ignorance, traditional customs, social and economic problems (Jonsson,1986a). It has also been reported that the continual subordination of women, lack of control over resources and poor intra-family food distribution contribute significantly to the prevalence of malnutrition in Sub-Saharan Africa

(FAO,1981; 1985b; Ikpi *et al.*,1986; Jonsson,1986a).

2.9.1 Household Income, Nutritional Status and Food Security

Poverty is a proximal of malnutrition (FAO,1996f). Studies done by Gadiel (1986) showed that child malnutrition incidences are higher in poor families as compared to the rich ones. The probability of food insecurity and nutritional risk increases as the household income decreases. Greater risk of food insecurity and hence malnutrition exists in those households with large families and low incomes (Francois,1982). It is also noted that income-controlled by women, particularly in Africa, is more likely to be spent on food. At similar levels of income, households with more women controlled income are more likely to be food secure. There is also evidence to suggest that sources of income, such as large payments for a cash crop or remittances, are less likely to be spent on improving household food security (Kennedy, 1992; FAO, 1996h). Kennedy (1992) found that at very low levels income some types of female-headed households have lower

levels of pre-schooler malnutrition than higher income male-headed households. Women accomplish this by allocating more of their incomes to food and then allocating more of the total calories to their children. It has been long recognized that within the poorest groups, young children and pregnant and lactating women are the most vulnerable because of their high nutritional requirements per unit of body weight (Becker *et al.*,1986; Fletcher *et al.*,1988).

In recent years, studies have shown that improvements in household welfare depend not only on the level of household income, but also on who earns that income. These studies found that women, relative to men, tend to spend their incomes disproportionately on food for the family. Moreover, women's incomes are more strongly associated with improvements in children's health and nutritional status than are men's incomes (Quisumbing *et al.*,1995).

2.9.2 Anthropometric Measurements, Nutritional Status and Food Security

The state of food security at the household level can be revealed by assessing the nutritional status of household members, especially the vulnerable ones (Kabeer,1990). The most vulnerable age and sex groups are children under five years and women of child-bearing age (Yambi *et al.*,1990). The anthropometric information can be useful complements needed to capture the various dimensions of food insecurity. This is because they are measured at the individual level (FAO/WHO, 1992b). The anthropometric status of young children is one of the most sensitive indicators of sudden changes in health status and food availability, acting as an early warning sign of distress, ill health, famine and eventually death. Weight for age is often the only available measure of malnutrition in many developing countries (Yambi *et al.*,1990). Anthropometric indicators of nutritional status as weight for age reflect both food and health related factors (Garcia and Pinstrup-Andersen,1987; Payne,1990; FAO,1996j).

Yambi and Bantje (1982) reported that undernutrition is the result of too low consumption of food, which commonly occcurs among pregnant and lactating mothers and children underfive years of age. Weight for age of underfives is often used for obtaining such information (FAO,1982b).

In separate studies (Bantje,1981; Neuvians,1987; Ishengoma,1992) malnutrition of underfives was assessed using weight for age. The proportion of malnutrition (P), was calculated as follows:

$$P = \frac{\text{Number of identified malnourished under fives}}{\text{Total number of under fives surveyed}} \times 100$$

In Mara region, a study of nutritional assessment using the weight for age index, over 30% of the children were found to be underweight and thus at risk of infection, which could in turn precipitate malnutrition (CARE International in Tanzania,1995). Recent analysis of the food and nutrition situation in Tanzania based on survey data show that the prevalence of various forms of

malnutrition is high for various groups of the population (Magambo,1993).

2.9.3 Protein Energy Malnutrition (PEM), Nutritional Status and Food Security

PEM is often defined as an inadequate intake of food in quantity and quality. More than one quarter of the population (28%) suffer from protein energy malnutrition and 32% from nutritional anaemia. The most affected group is the children under five years old (URT and UNICEF,1990; URT,1992). Mosha (1990b) states that national prevalence malnutrition ranges from about 2-7% for severe malnutrition and moderate malnutrition ranges from 30-45% with much regional and district level variation.

PEM affects on average 50% of the under fives at a moderate level including 5% at a severe level country wide (Mosha, 1992). These children are under weight (< 80% standard weight for age). In areas implementing child survival and development programmes this estimate has been lowered to between 30 and 40%. Chronic malnutrition

resulting in stunting affects, on the average, 35% of children in various areas of the country studied (Yambi *et al.*,1990). Fifteen percent of pregnant and lactating women suffer from all forms of malnutrition while 20% of the remaining groups are also affected. Anaemia affects 45% of those under five years old, 80% of vulnerable women and 20% of the rest of the population. Iodine Deficiency Disorders (IDD) affect 13% of the under fives, 52% of vulnerable women and 40% of the remainder. Meanwhile, Vitamin A Deficiency (VAD) affects 30% of the under fives (TFNC,1991; Magambo,1993).

Nutritional status as measured by quality of food consumed has been considered by many as an important indicator of household food security. Food shortages tend to be reflected first and foremost in children in the form of retarded growth (Wandel and Holmboe-Ottesen,1992). The main dietary reason behind high levels of PEM in Tanzania is inadequate intake of "total food" energy (Lukmanji,1987). It is common in Tanzanian households for slightly older children to eat from the same plate, thus the amount of food consumed in relation to the number of

children becomes important. Quite often, food is not prepared specially for children and the consistency may limit intake for small children (Lorri and Kavishe,1990).

The problem of food insecurity is wide spread and chronic. Although not in the acute sense, the high prevalence of stunting is evidence of the existence of widespread chronic food shortages. The clinical picture of PEM, standing at just under 10 percent, implies the presence of both a chronic relative food deficiency (Kwashiorkor) and an acute absolute food deficiency (marasmus). In terms of food security, the implication is that probably twice as many households suffer from acute as compared to chronic food insecurity (Wagao,1991).

2.9.4 Feeding Frequency, Type of Weaning Foods, Nutritional Status and Food Security

Several studies in Tanzania, have shown that the most important factor for the low food intake among young children is the very low feeding frequency only 2-3 times per day. For instance, in the Kilosa Nutrition survey, it

was shown that 41% of the children were fed two times a day with cereal gruels, mostly maize-based porridge, as the most common weaning food. A young child needs to be fed 5-6 times a day, given the bulkiness of most weaning foods used in Africa (UNICEF,1985; Jonsson,1986; Seenappa,1987; Kingamkono,1987).

Feeding frequencies of less than four times a day have been associated with poor nutrition as compared to higher frequencies (URT,1992). The most frequently fed child grows and develops better than the less frequently fed baby (Kisanga and Bunga,1983). In Tanzania, eating frequencies are low, on average twice or three times a day in children under-five years. Because of their small stomach, children unlike adults, need to eat more frequently in order to meet their daily energy needs (URT and UNICEF,1990; Kavishe, 1993). The low number of meals per day and the low energy density of foods are the main causes of inadequate dietary intake and so malnutrition (Kavishe *et al.*,1990; Jonsson, 1986b; URT,1992).

A study conducted in Morogoro region found that most children were fed only once or twice per day with plain maize flour porridge (UNICEF,1985; Ishengoma,1992). URT and FAO (1992) data pointed out that the dominant weaning diet is plain maize porridge in 80-100% of households. Pulses were mixed with porridge in 0-40% of households. Mascarenhas (1983) found that in about half of the households studied, the pre-school children got only one or two meals a day. The recommended feeding frequency is 4-6 times a day (Jonsson,1986b; Kavishe,1993). The way of feeding also affects the total amount of food consumed.

In the Kilosa Nutrition Surveys it has been shown that 41% of the children were fed two times a day. Maize-based porridge was the most common weaning food consumed on average twice a day (Lorri and Kavishe,1990). Cereal based gruel or porridge has a low energy density, which requires higher feeding frequencies (Jonsson,1986b; Wangara,1988). The Maternal Child Health (MCH) clinics recommend to add milk, groundnut flour or fish meal to the porridge but most of the households can not afford them. Children's food that is composed of porridge only is inadequate in

terms of nutrient content (Wangara,1988). Generally, in Tanzania, the typical weaning foods are bulky, thus of low energy and nutrient density (Yambi *et al.*,1990).

Some of the factors which can influence the frequency of meals and the content of the meals taken by a household include women's contribution in terms of their labour time allocated to various activities in the household, cash income they earn from non-farm activities and food availability in the household (Lukmanji,1987). It has been reported by Gadiel (1986) that failure of many households to secure sufficient food either through production or purchasing from market have been the major cause for low frequency of feeding per day.

However, reports by ILO (1984) indicate that lack of a cheap and reliable source of fuel is another important factor which affects the frequency of feeding per day and the whole feeding pattern in the households. As a result of lack of fuel (energy) some households are obliged to reduce the number of meals prepared per day or avoid preparing foods which require a long time to cook, for

instance beans. The author, however, concluded that as the frequency of feeding decreases inadequate intake of calories, proteins and other nutrients will be the outcome. Therefore, such poor nourishment leads to poor nutritional status of children and pregnant and lactating mothers. Missano (1993) added that feeding frequency of less than four times a day in children under five years is associated with poor nutrition.

Inadequate food intake is the immediate cause of malnutrition. A complete lack of food in the household will, of course, reduce the feeding frequency immediately and cause starvation (Jonsson,1988). According to Wagao (1991) inadequate food intake could be caused by food shortages due to poor production, storage/processing or poor food distribution.

In Tanzania, 40-60% of rural children under five years are undernourished. They are below 80% of the standard weight for age. Six to seven percent of children are severely undernourished (below 60% of standard weight for age), mainly due to insufficient frequency of feeding,

inadequate weaning foods, low intake of animal protein by growing children, and women's workload (URT and UNICEF,1990; URT and FAO,1992).

2.9.5 Seasonal Variability, Food Production and Distribution, Nutritional Status and Food Security

The difference in the nutritional status level is likely to be due to seasonal effects. According to FAO/TFNC (1992) after harvest during the months of September to November, levels of malnutrition are lower than during the months of January to April (Markey,1990). Seasonal variability in dietary intake has been studied in some parts of the country. A two period village study in Morogoro region distinguished two periods: lean and abundance (post-harvest). From the findings it is estimated that the post-harvest energy intake was about 11% more than it was during the lean period (Wagao,1991).

Studies done by Seeneppa (1987) revealed that increased food production does not by itself achieve anything unless

associated with an equitable distribution to last until the subsequent main harvest, at the household level. Jonsson (1986b) in his studies in Iringa (Tanzania), discovered that despite the high harvest records at the regional and district levels, a good number of the households did not have adequate food supplies to bring them up to the next harvest. These were the very people with highest incidences of malnutrition.

A study conducted by TFNC during 1984/85 in Morogoro revealed a widespread malnutrition and nutrition related disorders, despite the record harvest of food grains (UNICEF,1985). Considering this, theoretically, there should not have been any malnutrition. This however, draws attention to the actual pattern of food distribution between the districts, wards, villages and even between and within households and accessibility among the individuals (Jonsson,1986b). Therefore, having sufficient food in a country or household does not by itself ensure elimination of malnutrition (WHO,1981). FAO (1981) suggested that steps must be taken to ensure equitable food distribution within regions, villages and

particularly in the households to avoid victimization of women and children.

In a study on household food security and its impact on the nutritional status of children in selected households in Morogoro Urban (Mosha,1988), the results revealed the existence of a direct relationship between poor nutritional status of the underfives and food insecurity. Most households had insufficient food and had hunger periods of various lengths in which households had no food. Factors like large household size and composition, low food production and consumption, food wastes, lack of income, ignorance and food habits had a significant effect in causing food insecurity to the household members. High incidences of malnutrition were observed where food insecurity was more pronounced.

Lack of nutrition education is among the factors that affect household food intake and distribution (TFNC,1986). Andersen (1983) reported that often lack of proper education, dietary practices, taboos, food restrictions and a set of other socio-cultural aspects have been blamed

for precipitating poor nutritional status. Mudambi and Rajagopal (1981) and TFNC (1985) reported that some unsatisfactory methods of food preparation and unhygienic storage and preservation can reduce the nutritional value of the available foods. Consequently, even in places where food is available, poor food preparation, storage and preservation, together with improper handling and distribution within the households can endanger the food security of its members.

Many steps have been taken to improve the food production and consumption situation but the frequency of malnutrition does not seem to have changed much over the years. Perhaps, the most important of these are the growing numbers of people who recognize the reality and nature of the food insecurity problem, particularly at the household level. Being aware of the situation, the government decided to establish a household food security programme with a goal of eradicating malnutrition through increased food production and consumption at the household level (TFNC,1983; Mosha,1988).

Food security is of supreme importance in improving the nutritional status of many millions of people who suffer from persistent hunger and undernutrition and many others who are at the risk of facing the same situation. Ensuring household food security is a necessary condition for improving nutritional status, but, by itself, it is not sufficient. The nutritional status of each member of the household depends on three conditions being met: the food available to the household must be shared according to individual needs; the food must be of sufficient variety, quality and safety; and each family member must have good health status in order to benefit nutritionally from the food consumed (NATURA - NECTAR,1993).

NATURA-NECTAR (1993) concluded that food security and nutritional well-being arising from food consumed by households is determined by at least five interrelated factors:

- Availability of food through market and other channels.

- Ability of households to acquire whatever food the market and other sources have to offer, which is a function of household income levels and flows and the resource base for subsistence farming.
- Desire to buy specific foods available in the market or to grow them for home consumption, which is related to food habits, intrahousehold income control, and nutritional knowledge.
- Mode of preparation and to whom the food is fed, which is influenced by income control, time constraints, food habits, and nutritional knowledge.
- Health status of the individuals, which is governed by the nutritional status of the individual, nutritional knowledge, health and sanitary conditions at the household and community levels, and care taking, among others.

When food production data are related to information regarding child malnutrition and mortality a paradoxical relationship is found. There is no clear relationship between child malnutrition and mortality at both the regional and district levels. It is noteworthy at those

areas with large volumes of food also suffer from high rates of malnutrition and child mortality. The reason for this discrepancy seems to be that availability of food does not guarantee its accessibility due to social and/or economic constraints including education. Thus, household food security is clearly more than food production alone (Kavishe *et al.*,1990).

More recent efforts have focused on bringing developing countries closer to self-sufficiency in food production. Substantial agricultural research has been devoted to the development of improved technologies and methods of increasing food crop yields in food deficit countries. Yet, for various reasons, food shortages and malnutrition continue to plague many developing countries, particularly in Sub-Saharan Africa (Ohiorhenuan,1991; Doss and Olson, 1991). Efforts to promote food security at the household level in order to reduce malnutrition would require a mixture of improvements in production and productivity, increases in income and diversification of income sources, improvements in distribution and marketing, access to services, education and social relations that place the

burden of work on women (Yambi *et al.*,1990).

URT/UNICEF (1990) and FAO/WHO (1992c) concluded that food security is of supreme importance in improving the nutritional status of many millions of people who suffer from persistent hunger and undernutrition and many others who are at risk of facing the same situation. Ensuring household food security is a necessary condition for improving nutritional status, but by itself, it is not sufficient. The nutritional status of each member of the household depends on several conditions being met: the food available to the household must be shared according to individual needs, the food must be of sufficient variety quality and safety; and each family member must have good health status in order to benefit nutritionally from the food consumed. Food insecurity leads to much human suffering. In addition, it results into substantial productivity losses due to reduced work performance, lower cognitive ability and school performance and reduced income earnings. Food security and adequate nutrition are beneficial outcomes in themselves, as well as important inputs to economic development. Improvements in the

nutrition of women and children depend on income and food security.

The problems of hunger and food insecurity have global dimensions and are likely to persist and even increase dramatically in some regions, unless urgent, determined and concerted action is taken, given the anticipated increase in the world's population and the stress on natural resources (FAO,1996j). FAO (1996b) revealed that unless the international community and national governments address the causes underlying food insecurity and undernutrition the number of undernourished people will remain unacceptably high in the decades to come. By 2010 an estimated 700 to 800 million persons worldwide would still be chronically undernourished. In Sub-Saharan Africa alone the numbers would expand by 50% to more than 300 million people.

FAO (1996e) reaffirm that a peaceful, stable and enabling political, social and economic environment is the essential foundation which will enable states to give adequate priority to food security and poverty

eradication. Democracy, promotion and protection of all human rights and fundamental freedoms, including the right to development and the full and equal participation of men and women are essential for achieving sustainable food security for all. The sustainable development policies will promote full participation and empowerment of people, especially women.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter describes the methodology which was used to collect and analyze the data. The chapter presents description of the study area, research design, population and sampling procedure, instrumentation and data collection and analysis.

3.2 Description of the Study Area

The study was conducted in Morogoro rural and Kilosa districts within six villages namely: Fulwe, Melela, Msufini (Morogoro rural) and Kidoma, Kimamba and Dumila (Kilosa district). The two districts are among the five administrative districts of Morogoro region (Fig.5). Morogoro rural and Kilosa districts were chosen for this study, firstly as a case representing seasonal food shortages. Secondly, this was due to easy accessibility and thirdly due to differences in society set up. Morogoro rural is a matrilineal society while Kilosa is a patrilineal society. Morogoro rural and Kilosa districts are characterized by both semi-humid and humid climates.

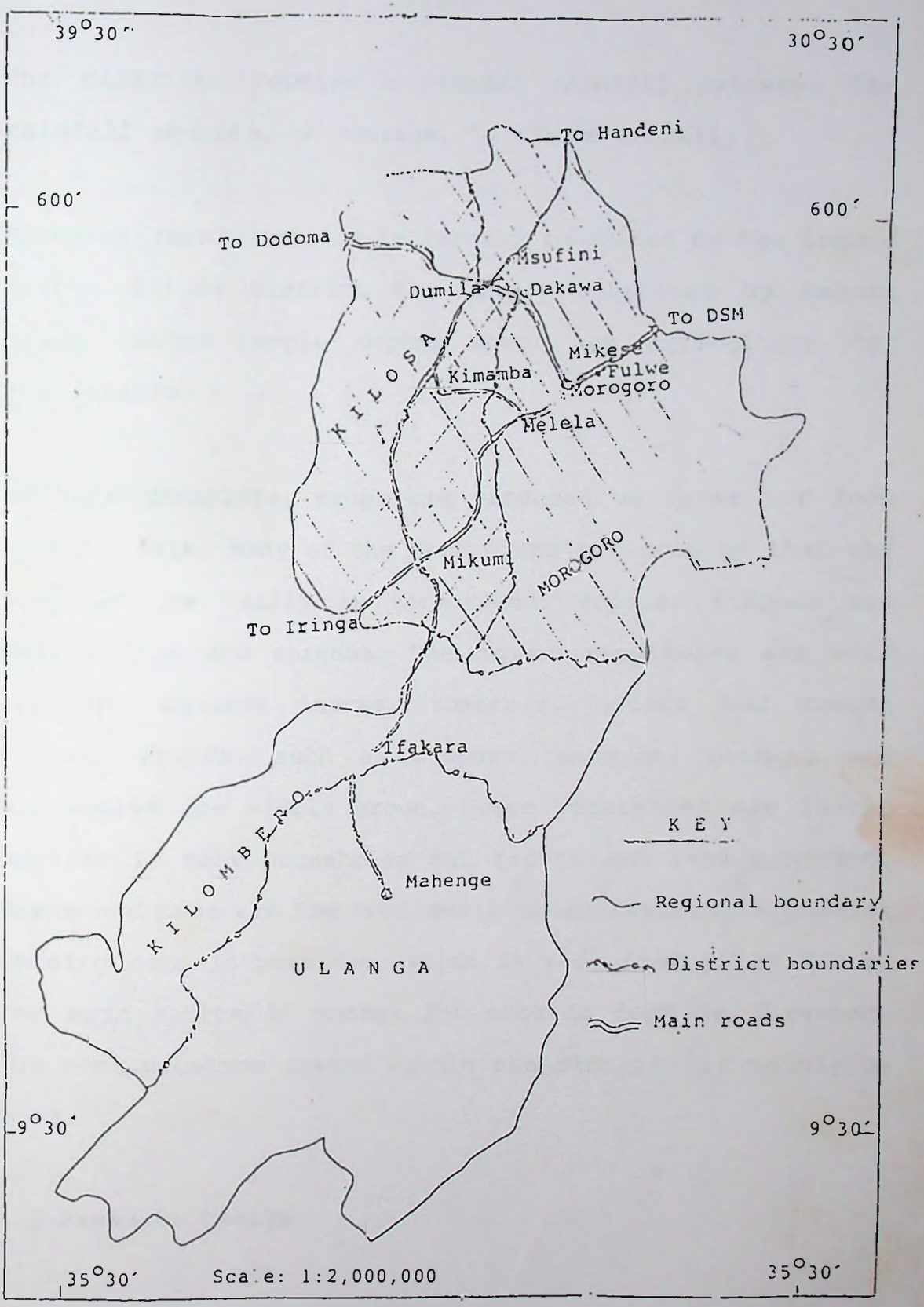


Fig 5. Morogoro region: Location of Morogoro rural and Kilosa districts (study area)

The districts receive a bimodal rainfall pattern. The rainfall amounts, on average, to 800 mm annually.

Morogoro rural district is largely inhabited by the Luguru tribe. Kilosa district is largely inhabited by Kaguru tribe. These people depend mostly on agriculture for subsistence.

In both districts, crops are produced on farms for food and for sale. Many of the food crops are sold so that the food of the family is threatened. Popular staples are maize, rice and sorghum. The common vegetables are wild spinach, cassava leaves, tomatoes, onions and cowpea leaves. Fruits, such as pawpaws, mangoes, oranges and pineapples are widely grown. Green vegetables are fairly popular in many households but fruits are less consumed. Beans and peas are the dominantly eaten legumes. A popular weaning food is porridge, which is made from maize flour. The main source of energy for cooking food is firewood. The communication system within the district is mainly by road.

3.3 Research Design

A longitudinal survey design, covering two cropping seasons was used in this study. Such a design according to

Jellife (1974) detects relationships over a long period of time, thus giving a
true picture of the situation. It covers the seasonal variations that are so important and so frequently underestimated; and provides information during the whole year. Almost inevitably one finds large amounts of the information becoming available.

3.4 Population and Sampling Procedure

The population for the study consisted of the household members, especially women and men in the study area.
A purposive sampling technique was adopted to select three villages in Morogoro district and three in Kilosa district. The selection criterion for the villages was based on accessibility of the village. A representative sample for the study from each village was based on Boyd's formula n/N x 100 = C, where C represents a figure greater or equal to five percent of the village household population, N is the total households in the village and n is the number of selected households (Boyd *et al.*,1981). A fixed whole number of the households was selected and calculated by using Boyd's formula resulting to 5% or closest to 5% (as long as it is above 5%) of the total households in the village. These households were used to get the information needed in the basic survey (data

collection). The sampling frame was based on a village register and respondents were selected by random sampling procedure. Fifty percent of the selected households in each village were selected by random sampling procedure for the continuous data collection. Table 11 shows the village households and sampled households in the study area. Table 12 shows the sample size in the study area.

Table 11. The village households (N), household sampled (n) and percentage of sampled households

Villages	Number of Villlage households (N)	Number of sampled households (n)	Percent of sampled households
Fulwe	1137	57	5.0
Melela	800	40	5.0
Msufini	388	20	5.2
Kidoma	615	31	5.0
Kimamba	850	43	5.1
Dumila	1013	51	5.0

Source: Survey data 1994/95

Table 12. The sample size in the study area and percent of sampled households (mothers)

Village	Female	Male	Total	Number of sampled households	Percent of sampled household (mothers)
Fulwe	57	57	114	57	29
Melela	40	40	80	40	20
Msufini	20	20	40	20	10
Kidoma	31	31	62	31	16
Kimamba	43	43	86	43	22
Dumila	51	51	102	51	26

Source: Survey data 1994/95

3.5 Instrumentation and Data Collection

Primary data were collected by using the questionnaire. This was in three stages:

(i) A preliminary survey was conducted for a larger number of villages before a more intensive study was done on fewer villages. The preliminary survey was very important to obtain general information about the village and for familiarization and introduction of the study objectives to the village government. During the preliminary survey, a list of relevant guidelines and questions were used to guide the discussions with the respondents. To ensure validity, ten members from five households in Mikese village were interviewed. The main

reason of pre-testing was to identify any shortcomings and assist in making modifications in some questions before the actual data collection. A structured questionnaire was used to gather information during the actual survey (Appendix. 1).

(ii) Basic data collection: These data included information on personal characteristics, food production and supply, stability and accessibility, factors limiting the contribution of women to household food security and the extent of women involvement in household coping strategies during food shortages. Food accessibility was determined through qualitative indicators, establishing the source and measuring the content of the meals. Frequency of meals per day was also used to determine the food accessibility. This approach was adopted from Kabeer (1990) who did a study in rural Bangladesh and noted that such qualitative indicators were a good measure of household food security.

(iii)Continuous data collection: Data on different activities performed by women relative to men were collected. This also involved the observation method. The observed data on what was happening in the homes and fields, gender work performance and general appearance of the area was noted in a notebook for additional

information. Open ended questions were added to probe deeper for additional insights into the information collected. The continuous data collection was mainly performed during land preparation, planting, weeding, harvesting and post-harvest periods.

Data for nutritional status were collected by utilizing anthropometric measurements (weight for age) of a selected sample of under five years old children. One trained enumerator from each of the six villages sampled assisted the researcher in the data collection after an initial training of two days. Two household members preferably husband and wife were interviewed in their homes after an initial appointment through the village chairman and the ten cell leader. There were few cases of singles, widows and separated couples.

Secondary data on the aggregates of food production were obtained from reports and other documents from National Agricultural Library at SUA, Regional and District Agricultural offices, Food Security Department, Tanzania Food and Nutrition Centre (TFNC), Institute of Resource Assessment (IRA), Food and Agriculture Organization (FAO) and other related sources.

3.6 Data Analysis

3.6.1 Qualitative Analysis

Data collected was analyzed using programmes from the Statistical Package for the Social Sciences (SPSS). Food production and supply were analyzed. The amount of cereal (maize, rice and sorghum) available was taken as an indicator of food security in Morogoro rural and Kilosa districts. The cereal quantities were 90 percent of acceptable quantities for good household food security, which should be about 3 bags for direct consumption per individual per year (Kingamkono,1987; Mosha,1990). This method was preferable to the other method recomends on 2780 Kcal/person/day (FAO/WHO/UNU,1985) because it is easier and understandable to be used by the respondents for their future plans in household food security.

Frequency distributions and cross tabulations were used in analyzing food accessibility, food stability, factors limiting the contribution of women to household food security, and the coping strategies. The role played by women relative to men was analyzed by frequency tables. Malnutrition is one of the indicators commonly used in assessing food security situation (Kabeer,1990). In this study, a proxy for malnutrition the weight for age of

chidren under five was used. The proportion of malnourished under fives was calculated.

The chi-square analysis of independence/dependence was computed in establishing the relationship between an indicator of nutritional status (weight for age) and indicators of factors contributing to variations in nutritional status. Cross tabulations identified different degrees of nutritional status among the population. The variables included women's income, cultivated hectareage for food crops, harvested food crops, storage of food up to the next harvest, the size of household, under five children feeding frequency and type of foods.

3.6.2 Regression Analysis

Multiple Regression analysis was used to determine the contribution of women to household food security. The regression was used so as to aid in drawing inferences on the target population using the sample data. Multiple regression analysis provide a measure of relations among a set of variables for the purpose of predicting the dependent variable or estimation of specified coefficients. One way of comparing the contribution of women to household food security relative to men was to look at those factors that influenced total bags of maize

produced (where a bag was equivalent to 100 kg; maize was the main food crop in the study area). In this case the contribution of women to household food security was examined by determining the contribution of women's labour (in terms of hours) to the total bags of maize produced (a predictor of household food security).

Total number of bags of maize produced was a fuction of many factors. The following factors were hypothesized to influence total bags of maize production: hours spent by women in planting, weeding, harvesting and processing food crops. Also, education level and quantity of fertilizer (in bags of 50 kg) applied were hypothesized to influence total bags of maize produced. Hours spent by women in transporting crops home from fields and in marketing were hypothesized to be of no influence to total bags of maize produced. Total bags of maize production was regressed against ratio of labour hours (women/(men + women)) in order to determine the contribution of women to total production, hence their contribution to household food security. In this case, the linear relationship was hypothesized, implying use of an ordinary least square regression model.

The model was specified as follows:

$$Y = B_o + B_1P_f + B_2P_m + B_3W_f + B_3W_m + ---B_{if} + B_{im} + e$$

where Y = Total bags of maize production

B_o = constant

B_i = The coefficients for all variables

P_f = Hours spent by females in planting seeds

P_m = Hours spent by males in planting seeds

W_f = Hours spent by females in weeding

W_m = Hours spent by males in weeding

H_f = Hours spent by females in harvesting

H_m = Hours spent by males in harvesting

T_f = Hours spent by females in transporting crops home from fields

T_m = Hours spent by male in transporting crops home from fields

PC_f = Hours spent by females in processing food crops

PC_m = Hours spent by males in processing Food crops

M_f = Hours spent by females in marketing surplus crops

M_m = Hours spent by males in marketing surplus crops

E_f = Female education level

E_m = Males education level

Fert = Quantity of Fertilizer applied in bags (a bag is equivalent to 50 kg).

e = Error term

The assumption in this model is that women's labour in planting (P_f), weeding (W_f), harvesting (H_f) and proccessing PC_f) are hypothesizing for a positive effect in total bags of maize production. It means that an hour change of women's labour in planting, weeding, harvesting and proccessing has a relative effect on the total bags of maize production hence household food security. Education level (E_f) and the quantity of fertilizer (in bags of 50 kg) applied were hypothesised to have a positive effect in total maize production (bags).

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Introduction

This chapter presents the results of the study. It discusses characteristics of the respondents, household food security situation in the study area (food production and supply, stability and accessibility), the role played by women relative to men in the household food security and the extent of women involvement in the household coping strategies during food shortages. The main factors limiting the contribution of women to household food security are also discussed.

4.2 Characteristics of Respondents

4.2.1 Age

The distribution of respondents (484 of which 242 were females and 242 were males) by age is presented in Table 13. The respondents were grouped into four age groups based on whether they were children, young adults, adults or old citizens. None of the respondents were under 18 years of age. The remaining 10.7% of the respondents were between 18 and 25 years, 71.9% were between 26 - 55 years.

Table 13. Age distribution of the respondents in the sampled households

Age (Years)	Female		Male		Total	
	Number	Percent	Number	Percent	Number	Percent
18 - 25	42	17.4	10	4.1	52	10.7
26 - 55	179	74.0	169	69.8	348	71.9
Above 55	21	8.6	63	26.1	84	17.4
Total	242	100.0	242	100.0	484	100.0

These two groups were taken as the economically active age group.

Only 17.4% of the respondents were above 55 years old, a group classified as economically not active. The majority (82.6%) of the respondents being in the economically active age group, therefore made the study area to be treated as being in a good food security situation in relation to availability of active labour for production of enough food to meet household needs.

The results also showed that more women (91.4%) were in the economically active age group than men (73.9%). In this study, it was also assumed that most activities of household food security were performed by economically active respondents. Therefore, this simply implied that women were more economically active in household food security activities relative to men. The results of this

study on active labour distribution both on the basis of age and sex compared well with earlier documentation by FAO (1988) that the issue of food security cannot be properly addressed without recognising the important role of rural women. Women play a significant part in food security (Gittinger,1990; Missano,1993). Women are the world's farmers and in Africa most food is produced by women (Dankelmen,1988; Jonsson,1988; FAO,1996a).

4.2.2 Marital Status

Table 14 summarises the information on sampled households in relation to marital status.

Table 14. Marital status in the sampled households

Marital status	Female		Male		Total	
	Number	Percent	Number	Percent	Number	Percent
Single	3	1.2	1	0.4	4	0.8
Married	234	96.8	239	98.8	473	97.8
Widow	4	1.6	1	0.4	5	1.0
Divorce/ separate	1	0.4	1	0.4	2	0.4
Total	242	100.0	242	100.0	484	100.0

In this study the married, single, widow and separated couples were 97.8%, 0.8%, 1.0% and 0.4%, respectively. It seems that the food production in the surveyed households was mostly an affair involving married couples as is clearly shown by the majority.

4.2.3 Family Size

The mean family size for the sampled villages ranged between 5.3 to 8.2 (Table 15).

The mean of the entire population of the six villages, which formed the study area, was 6.6. Generally, the family size of each of the villages or of the total households sampled in the

Table 15. Family size in the sampled households

Village	Mean ± SD	Cases
Fulwe	6.6 ± 3.4	114
Melela	5.3 ± 2.4	80
Msufini	6.0 ± 2.5	40
Kidoma	5.7 ± 2.0	62
Kimamba	8.2 ± 3.5	86
Dumila	7.3 ± 3.6	102
Entire population	6.6 ± 3.2	484

study area was slightly higher than the National average which stood at 5 (Tanzania Population Census,1988). Big family size is one of the factors contributing to food

insecurity (Lorri and Kavishe,1990). Details on the household composition are shown in the Appendices 2a - 2c on pages 334 - 335.

4.2.4 The Head of the Household by Sex of the Respondent

Table 16 shows, based on the sampled households, the distribution of households heads by sex.

Table 16. Distribution of heads of households by sex of respondent

Response	Female		Male	
	Number	Percent	Number	Percent
Yes	21	8.7	227	93.8
No	221	91.3	15	6.2
Total	242	100.0	242	100.0

Among the respondents interviewed in the study area, males dominated (93.8%) as heads of the households. Only 8.7% females were heads of the households. These were either singles, widows, divorce or separated couples and or married women who pointed out to be the head of the housheols. Usually, heads of the households are the decision makers in the households, for the different activities undertaken. From the study, the majority of the women not being heads of the households, hints marginalization of their contribution in decisions made in

the households. Such constraints could easily contribute to food insecurity taking into consideration that they formed the majority of the active labour force in the households. These findings are quite in agreement with those encountered by Aarnink and Kingma (1991) who reported that women span of manoeuvre in household decision making is drastically curtailed by customs and patriarchal power with exception in the matrilineal set up. Surprisingly, although the effect of matrelinearity was expected to feature promineatly in the study, this was not the case. The effect of matrilinearity on food security in the study area was insignificant for two possible reasons:

(i) In-migration and intermariages of different ethnic groups and

(ii) The economic changes (similar observations have been reported by Swantz (1998) on similar studies in Mtwara and Lindi, where little or no in-migration has taken place.

4.2.5 Education Level of Respondents

It was expected that the extent to which the respondents were educated would influence the situation of household food security in the study area. Table 17 indicates the education level of the respondents in the study area.

Table 17. Level of education of respondents in the study villages

Education level	Female		Male		Total	
	Number	Percent	Number	Percent	Number	Percent
No formal education	66	27.3	33	13.6	99	20.5
Adult education	42	17.4	47	19.4	89	18.4
Primary education	133	54.9	153	63.3	286	59.1
Secondary education	1	0.4	9	3.7	10	2.1
Total	242	100.0	242	100.0	484	2.1

The data indicate that the majority (59.1%) of the respondents had primary school education as their highest education level. Of these, 63.3% were male and only 54.9% were female. The respondents who had no formal education formed 20.5% of the sample. Again, of these, there were less men (13.6%) than women (27.3%). Education is one of the constraining factors on women's full participation in household food security (Uwakah *et al.*,1996). These findings are supported by Agarwal and Anand (1982); Collier (1989) and Makundi (1996) that women have limited access to training and other basic resources that could facilitate their tasks and increase their productivity and hence their household food security.

4.3 Food Production and Supply

4.3.1 Cultivable Area Within the Village

As gathered from Table 18 it seems evident that almost all respondents (99.8%) produced food for their households. The majority (32.8%) of the respondents had 0.9-1.3 cultivable hectares within the village. Whereas other respondents (22.1%) had above 2.3 hectares, 21.4% had 1.4-1.8 hectares and 18.4% of the respondents had 0.4-0.8 cultivable hectares within the

village. For most respondents, availability of cultivable land was not a problem to household food security.

4.3.2 Cultivable Area Outside the Village

Results from Table 19 show that 64.0% of the respondents did not have cultivable land outside the village. However, 12.4% of the respondents had 0.9-1.3 cultivable hectares outside their villages. All respondents in Kimamba had their cultivable land outside their village. This was true with Kimamba because the respondents hired the land they cultivated from the sisal estate under a certain agreement of payment. It was assumed that having land away from homestead influenced household food insecurity in the study area.

Table 18. Cultivable area within the village

Cultivable area (hectares)	Villages													
	Fulwe		Melela		Msufini		Kidoma		Kimamba		Dumila		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Less 0.4	1	0.9	0	0.0	2	5.0	0	0.0	0	0.0	0	0.0	3	0.7
0.4 - 0.8	7	6.1	10	12.5	10	25.0	20	32.3	6	75.0	21	21.4	74	18.4
0.9 - 1.3	28	24.6	20	25.0	12	30.0	31	50.0	2	25.0	39	39.8	132	32.8
1.4 - 1.8	34	29.8	20	25.0	4	10.0	9	14.5	0	0.0	19	19.4	86	21.5
1.9 - 2.3	5	4.4	6	7.5	6	15.0	0	0.0	0	0.0	1	1.0	18	4.5
Above2.3	39	34.2	24	30.0	6	15.0	2	3.2	0	0.0	18	18.4	89	22.1
Total	114	100.0	80	100.0	40	100.0	62	100.0	8	100.0	98	100.0	402	100.0

4.3.3 Area Under Cultivation Within the Village

Data from Table 20 revealed that most (40.4%) of the respondents cultivated an area of 0.9-1.3 hectares within the village. The cultivated 0.9-1.3 hectares with low technology, is inadequate for the average national households size. For adequate household food production 2.1 to 5.0 hectares should be cultivated. These findings are supported by Malima (1993) that small plots which are poorly managed, result in low yields. This in turn results in food insecurity, hunger and poverty.

4.3.4 Area Under Cultivation Outside the Village for the Sampled Households

Table 21 summarizes the area under cultivation outside the village. About 60% of the respondents reported as not having a cultivated area outside their villages. Over 50% of respondents in Kimamba cultivated the area of above 2.3 hectares. Most of the farming in Kimamba was done outside the village due to land constraint. This might result in food insecurity in the households due to high transportation costs and post-harvest losses.

Table 19. Cultivable area outside the village

Cultivable area (hectares)	Villages													
	Fulwe		Melela		Msufini		Kidoma		Kimamba		Dumila		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
None	105	92.1	72	90.0	35	87.5	29	56.9	0	0.0	59	58.4	300	64.0
Less 0.4	0	0.0	0	0.0	0	0.0	0	0.0	2	2.4	0	0.0	2	0.4
0.4 - 0.8	6	5.3	2	2.5	3	7.5	15	29.4	11	13.3	21	20.8	58	12.4
0.9 - 1.3	1	0.9	2	2.5	0	0.0	6	11.8	16	19.3	8	7.9	33	7.0
1.4 - 1.8	2	1.7	0	0.0	2	5.0	1	1.9	15	18.1	5	4.9	25	5.3
1.9 - 2.3	0	0.0	2	2.5	0	0.0	0	0.0	9	10.8	1	1.0	12	2.6
Above 2.3	0	0.0	2	2.5	0	0.0	0	0.0	30	36.1	7	6.9	39	8.3
Total	114	100.0	80	100.0	40	100.0	51	100.0	83	100.0	98	100.0	469	100.0

Table 20. Area under cultivation within the village

Cultivable area (hectares)	Villages													
	Fulwe		Melela		Msufini		Kidoma		Kimamba		Dumila		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Less 0.4	3	2.6	0	0.0	3	7.5	2	3.2	0	0.0	1	1.0	7	1.7
0.4 - 0.8	15	13.3	16	20.0	16	40.0	27	43.5	6	75.0	26	26.5	106	26.4
0.9 - 1.3	51	44.7	31	38.7	14	35.0	29	46.9	1	12.5	36	36.7	162	40.4
1.4 - 1.8	12	10.5	11	13.8	2	5.0	2	3.2	6	12.5	16	16.4	44	10.9
Above 1.8	33	28.9	22	27.5	5	12.5	2	3.2	0	0.0	19	19.4	83	20.6
Total	114	100.0	80	100.0	40	100.0	62	100.0	8	100.0	98	100.0	402	100.0

Table 21. Area under cultivation outside the village

Cultivable area (hectares)	Villages													
	Fulwe		Melela		Msufini		Kidoma		Kimamba		Dumila		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
None	106	92.9	72	93.5	35	87.5	30	55.6	0	0.0	58	58	301	64.2
Less 0.4	0	0.0	0	0.0	0	0.0	0	0.0	2	2.4	0	0.0	2	0.4
0.4 - 0.8	6	5.3	3	7.5	3	7.5	16	29.6	12	14.3	21	21.0	61	13.0
0.9 - 1.3	1	0.9	0	0.0	0	0.0	7	12.9	16	19.0	12	12.0	38	8.1
1.4 - 1.8	0	0.0	5	5.0	2	5.0	0	0.0	10	11.9	2	2.0	14	3.0
Above 1.8	1	0.9	0	0.0	0	0.0	1	1.9	44	52.4	7	7.0	53	11.3
Total	114	100.0	80	100.0	40	100.0	54	100.0	84	100.0	100	100.0	469	100.0

4.3.5 Distance to Farm Outside the Village

Table 22 shows that the majority (49.1%) of the respondents who had farms outside their villages, were more than 4 km from their villages. It was evident from these results that for those respondents with farms outside their villages, such farms were too far from the homesteads. If the means of transport to these farms was by foot, this activity was exhaustive and greatly affected the productivity of these respondents. Reaching the farm early is so crucial from productivity point of view. It is clear from Table 23 that the commonest means of reaching the farm outside the village was by foot as encountered in 40.2% of the respondents in the study area. The results show that a significant amount of time was wasted on walking and this obviously resulted in low production, hence food insecurity.

Public transport was difficult to synchronize with farming activities. Therefore, it sounds logical for the respondents to be encouraged to invest in purchase of bicycles.

Table 22. Distance to farm outside the village in the sampled households

Distance (km)	Number	Percent
Less than 1 km	9	5.3
1 - 2	31	18.3
3 - 4	46	27.3
More than 4	83	49.1
Total	169	100.0

Table 23. Means of transport to the farm outside the village in the sampled households

Means of transport	Number	Percent
Foot	68	40.2
Bicycle	44	26.0
Car/bus	28	16.6
Foot/bicycle	26	15.4
Bicycle/bus	1	0.6
Foot/bus	2	1.2
Total	169	100.0

4.3.6 Time Taken to Travel to Farm by Respondents

Table 24 summarizes time required by respondents to reach their farms. The time taken for more than 75.0% of the respondents to reach their farms was 0.5 to 3 hours. The time needed for the returning home ranged between 1 and 6 hours. Therefore, the time spent on a return trip was from 1 to 6 hours. The fact that majority of the respondents

walk to their farms, spend long time to reach these farms and arrive there already exhausted was a vivid observation. This makes them less productive and leaves them with few hours of working before they start their journey home for other household chores. To reduce household food security in this context implies exploring means of minimizing this wasted time.

Table 24. Time taken to travel to the farm by respondents in the sampled households

Time (hours)	Number	Percent
Less than 0.5	27	14.2
0.5 - 1	83	43.7
2 - 3	61	32.1
More than 3	19	10.0
Total	190	100.0

4.3.7 Proportion of Farm Cultivated Within and Outside the Village

Tables 25 and 26 show the proportion of the farm cultivated within and outside the village. Generally, more than 60% of the respondents cultivated the whole farm within the village (Table 25). The percentage in Kidoma (83.3%), Dumila (82.8%) and Kimamba (77.8%) compared to other study villages. Most of respondents in these villages used tractors in cultivation. Use of hand hoe was

popular in Msufini (35%), Fulwe (43.9%) and Melela (48.8%) villages.

It is difficult to cultivate a big area with a hand hoe. This limitation therefore causes low production and hence household food insecurity for those depending entirely on use of hand hoe to produce enough food to feed their large households for the whole year. It is only 30% of the respondents who cultivated the whole plot outside the village (Table 26). Of this, almost all respondents in Kimamba (92.8%) cultivated the whole plot outside the village.

4.3.8 Reasons for not Cultivating the Whole Farm Within and Outside the Village

Table 27 show a summary of reasons for not cultivating the whole farm within and outside the village in the study area. Low capital was the main reason for not cultivating the whole farm within and outside the village as reported by the respondents (54.9% and 41.4% of the respondents respectively). Low capital and technology in combination were also pointed out (11.1% and 10.3%, respectively as limiting factors).

Table 25. Proportion of farm cultivated within the village

Response	Villages													
	Fulwe		Melela		Msufini		Kidoma		Kimamba		Dumila		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Yes	50	43.9	39	48.8	14	35.0	50	83.3	7	77.8	82	82.8	242	60.2
No	64	56.1	41	51.2	26	65.0	10	16.7	2	22.2	17	17.2	160	39.8
Total	114	100.0	80	100.0	40	100.0	60	100.0	9	100.0	99	100.0	402	100.0

Table 26. Proportion of farm cultivated outside the village

Response	Villages													
	Fulwe		Melela		Msufini		Kidoma		Kimamba		Dumila		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Yes	4	3.5	4	5.0	7	17.5	20	33.9	77	92.8	28	31.1	140	30.0
No	110	96.5	76	95.0	33	82.0	39	66.1	6	7.2	62	68.9	326	70.0
Total	114	100.0	80	100.0	40	100.0	59	100.00	83	100.0	90	100.0	466	100.0

Table 27. Reasons for not cultivating the whole farm within and outside the village

Reasons	Percentage within the village	Percentage outside the village
Infertile soil	7.8	13.8
Lack of labour	22.9	3.4
Low capital	54.9	41.4
Pests	1.3	3.4
Infertile soil and capital	0.7	0.4
Low capital and technology	11.1	10.3
Theft	1.3	3.4
Distance limiting factor	0.0	3.4
Labour and capital	0.0	13.7
Labour, capital, distance	0.0	3.4
Infertile soil, capital,		
Total	100.0	100.0

It can be concluded from the results that low capital was the main constraint for not cultivating the whole farm within and outside the village. Supplementary income, possibly from income generating activities seem logical as a means of minimizing the capital constraint that is limiting agricultural production and thus household food security. This is supported by Makundi (1996). Therefore, there is a great need to encourage respondents involvement in such economic ventures, on a profit making basis.

4.3.9 Harvesting Time for Different Cereals in the Study Area

Most of the harvesting started from June to July (Table 28).

Table 28. Harvesting time for different cereals in the study area

Months	Crops					
	Maize		Rice		Sorghum	
	Number of respondents	Percent	Number of respondents	Percent	Number of respondents	Percent
February	7	1.5	1	0.4	0	0.0
March	28	6.0	0	0.0	0	0.0
April	84	17.9	4	1.6	0	0.0
May	33	7.0	39	15.5	0	0.0
June	90	19.2	135	53.8	14	8.7
July	142	30.3	26	10.4	136	84.5
August	61	13.0	27	10.8	6	3.7
September	24	5.1	27	7.6	5	3.1
Total	469	100.0	251	100.0	161	100.0

The peaks of harvesting of maize, rice and sorghum were July, June and July, respectively. For these crops, 49.5, 64.2 and 93.2% of the households harvested the major part of their maize, rice and sorghum, respectively (within this period). During these harvesting months, there was expected to be a lot of food in the study area. This area was also expected to experience minimal malnutrition during harvesting months. This is true of the cereals to be harvested during these months (June - July) in most regions of Tanzania.

4.3.10 Month of Commencement of Eating Green Maize in the Sampled Households

Close to 80.0% of the respondents started eating green maize in March, April or May (Table 29). The rest, started eating green maize in January (3.0%), February (5.1%) and June (13.5%).

Table 29. Months of commencement of eating green maize in the sampled households

Month	Number	Percent
January	14	3.0
February	24	5.1
March	93	19.9
April	121	25.9
May	153	32.7
June	63	13.5
Total	468	100.0

4.3.11 Important Food Crops in the Sampled Households

The majority (61.2%) indicated maize and rice (staple food) were the important food crops (Table 30).

Only 16.1% reported maize alone as the important food crop. Maize and sorghum (13.0%) were indicated as number three in importance as food crops. Therefore, the main food crops in the study area were: maize, rice and

Table 30. Important food crops in the sampled households

Type of crop	Number	Percent
Maize	78	16.1
Rice	6	1.2
Sorghum	15	3.1
Maize and rice	296	61.2
Maize and sorghum	63	13.0
Rice and sorghum	5	1.0
Maize; rice and sorghum	21	4.3
Total	484	100.0

sorghum. In order to overcome the problem of food insecurity in the study area, there is need of increasing production of maize, rice and sorghum. Sorghum as a drought resistant food crop should be emphasised in those villages with limited rainfall.

4.3.12 Important Cash Crops in the Sampled Households

It was found from this study (Table 31) that 40.1% of the respondents, used rice and maize as cash crops.

Simsim (18.8%) was the next important cash crop after rice and maize. Cotton (12.4%) came after simsim. Rice and maize were both cash and food crops.

Table 31. Important cash crops in the sampled households

Cash crops	Number	Percent
Cotton	39	12.4
Simsim	59	18.8
Sunflower	30	9.6
Cotton and simsim	3	1.0
Simsim and sunflower	26	8.3
Cotton and sunflower	13	4.1
Cotton; simsim; sunflower	2	0.6
Rice and maize	126	40.1
sorghum	15	4.8
Maize and sorghum	1	0.3
Total	314	100.0

The study findings compare with those by Kingamkono (1989); Mosha (1990a); Wagao (1991) and Mngodo *et al.* (1996). Also, the results of this study relate to those of the agricultural survey done by the Bureau of Statistics in 1986/87 which revealed that as high as 41.0% of the rural households had their main source of income from sales of crops, especially food crops.

This situation contributes to household food insecurity (Lorri and Kavishe,1990; Makundi, 1996). In order to solve the problem of food insecurity, there is need to increase food crop production so that the respondents generate surplus for sale to increase household income.

4.3.13 Mean Production of Maize in the Study Area

Table 32 shows the mean production of maize in bags of approximately 100 kg.

Table 32. Mean production of maize in the study area

Villages	1995		1996	
	Number	Production (bags) Mean ± SE	Number	Production (bags) Mean ± SE
Fulwe	106	4.6 ± 0.4	104	7.8 ± 0.8
Melela	56	10.0 ± 2.4	63	7.0 ± 1.0
Msufini	40	2.5 ± 0.3	38	6.6 ± 1.0
Kidoma	51	5.7 ± 0.8	47	3.7 ± 0.5
Kimamba	83	40.9 ± 5.2	85	37.2 ± 3.2
Dumila	102	13.3 ± 1.0	102	10.2 ± 1.0
Entire population	438	14.0 ± 1.2	439	13.4 ± 0.9

Kimamba respondents harvested more maize in 1995 and 1996, (40.9 ± 5.2 and 37.2 ± 3.2 bags, respectively) compared to other villages. The least maize producer was Msufini (2.5 ± 0.3 and 6.6 ± 0.5 bags in 1995 and 1996, respectively). The high maize production in Kimamba and Dumila villages was justified by the fact that some of the respondents in these villages used tractors in their cultivation.

Consequently, relatively large area compared to Msufini or Kidoma, where most of the respondents used hand-hoe was cultivated. Furthermore, Kimamba and Dumila were more accessible, and most of the respondents used fertilizers and other agricultural inputs, such as improved seeds compared to other villages. This approach if applied to the other villages could help to increase production and thereby ensure household food security.

The entire mean maize production for all the study villages was 14.0 $\pm$ 1.2 bags in 1995 and 13.4 $\pm$ 0.9 bags in 1996. These results differ from those of Kingamkono (1987), where mean production was 9.3 bags of maize in Iringa region. However, although Iringa is a region neighbouring Morogoro region, still differences were obvious due to varying climatic conditions. The results of the study showed that there was a slight decrease in production of maize in 1996 when compared to 1995 production statistics. Similar observations elsewhere have been made by Rukuni and Eicher (1987); Ringia (1990); URT (1992a); WFP (1993). According to the authors, among the major causes of food insecurity low food production at the household level was cited.

4.3.14 Mean Production of Rice in the Study Area

The mean production of rice was as presented in Table 33.

Table 33. Mean production of rice in the study area

Villages	1995		1996	
	Number	Production (bags) Mean ± SE	Number	Production (bags) Mean ± SE
Fulwe	16	2.4 ± 0.3	24	1.8 ± 0.3
Melela	21	3.8 ± 1.1	37	3.8 ± 0.5
Msufini	29	5.9 ± 1.2	38	11.9 ± 1.1
Kidoma	59	8.9 ± 0.7	28	2.5 ± 0.5
Kimamba	36	5.1 ± 0.6	1	2.0 ± 0.0
Dumila	59	33.8 ± 5.2	51	13.8 ± 2.0
Entire population	220	13.6 ± 1.7	179	7.9 ± 0.7

It was found from this study that unlike with the case of maize production, Dumila produced more rice than the remaining villages in both years (33.8 ± 5.2 and 13.8 ± 0.0 bags in 1995 and 1996, respectively).

The least rice producer was Fulwe village (2.4 ± 0.3 bags and 1.8 ± 0.3 bags in 1995 and 1996, respectively). The entire mean rice production in 1995 was 13.6 ± 1.7 bags while it was 7.9 ± 0.7 bags in 1996 statistics. In general, there was a decrease in rice production in 1996 compared to 1995 statistics. This was due to low rainfall

in 1996 (770.2mm) compared to 1995 (1005.6mm). Rice being an important crop in food security raises the question that food insecurity could be minimized when efforts to increase production of this crop are made.

4.3.15 Mean Production of Sorghum in the Study Area

Table 34 summarizes the results of mean production of sorghum in the study area.

Table 34. Mean production of sorghum in the study area

Villages	1995		1996	
	Number	Production (bags) Mean ± SE	Number	Production (bags) Mean ± SE
Fulwe	3	0.7 ± 0.2	72	1.7 ± 0.1
Melela	62	7.7 ± 0.8	67	5.9 ± 0.4
Msufini	14	3.0 ± 0.6	7	2.8 ± 0.5
Kidoma	44	4.4 ± 0.6	30	1.9 ± 0.3
Kimamba	21	2.0 ± 0.4	1	1.0 ± 0.0
Dumila	0	0.0 ± 0.0	16	2.7 ± 0.6
Entire population	144	5.2 ± 0.4	193	3.3 ± 0.2

Melela was the main producer of sorghum in both years (1995 and 1996 producing 7.7 ± 0.8 and 5.9 ± 0.4 bags, respectively. The second leading village in sorghum production was Kidoma (4.4 ± 0.6 and 1.9 ± 0.3) bags in 1995 and 1996, respectively. Excluding Dumila, the least sorghum producer was Fulwe (0.7 ± 0.2 and 1.7 ± 0.1 bags

for 1995 and 1996, respectively).

In conclusion, Kimamba village was the main producer of maize while Dumila produced most of the rice. Of the study villages, Melela was the main producer of sorghum (Tables 32, 33 and 34). There was a general decrease in production of maize, rice and sorghum in 1996 compared to 1995. The results also showed that 51.6% of the respondents pointed out a decrease of food crop production in 1994/95. Variation in production was due to variable annual rainfall pattern (Table 4). Therefore, there is a need for improved storage so that in a good year of food crop production more food could be stored and thus carried to the following year as a remedy.

Based on recommendations by Mosha (1990a) that 3 bags of cereals per person per year are needed to ensure household food security for the year it can be concluded that the food in the study area was adequate in 1995 (5 bags per person per year) and (3.7 bags per person per year of cereals: maize, rice and sorghum in 1996). Although household food security data may seem to be adequate, the main problem of household food insecurity in the study area was due to early food crop sale (over 50% of crop production), leaving the household without enough food before the next harvest. As a consequence, households had to buy food for the rest of year. Improving food security in the study area and indeed in the region should go hand

in hand with storing enough and stopping early selling of food crops, thus reversing the mentioned trend. This relates with Makundi (1996) findings.

4.3.16 Mean Production of Cotton in the Sampled Households

The results in Table 35 shows that 35 respondents from Msufini produced cotton in 1996.

Table 35. Mean production of cotton in the sampled households

Villages	1995		1996	
	Number	Production (bags) Mean ± SE	Number	Production (bags) Mean ± SE
Fulwe	1	0.2 ± 0.0	2	10.2 ± 0.0
Melela	20	4.7 ± 1.6	35	6.0 ± 1.6
Msufini	2	0.9 ± 0.6	2	2.3 ± 2.3
Kidoma	0	0.0 ± 0.0	1	1.0 ± 0.0
Kimamba	0	0.0 ± 0.0	1	22.0 ± 0.0
Dumilla	0	0.0 ± 0.0	1	4.0 ± 0.0
Entire population	23	4.1 ± 7.0	42	6.3 ± 9.1

Kimamba produced more cotton than the other villages in the study area. From Table 35 it is noted that the cases of growing cash crops were too few, possibly because most of the respondents in this area grew maize, rice and sorghum as both food and cash crops as they had a readily available market. The results show that there was an increase in cotton production in 1996 compared to 1995. There is a need for more emphasis in the production in order to get more income. The rest of the villages with the exception of Melela, produced cotton. This was because

most people in the study area produced maize, rice and sorghum as both food and cash crops.

4.3.17 Mean Production of Simsim in the Sampled Households

The results in Table 36 reveal that the respondents cultivated more simsim as a cash crop compared to cotton and sunflower.

Table 36. Mean production of simsim in the study villages

Village	1995		1996	
	Number	Production (bags) Means ± SE	Number	Production (bags) Means ±SE
Fulwe	28	1.8 ±1.4	68	0.8 ±0.0
Melela	2	9.0 ±2.0	3	2.5 ±1.3
Misufini	8	0.8 ±0.1	17	1.3 ±0.3
Kidoma	8	1.6 ±0.3	16	2.2 ±0.1
Dumila	37	2.3 ±0.4	59	2.2 ±0.3
Entire population	83	2.1 ±0.3	163	1.4 ±0.1

In the study area, 163 respondents cultivated simsim while only 42 and 46 respondents cultivated cotton and sunflower respectively. There was a slight increase in simsim production in 1995 compared to 1996.

4.3.18 Mean Production of Sunflower in the Sampled Households

Table 37 summarizes the mean production of sunflower in the sampled households. Melela produced more sunflower compared to other villages. The production was almost constant in 1995 and 1996. There is a need to increase cash crops for household income. If possible, food crops

(maize, rice

Table 37. Mean production of sunflower in the sampled households

Villages	1995		1996	
	Number	Production (bags) Mean ± SE	Number	Production (bags) Mean ± SE
Fulwe	2	5.0 ± 0.0	2	0.5 ± 0.0
Melela	11	4.4 ± 1.0	33	4.8 ± 0.6
Msufini	0	0.0 ± 0.0	1	1.0 ± 0.0
Dumila	5	1.4 ± 0.5	10	1.0 ± 0.2
Entire population	18	3.6 ± 0.7	46	3.7 ± 0.5

and sorghum) should remain as food crops and sell only the surplus. To avoid endangering households food security, increased production of these dual purpose crops like maize and rice need to be stressed. This increase could be achieved through increased use of agricultural inputs (improved seeds and fertilizer), improved storage or expansion of farm size.

4.3.19 Response to Sale of Food Crops

About 40% of the respondents sold their food in the cropping year 1995. Only 15.5% sold this in the cropping year 1996 (Tables 38 and 39). The percentage was lower in 1996 compared to that of 1995 due to fear of being reprimanded by government officials as they are restricted from selling the green maize. Sale of food crops affects the household food security. This has also been hinted by Mosha (1990a) and Makundi (1996). Consequently, it seems logical to stress increased production to create surplus food that can be sold.

Table 38. Response on sale of food crops by respondents for cropping year 1995

Response	Villages													
	Fulwe		Melela		Msufini		Kidoma		Kimamba		Dumila		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Yes	11	9.6	39	48.8	28	70.0	7	11.3	52	60.5	55	53.9	192	39.7
No	103	90.4	41	51.2	12	30.0	55	88.7	34	39.5	47	46.1	292	60.3
Total	114	100.0	80	100.0	40	100.0	62	100.0	86	100.0	102	100.0	489	100.0

Table 39. Response on sale of food crops by respondents for cropping year 1996

Response	Villages													
	Fulwe		Melela		Msufini		Kidoma		Kimamba		Dumila		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Yes	2	1.8	10	12.5	29	72.5	5	8.1	29	33.7	0	0.0	75	15.5
No	112	98.2	70	87.2	11	27.5	57	91.9	57	66.3	102	100.0	409	84.5
Total	114	100.0	80	100.0	40	100.0	62	100.0	86	100.0	102	100.0	484	100.0

4.3.20 Reasons for Selling Food Produce

Table 40 shows the reasons for selling food produce. The main reason for selling food produce was to obtain cash. Other reasons pointed out were to avoid losses due to pests or sale was necessitated by lack of storage facilities. Only a small proportion sold the food because they had surplus food. The obvious solution to be taken could be to increase food produce coupled with improvement of storage structures. Such a move will help to improve household food security in the study area. In the absence of surplus food, sale of food produce will always affect the situation of food security in the household, leaving the respondents with inadequate stocks to last until the next harvest. Similar findings have been documented by FAO (1985); FAO (1996e) and URT and UNICEF (1997).

Table 40. Reasons for selling food produce in the sampled households

Reasons	1995		1996	
	Number	Percent	Number	Percent
To obtain cash	156	81.3	72	96.1
Avoid losses due to pests/no storage	2	1.0	2	2.6
Surplus	34	17.7	1	1.3
Total	192	100.0	75	100.0

Since the primary cause of sale of food was shortage of cash, the practice will persist until other methods of

raising this income are identified and exploited. Surplus food production is limited. Therefore, one of the feasible ways of achieving this goal will be to manipulate the production process so that more surplus can be created. Alternatively, other income generating activites in the household need to be identified and exploited.

4.3.21 Time After Harvest when Household Food Crops were Sold

More than 80% of the respondents sold their food crops in less than three months after harvesting (when prices were generally low) (Table 41).

Table 41. Time after harvest when household food crops were sold

Months after harvest	1995	1996
	Percent	Percent
Less than a month	30.7	58.4
1 - 2 months	49.5	39.0
3 - 4 months	10.9	0.0
5 - 6 months	7.8	2.6
7 - 8 months	1.0	0.0
Total	100.0	100.0

At this time, forces of supply and demand are the determinants of price and thus income from the sales. Almost all the respondents sold their food crops within six months of harvest. Based on these two years of study,

it is seen that it is common to find households going hungry three months before harvesting, unless the incomes from previous sales were purposely kept for food purchase, which seems unlikely. Income generating activities are the next possible remedy, but again, this was limited to the few households that had this opportunity within their reach. The findings of this study agree with those documented by Seenappa (1987); URT (1992) and Mosha *et al.* (1992). In such a situation, most respondents were likely to suffer from indicative food insecurity.

4.3.22 Sale of Green Maize in the Sampled Households

Other options of generating income need exploration. Not many of the respondents sold green maize. This is a common practice in some of the villages which were along the Dar es Salaam and Dodoma highway. Existence of regional policy restricting this sale could have affected the responses during the survey. For example, in Dumila and Fulwe villages, there is always sale of green maize. Respondents main reason of selling green maize was for generating income to meet other household needs. However, this practice is not good as it affects food security in the study area, although it can be of use in minimizing post-harvest losses as an alternative to storage so that the produce could be sold thereafter.

4.3.23 Area of Green Maize Sold in the Sampled Households

The majority (55.0%) of the respondents sold less than 0.1 hectare of green maize per year (Table 42).

Table 42. Field area of green maize sold in the sampled households

Area (ha)	Number	Percent
Less than 0.1	11	55.0
0.2	4	20.0
More than 0.2	4	20.0
All area	1	5.0
Total	20	100.0

Few (5.0%) respondents sold all the area planted to green maize. Before deciding on sale, the respondents had to be assured of the security of food in their households. Therefore, there is a need to educate the respondents on the required food of 3 bags per person per year recommended by Mosha (1990a). However, this needs to be coupled with good storage management otherwise at the time when this food will be required, most of the maize/cereal could have been damaged by insects and rodents as is always the case in many Tanzanian households. Sale of green maize was aggravated by need for cash and storage problems.

Therefore, different activities of raising household income should be formulated other than selling green maize. Also, need for improvement of simple storage structures will help in minimizing the storage problems.

4.2.24 Use of Fertilizer and Improved Seeds by Respondents

The results in Table 43 show that fertilizer use was very minimal as was practised by only 3.1% of the households. This could be the reason why the production was relatively low. Efforts to increase yield should be emphasized since the potential exists. Improved seeds were used by 69.2% of the respondents. The combination of use of improved seeds and fertilizer will increase the production and hopefully improve the situation of household food security in the area as it will contribute positively to the increase of surplus in the household.

Table 43. Use of fertilizer and improved seeds by respondents

Response	Fertilizer use		Improved seeds use	
	Number	Percent	Number	Percent
Yes	16	3.1	335	69.2
No	468	96.9	149	30.8
Total	484	100.0	484	100.0

4.3.25 Amount of Fertilizer Used in the Sampled Households

In the study area, fertilizer seemed not to be commonly used (Table 44).

Table 44. Amount of fertilizer used in the sampled households

Amount of fertilizer (bags)	Number	Percent
1	5	33.3
2	5	33.3
3	2	13.4
More than 3	3	20.0
Total	15	100.0

For those respondents who used fertilizer, 66.6% used only 1 to 2 bags (i.e. 50 to 100 kg fertilizer). Of the respondents interviewed, only 13.4% used 3 bags and 20.0% used more than 3 bags of fertilizer per season.

The type of fertilizer commonly used was sulphate of ammonia and urea, especially in growing maize. The majority of the respondents did not use fertilizer because of unavailability and the high cost. Therefore, the Government should consider the availability of fertilizers to rural villages and provision of agricultural credits as a means of stimulating farmers to produce a surplus. Also, through education by village agricultural extension workers, demontration plots might help to encourage the

farmers to use fertilizer and increase food production.

4.3.26 Amount of Improved Seeds Used in the Sampled Households

Table 45 indicates the amount of improved seeds used in the sampled households.

The majority (67.5%) used more than 5 kg of improved seeds. The most common improved seeds used by respondents for maize in the study area was STAHA. Improved seeds coupled with the use of fertilizer and better utilisation of extension services could help to improve the production hence improve household food security.

Table 45. Amount of improved seeds used in the sampled households

Amount of seeds (kg)	Number	Percent
1	4	1.2
2 - 3	41	12.2
4 - 5	64	19.1
More than 5	226	67.5
Total	335	100.0

4.3.27 Reasons for not Using Fertilizer and Improved Seeds

Reasons for not using fertilizer and improved seeds are summarized in Table 46.

Table 46. Reasons for not using fertilizer and improved seeds

Reasons	Fertilizer		Improved seeds	
	Number	Percent	Number	Percent
Too expensive	326	69.7	89	59.7
Not available	52	11.1	25	16.8
Education level	79	16.9	15	10.1
Not available and education level	2	0.4	0	0.0
Beliefs and taboos	0	0.0	11	7.4
Expensive and unavailable	9	1.9	9	6.0
Total	468	100.0	149	100.0

Fertilizer and improved seeds use were limited by cost, availability and level of education. Educating the respondents on the fertilizer use may be beneficial.

4.3.28 Purchase of Food in the Sampled Households

It was interesting to note that despite the large quantity of food crops produced, over 80% of the respondents purchased food in the study area. The main reasons were early sale of food crops and poor storage methods. These findings are in accordance with Kingamkono (1989) that early sale left the households without enough food for the whole year and hence opting for buying at high prices before the next harvest.

4.3.29 Types of Food Purchased by Respondents

Table 47 shows the types of food purchased by respondents in the study area.

Table 47. Type of food purchased by respondents

Type of food	Number	Percent
Maize	93	23.3
Rice	60	15.0
Maize and rice	143	35.8
Cassava and bananas	66	16.5
Maize, cassava, bananas	6	1.5
Rice, sweet potatoes	31	7.8
Yams	1	0.3
Total	400	100.0

Cereals (maize and rice or both) were the most purchased, accounting for almost 75% of the total purchases. The main reason was that maize and rice were both food and cash crops. Most of the respondents sold these crops immediately after harvest and found themselves without enough food for the rest of the year. The only altenative was purchasing at a later time. This affected the situation of food security in the area. Therefore, improved storage methods need to be identified, improved and encouraged. There was also need to put more emphasis on other non-food crops, such as cotton, simsim and sunflower, which do well in the study area and which are not essential food staples.

In order to improve the storage methods, due to high costs of pesticides, the exchange of harvest and pesticides (barter system) could be used. Furthermore, improved and cheaper storage structures should be encouraged. In addition to that, village granaries could be constructed. This would help to cater for a larger population hence improve household food security.

4.4 Food Stability

4.4.1 Reasons for Decrease of Food Crop Production

Table 48 reveal, that over 50% of the respondents reported a decrease in food production in 1994, 1995 and 1996. The dominant reason given was drought (49.2%). This is supported by Mtebe *et al.* (1988) in CSD areas in Morogoro rural, where the respondents cited drought as the number one reason that contributed to food insecurity. Other reasons, such as insects, diseases, and wild animals were also pointed out. This study results are also supported by Ringia (1990) and Makundi (1996).

4.4.2 Food Storage Methods in the Sampled Households

Table 49 shows storage methods in the sampled households. The results showed that the dominating storage method was storing food crops in gunny and plastic bags. On average

Table 48. Reasons for decrease of food crop production (1994, 1995, 1996)

Reason	Fulwe		Melela		Misufini		Kidoma		Kimamba		Dumila		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Drought	9	14.5	19	55.9	10	55.5	34	72.3	42	89.5	9	20.5	123	49.2
Insects	1	1.6	0	0.0	5	27.7	3	6.4	0	0.0	3	6.8	9	3.6
Diseases	13	21.0	7	20.6	1	5.6	0	0.0	0	0.0	0	0.0	21	8.4
Wild animals	1	1.6	1	2.9	1	5.6	4	8.5	0	0.0	1	2.3	8	3.2
Drought and wild animals	32	51.6	7	20.6	1	5.6	6	12.8	6	12.5	10	22.7	62	24.8
Drought and diseases	6	9.7	0	0.0	0	0.0	0	0.0	0	0.0	21	47.7	27	10.8
Total	62	100.0	34	100.0	18	100.0	47	100.0	48	100.0	44	100.0	250	100.0

66.5% of the respondents used gunny or plastic bags as their storage methods. The findings are in accordance with Makundi (1996) that the main storage method was gunny bags. Gunny and plastic bags were only for temporary storage as they did not offer an effective barrier to invasion by insects and rodents. Storage methods can increase accessibility to insects.

Traditional granaries were also still in existence (12.9%) but in a limited number, probably due to cost of production and availability of construction materials. The results are in accordance with FAO (1996a) that most people in Tanzania use traditional methods in grain storage. Improved storage, for example use of drums, offer barriers to storage pests, especially insects and rodents.

Table 49. Food storage methods in the sampled households

Method	Number	Percent
Gunny bags/plastic bags	322	66.5
Drums	11	2.3
Traditionaly granary "Vihenge"	59	12.9
Ceiling	46	9.5
Floor	2	0.4
Gunny bags/plastic bags & ceiling	44	9.1
Total	484	100.0

However, their cost is a limiting factor that could be solved by exchange with produce to cover such costs.

4.4.3 Amount of Food Usually Stored by Respondents

The majority (73.0%) of the respondents stored less than 10 bags (Table 50).

Table 50. Amount of food usually stored by respondents

Amount of food stored (bags)	Number	Percent
Less than 2	57	11.6
2 - 4	148	30.6
5 - 6	63	12.9
7 - 8	50	10.4
9 - 10	36	7.5
Above 10	130	27.0
Total	484	100.0

The food storage of less than 10 bags was inadequate in relation to the average household size of 6.6. In this situation the storage must not be less than 19 bags per household. This is in agreement with Yambi *et al.* (1990) and Makundi (1996) that the amount of food stored is one of the factor, that contributes to household food insecurity. Also, the findings of this study reinforce those by Ministry of Agriculture (1996) which indicated that, in Tanzania, about 40% of the population is food insecure. A reasonable and durable village food storage structure could be constructed for the villagers food storage. The stored food could be used during the food scarcity periods for the respective families.

4.4.4 Amount of Food Stored in 1994 in the Sampled Area

Table 51 shows the amount of food stored in 1994 in the sampled households.

Table 51. Amount of food stored last year (1994) in the sampled area

Amount (bags)	Number	Percent
None	10	2.1
Less 2	33	6.9
2 - 4	93	19.5
5 - 6	83	17.4
7 - 8	66	13.8
9 - 10	44	9.2
Above 10	149	31.2
Total	478	100.0

A few (2.1%) respondents did not store any food at all. The results of this study showed that the number of people per household ranged between 2 and 20. The majority (57.6%) of the respondents, stored less than 8 bags, which was not enough even for a household of 2 people. Therefore, such a situation indicated food insecurity in the households. Findings from the study showed that for more than 50% of the respondents their food storage lasted between 1 and 9 months. This is similar to the findings of Seenappa (1987) and URT (1992).

4.4.5 Reasons for Inadequate Food for the Family Until the Next Harvest

The results in Table 52 show that the dominant reason was inadequate storage (77.6%).

Table 52. Reasons for food not being enough for the family until the next harvest

Reasons	Number	Percent
Not enough stored	163	77.6
Early sales	33	15.7
Storage losses	11	5.2
Not enough stored and early sales	1	0.5
Early sales and storage losses	2	1.0
Total	210	100.0

Sales of food (15.7%) and storage losses (5.2%) were also important reasons pointed out by respondents. As it was pointed out in the results, in order to improve household food security, there was need to improve storage capacity by investigating/identifying successful storage methods or structures. The second strategy was to control sales in order to control prices and then to minimize storage losses. These reasons agree with Mosha (1990a), Yambi *et al.* (1990) and Makundi (1996) and seem logical to address if the interest is improving food security in the study area.

4.4.6 Measures Taken to Ensure Enough Food Until the Next Season in the Sampled Households

Table 53 shows that the only major remedy to ensure enough food until the next season was to purchase the food (66.2%).

Table 53. Measures taken to ensure enough food until the next season in the sampled households

Measures taken	Number	Percent
Purchase	139	66.2
Casual labour	61	29.0
Friends	6	2.9
Purchase and friends	4	1.9
Total	210	100.0

Casual labour (29.0%) was another measure that was even though unreliable. Donations from friends (2.9%) was another means of ensuring enough food. These measures agree with those pointed out by Wagao (1991). For food security, a reliable continuous food supply is essential.

4.4.7 Period When the Last Stock was Finished

Table 54 summarizes the period the last food stock was finished. It was interesting to note that some respondents (3.5%) depleted their food stock within a month after harvesting. More than 50% depleted their food stocks within Table 54 nine months. It was only in 37% of the respondents that food stock lasted until the next harvest.

Table 54. Period when the last stock was finished

Month	Fulwe		Melela		Misufini		Kidoma		Kimamba		Dumila		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	8	7.0	0	0.0	6	15.0	0	0.0	3	3.5	0	0.0	17	3.5
2-3	13	11.4	2	2.5	10	25.0	6	9.7	0	0.0	1	1.0	32	6.6
4-5	23	20.2	0	0.0	6	15.0	2	3.2	4	4.7	20	19.6	55	11.4
6-7	27	23.7	11	13.7	13	32.5	4	6.5	4	4.7	15	14.7	74	15.3
8-9	11	9.6	10	12.5	2	5.0	9	14.5	12	13.9	23	22.5	67	13.8
Above 9	4	3.5	6	7.5	0	0.0	9	14.5	2	2.3	39	38.2	60	12.4
Next harvest	28	24.6	51	63.8	3	7.5	32	51.6	61	70.9	4	3.9	179	37.0
Total	114	100.0	80	100.0	40	100.0	62	100.0	86	100.0	102	100.0	484	100.0

These findings are supported by Seenappa (1987); Mtebe et al., (1988) and URT (1992). A society whose 63% of the households does not have enough food to take them to the next harvest is obviously insecure.

4.4.8 Experience on some Storage Losses

More than 50% of the respondents experienced storage losses. This was a fact that needed attention as it affected the total quantity stored implying that even if yield was increased, without control of the storage losses, this could mean producing more food for the insects and other storage pests, like rodents.

4.4.9 Causes of Crop Destruction in the Sampled Households

Rodents and insects were equally important (38.1%) as crop pests in the study area (Table 55).

Table 55. Causes of crop destruction in the sampled households

Means of crop destruction	Number	Percent
Rodents	94	38.1
Insects	94	38.1
Rodents and Insects	58	23.5
Total	247	100.0

Control of losses meant addressing seriously these two spoilage agents. FAO (1996a) reported that in Tanzania, the extent of post-harvest food losses has been estimated to be in the range of 15 and 45%. In order to improve the situation, improved storage structures should be constructed. Also, for the insects, moisture in drying is very important and should be controlled.

4.4.10 Use of Food Grains for Local Beer Production by Respondents

There was limited use of the crops in brewing (8.5%). The percentage seemed small. But, as a matter of fact, local beers are part of the life style of rural people, especially for refreshment and as source of income.

The study findings agree with Mosha (1990a); Yambi *et al.* (1990); Mngodo *et al.* (1996) that food crops are used in local brewing (if a big amount of food crops are used), which contribute to household food insecurity. Remember that beer is caloric and, therefore, a food, this is acceptable if not used in excess. Where as the local beers are a source of income generation, the opposite could also be true.

4.4.11 The Quantity of Crops Used per Year for Brewing in Sampled Households

Table 56 shows the quantity of crops used per year for brewing.

Table 56. Quantity of crops used per year for brewing in sampled households

Quantity (bags)	Number	Percent
Less than 1	11	26.8
1	8	19.5
2 - 3	16	39.0
4 - 5	6	14.6
Total	41	100.0

The majority (39%) used 2 to 3 bags of food crops per year in local brewing. Other respondents (26.8%) used less than a bag in local brewing. More than 50% used 2 to 5 bags of food crops per year for the same. Use of food crops in brewing affects household food security situation as also argued by Makundi (1996) and Mngodo *et al.* (1996).

4.4.12 Control Measures for Pests in the Sampled Households

More than 50% used chemical pesticides as a control measure (Table 57). Other respondents (33.1%) did not use any control measures and only a few (8.7%) used traditional methods, such as sun drying, as a crop control measure.

Table 57. Control measures for pests in the sampled households

Measures taken	Number	Percent
None	160	33.1
Chemical pesticides	280	57.9
Traditional methods	42	8.7
Pesticides and traditional methods	2	0.4
Total	484	100.0

The storage period was very short (less 9 months) for most households, partly because sale of crops shortly after harvesting was a common practice in the study villages. Findings from the study revealed that 88.6% of the respondents used synthetic pesticides during storage of most crops in the sampled households. Only 11.4% were unable to store crops by using the available pesticides. The reason could be that of high costly. Therefore, improved low-cost methods of crop storage seem necessary.

4.4.13 Reasons for not Using Chemical Pesticides by Respondents

Reasons for not using chemical pesticides by respondents are summarized in Table 58.

Table 58. Reasons for not using chemical pesticides

Reasons	Percent
Not available	11.4
Too expensive	51.4
Low technology	5.7
Not available and low technology	2.9
Too expensive and low education	28.6
Total	100.0

Cost (51.4%) was the outstanding reason which made respondents not use chemical pesticides. Other respondents pointed out high cost and low education (28.6%) as the main causes. Unavailability (11.4%) and use of low technology (5.7%) were also among the reasons. A similar explanation has been given before by URT and FAO (1992). Supply of pesticides on credit, in exchange for the produce could find wider adoption if this arrangement is properly planned, as many people could afford.

4.4.14. Factors Limiting Contribution of Women to Household Food Security

Factors limiting contribution of women to household food security were as shown in Table 59.

Table 59. Factors limiting contribution of women to household food security

Factors	Number	Percent
Drought	91	18.8
Pests	43	8.8
Diseases	5	1.0
Low capital	185	38.4
Low technology	47	9.7
Drought and pests	18	3.7
Drought and diseases	1	0.2
Diseases, capital and technology	2	0.4
Drought, diseases and capital	13	2.7
Drought and capital	66	13.6
Drought and low technology	13	2.7
Total	484	100.0

Insufficient capital (38.4%) was the overriding limiting factor to food security. Drought (18.8%), low technology use in agriculture (9.7%) and pests (8.8%) were the other factors. Insufficient capital and drought were the main factors limiting contribution of women to household food security. These are in accordance with Makundi (1996) findings. Improvement of these could help in improving food security, especially in the vulnerable households.

4.5 FOOD ACCESSIBILITY

4.5.1 Sources of Off-farm Income

Results in Table 60 show the source of income in sampled households. Males and females (6.7 and 5.3% respectively), were all employed and no particular gender seemed deprived of employment. Men were the dominant in terms of working

Table 60. Sources of off-farm income

Source of Income	Villages													
	Fulwe		Melela		Msufini		Kidoma		Kimamba		Dumila		Total	
	F	M	F	M	F	M	F	M	F	M	F	M	F	M
Employment	6.9	4.2	2.5	12.5	28.6	15.8	3.4	10.7	3.4	5.1	1.9	0.0	5.3	6.7
Labourer	32.6	31.2	17.5	37.5	7.0	21.1	0.0	42.9	0.0	12.8	5.7	24.5	12.0	28.3
Sales of cooked foods	34.9	29.1	7.5	15.0	42.9	26.3	6.9	10.7	55.2	69.2	26.4	44.9	26.9	34.5
Sales of mats	4.7	6.3	67.5	27.5	0.0	0.0	17.3	3.6	24.2	0.0	43.4	6.2	30.8	8.1
Local beer	13.9	10.4	5.0	2.5	0.0	0.0	62.1	7.1	17.2	2.6	13.2	10.2	18.3	6.3
Fruits & Vegetable	2.3	18.8	0.0	0.0	14.3	31.6	10.3	25.0	0.0	10.3	9.4	10.2	5.3	13.9
Labourer/Fruits/Vegetable	4.7	0.0	0.0	0.0	7.2	5.2	0.0	0.0	0.0	0.0	0.0	2.0	1.4	0.9
Sales foods & Local beer	0.0	0.0	0.0	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4
Labourers & Local beer	0.0	0.0	0.0	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0	0.9

Key: F - Female M - Male

Numbers indicate percentage

as labourers (28.3 and 12.0% respectively). Sale of foods was also gender specific but varied with villages; with Kidoma, Kimamba and Dumila men being dominant. The reason could be that these villages are undergoing urbanization. Generally, all sexes seemed dominant in food sales (but males to a greater extent, i.e. 34.5 and 26.9% respectively). Sale of local beer was a women's activity (18.3%). The women were also dominant in sales of mats, fruits and vegetables (18.3 and 6.3% for women and men, respectively). The study findings agree with Kurwijira (1993); Ousmane (1996); Ministry of Agriculture (1996) and Burfisher and Horenstein (1995).

4.5.2 Average Weekly Income from Supplementary Activities

Table 61 summarizes the average weekly income from supplementary activities earned by the household.

Table 61. Average weekly income from supplementary activities

Average weekly income (Tsh)	Number	Percent
Below 500	37	8.6
501 - 1000	115	26.7
1,001 - 2000	121	28.1
2,000 - 3000	68	15.8
3,001 - 4000	23	5.3
4,001 - 5000	34	7.9
Above 5000	33	7.7
Total	431	100.0

More than 75.0% of the respondents earned below Tanzanian shs 3,000 per week. This implies Tshs 2,000 to 12,000 per month, which was lower than the minimum wage for an average working Tanzanian. It is striking to note that the respondents' income per month was too low. Indeed, this implies food insecurity as it is not enough for purchasing food for the household for that whole month. Therefore, if the respondents could organize themselves in groups for a particular income generating enterprise, this could help to raise their income. In Tanzania, as a group, it is easier to get credit for a particular recognized activity than individually. The finance suppliers put more emphases on groups of about five or more people.

4.5.3 The Main Source of Daily Food in the Sampled Households

Table 62 shows that more than 70% of the respondents produced food from their own farms but also supplemented the produce with purchased foods. The only remedy is to increase production, improve food storage and avoid selling to buy later. These could help to improve food security in the area.

Table 62. The main source of daily food in the sampled households

Source	Number	Percent
Own production	131	27.1
Own production and purchase	353	72.9
Total	484	100.0

4.5.4 Feeding Frequency per Day

Feeding frequency per day for both adults and children is summarized in Table 63. Both adults and children (0.2%) had meals once per day. A bigger proportion (22.7 and 11.6%) of adults and children, respectively had meals

Table 63. Feeding frequency per day

Frequency of meals per day	Adults		Children	
	Number	Percent	Number	Percent
Once/day	1	0.2	1	0.2
Twice/day	110	22.7	56	11.6
Thrice/day	399	82.4	375	77.5
Four times/day	10	2.1	77	15.9

twice per day. Majority (82.4%) of adults had meals three times per day, most likely breakfast, lunch and dinner. This is common for most Tanzanians, when food is adequate and where activities do not limit this feeding regime. There was the same feeding frequency for children although

to a slightly less extent (77.5%). Very few (2.1%) adults had meals four times per day. This included light meals or snacks in between the major meals.

This trend was similar for children but the frequency was less for children (15.9%) than adults. Feeding frequency of 2 to 3 times per day can be considered inadequate, especially for growing children (UNICEF,1985) due to their small sized stomach. The recommended feeding frequency is 4 to 6 times per day (UNICEF,1985; Jonsson,1986b; Kavishe, 1993). Due to the small stomach of the children, (especially underfives) and to the bulkiness of the weaning foods used, increasing feeding frequency is a necessity. Feeding frequency of less than four times per day, is considered inadequate (Kavishe,1993).

4.5.5 Main Ingredients of Daily Family Meals

The majority (30.4%) of the respondents indicated animal protein and starch as the main ingredients of their daily meals (Table 64).

It was observed from the study that households in different villages differed in types of main ingredients of daily family meals. This explains the accessibility of food and income.

Table 64. Main ingredients of daily family meals

Ingredients	Fulwe		Melela		Misufini		Kidoma		Kimamba		Dumila		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Legumes + cereals	38	33.3	1	1.2	3	7.5	22	35.5	0	0.0	27	26.5	91	18.8
Vegetable + cereals	5	4.4	3	3.8	24	60.0	0	0.0	0	0.0	66	64.7	98	20.2
Animal protein + cereals	2	1.8	31	38.8	2	5.0	27	43.5	80	93.0	5	4.9	147	30.4
Animal protein + vegetable + cereals	68	59.6	0	0.0	4	10.0	2	3.2	4	4.7	1	1.0	79	16.3
Legumes + vegetables + cereals	0	0.0	45	56.2	7	17.5	10	16.2	2	2.3	3	2.9	67	13.8
Cereals foods	1	0.9	0	0.0	0	0.0	1	1.6	0	0	0	0.0	2	0.4
Total	114	100.0	80	100.0	40	100.0	62	100.0	86	100.0	102	100.0	484	100.0

4.5.6 Weaning Foods in the Sampled Households

Table 65 summarizes the different types of weaning foods used in the study area. More than 50% of the mothers used plain maize porridge. Other types of weaning foods used are listed in Table 65. It is obvious that with plain maize porridge, the child does not get enough nutrients hence malnutrition, particularly kwashiorkor. Similar statements have been made by UNICEF (1985) that the main weaning food in Tanzania is plain maize porridge. Unavailabilty of food, low nutrition education and income are contributing factors to which type of weaning foods should be used. Therefore, nutrition education and income generating activities are necessary to produce balanced meal for the household.

Table 65. Weaning foods in the sampled households

Weaning foods	Number	Percent
Plain Maize porridge	263	54.3
Porridge and milk	54	11.2
Rice porridge	3	0.6
Maize porridge and Groundnut	119	24.6
Maize porridge and fish flour	36	7.4
Power flour porridge	3	0.6
Rice; maize; groundnut and fish flour porridge	5	1.0
Rice; groundnut flour porridge	1	0.2
Total	484	100.0

4.5.7 Beliefs and Taboos Limiting Consumption of Different Foods in the Sampled Households

Table 66 indicates that due to religious beliefs, the majority (81.9%) of the respondents did not eat pork.

Table 66. Beliefs and taboos limiting consumption of different foods in the sampled households

Beliefs and taboos	Number	Percent
Religious belief	299	81.9
Power flour porridge	4	1.1
Left overs	19	5.2
Religious belief and power flour porridge	5	1.4
Religiuos belief and left overs	15	4.1
Religious belief and power flour;left overs	23	6.3
Total	365	100.0

Respondents regarded power flour porridge as local beer, therefore because of their religious beliefs they did not prefer taking it as normal porridge. These limiting factors hindered the accessibility of food to the respondents. With a bit of education, e.g., on the power flour, such beliefs could be avoided.

4.5.8 Availability of Food in the Village Market in the Sampled Households

All the respondents in the sampled households indicated that food was available in the village market. According to the majority, the food prices in the village market were affordable. Several reasons were pointed out for

those who did not afford, such as prices. Fluctuations of food prices and cost were the main reasons. Reports by Mosha (1990a) also documented that purchasing power determined the accessibility of food at household level.

4.6 Factors Limiting Contribution of Women to Household Food Security

Access to capital (49.6%) was the major factor limiting contribution of women to household food security (Table 67).

Table 67. Factors limiting the contribution of women to household food security

Factors	Number	Percent
Access to land	13	5.4
Access to capital	120	49.6
Access to decision making power	20	8.2
Lack of time	29	12.0
Knowledge about food and agriculture	3	1.2
All above	4	1.7
Access to capital, decision making and time	37	15.3
Land, capital, decision making and time	6	2.5
Access to land and capital	3	1.2
Access to land, capital and decision making	7	2.9
Total	242	100.0

Lack of time (12.0%) was the second limiting factor. This justifies the work load women have. Access to decision making power (8.2%) featured as another important factor but to a lesser extent. Access to land (5.4%) was important but was not as important as the previous

factors. This was especially for Kimamba village, where the villagers rented the area for food crops cultivation from the sisal estate under agreement of paying back a bag of maize per cultivated hectare of land, after harvesting.

4.6.1 Access to Land

4.6.1.1 The Ownership of Land in the Sampled Households

The land in the study area was owned by the husband (100%). There was no land owned by women. This is a constraint for the women in food production, taking into consideration the fact that women are the main producers of household food. In this context, it implies that women had no decision making power on the land. The findings of this study compare with those by FAO (1990), FAO (1996a) and Mngodo *et al.* (1996).

Despite limited involvement in the ownership, more than 50% of the women revealed that there was no restriction by husband in using the land. About 42.9% endorsed restriction in land use by husbands, a fact that threatens food security as it discourages production. As argued by Dankelman (1988), Aarnik and Kingma (1991) and FAO (1996a) women play a major role in food production. Without accessibility to land, it will not be possible for these women to cultivate enough land for food production. This contributes to food insecurity.

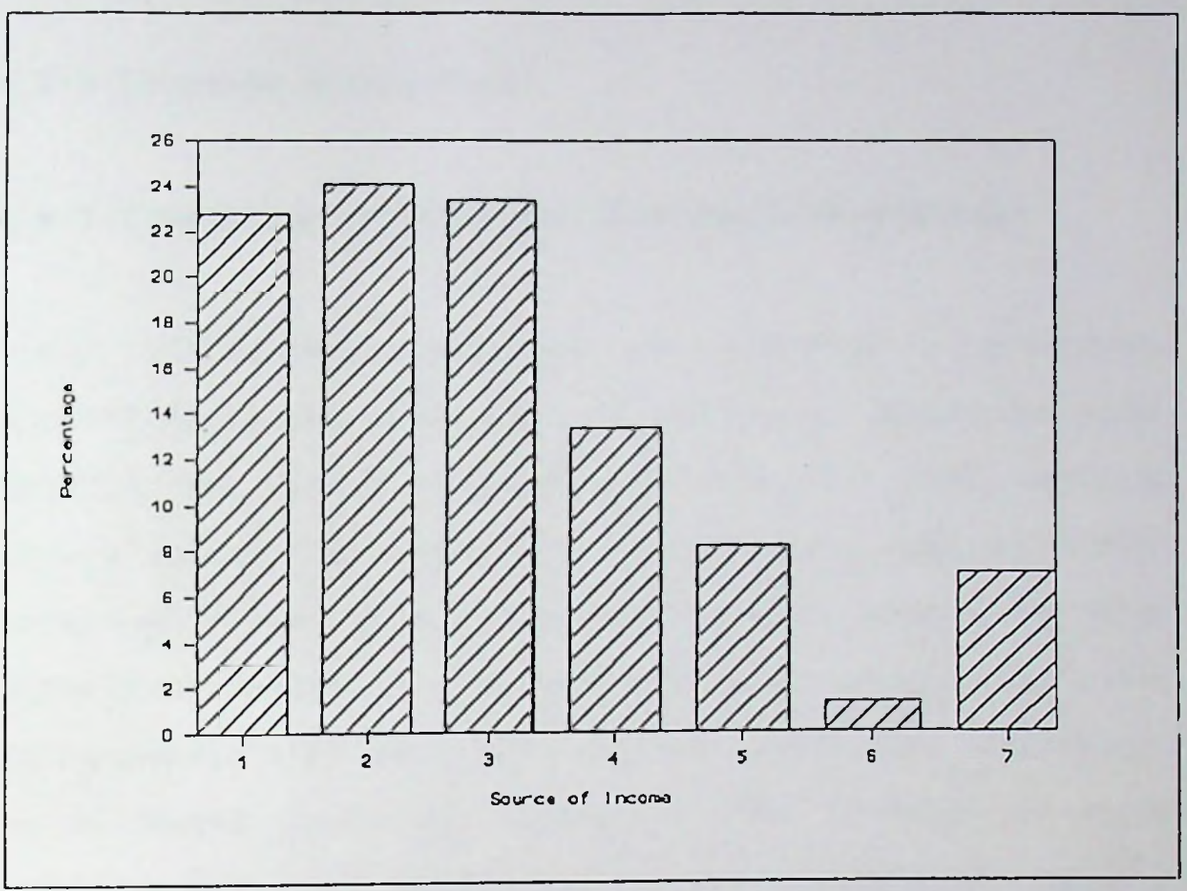
4.6.2 Access to Capital

4.6.2.1 Women's Source of Income in the Sampled Households

It was found that activities shown in Fig. 6 were the most common sources of income in the study villages. For more income generation, the women can be advised individually or to form groups, for economic activities. To increase their chances of acquiring credit or loans women should form groups. In Tanzania, credit or loan suppliers are interested in groups and not in individual person. However, a thorough economic analysis is required prior to involvement in any of such activities, to assure profitability of the venture. Cash income from these

activities helped in the improvement of household food security.

With cash income, respondents could purchase foods which are not produced on their farms. Also, cash income could be used to purchase foods to supplement those from the farms. Similar findings have been reported elsewhere (Ousmane,1996).



Key: 1 - Beer brewing
2 - Petty business
3 - Mats making
4 - Hired labour
5 - Cash crops
6 - Livestock production
7 - Selling cooked foods

Fig. 6: Women's source of income in sampled households in the study area

4.6.3 Decision Making Power

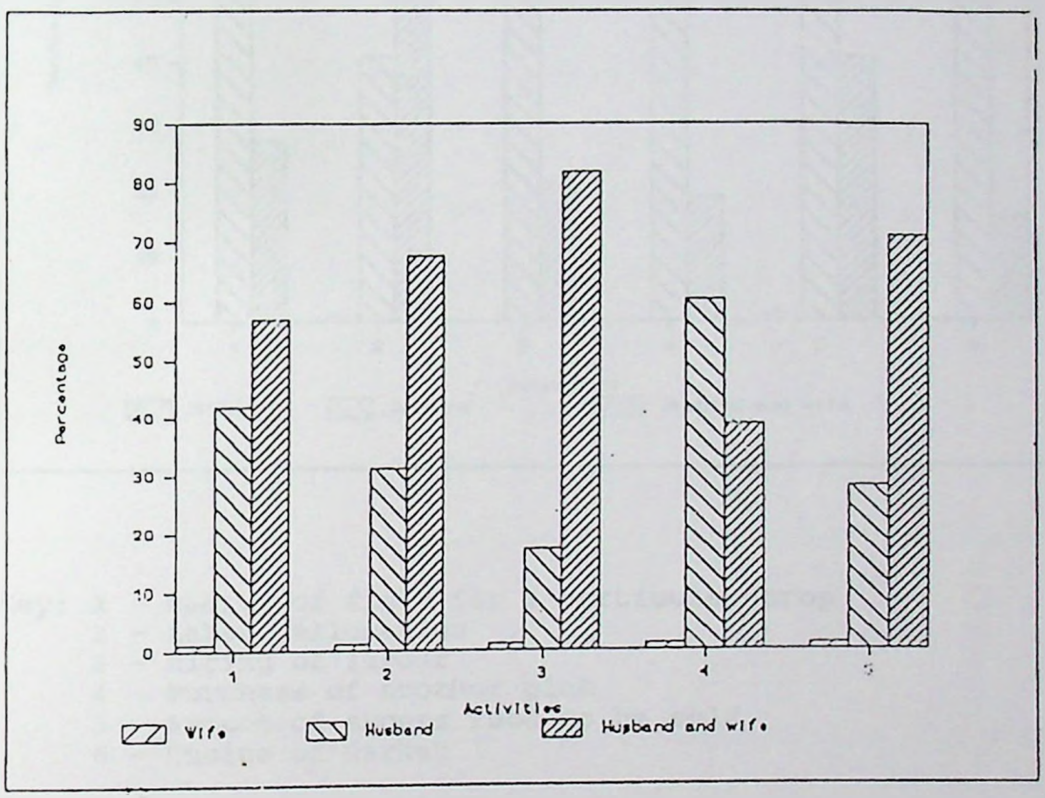
4.6.3.1 Decision on Different Production Activities

Fig.7 summarizes decisions on different production activities in the study area. In all cases, decisions were made by the family (husband and wife) but with husband always taking the leading role. Decisions made by women were negligible. This could contribute to household food insecurity taking into account that women play a big role in household food security but they cannot make decisions on different production activities. The findings of this study compare with Aarnink and Kingma (1991) that women's range of manoeuvre in household decision making is drastically curtailed by customs and patriarchal power.

4.6.3.2 Decision Making Related to Resource Allocation

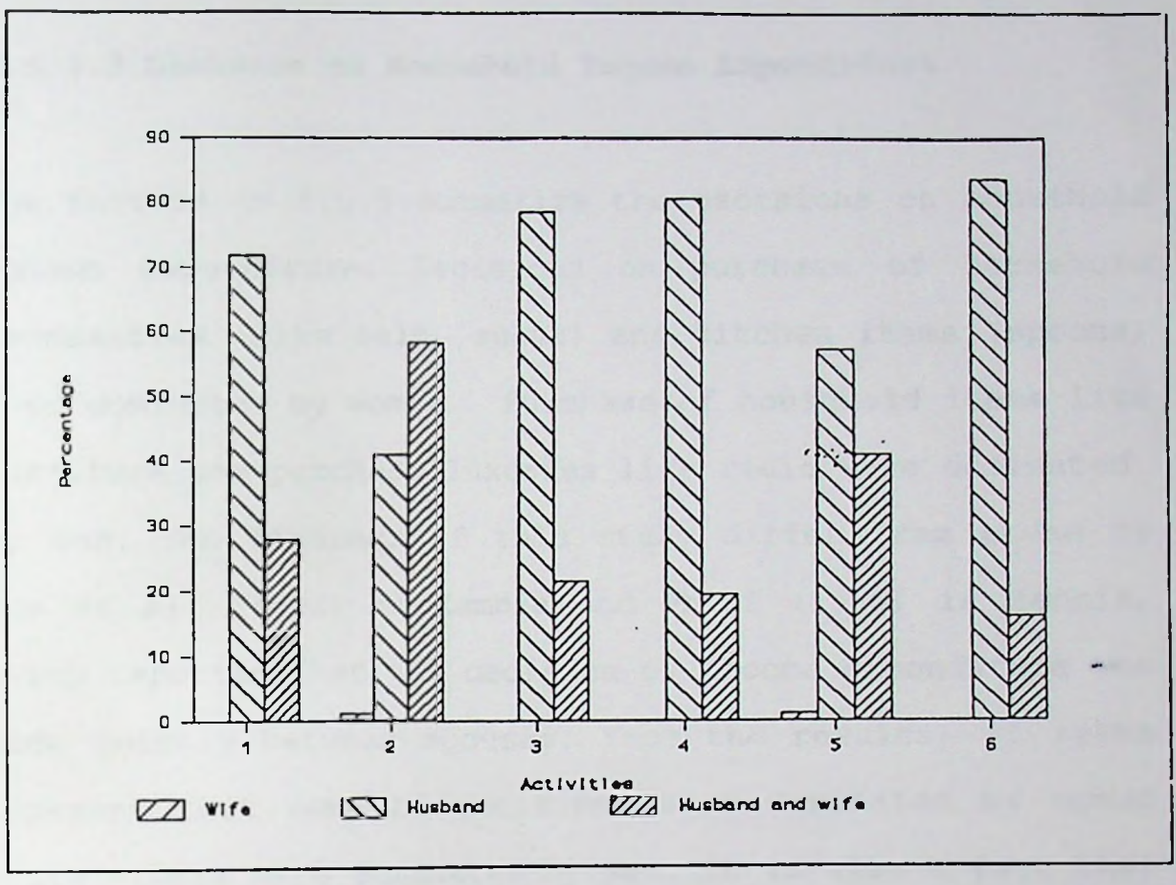
Results in Fig.8 show that women's contribution were generally marginalized in all activities. Most of the contribution to decision were made by men.

These findings are supported by URT and UNICEF (1990) that generally, in developing countries, at all levels of decision making, women are not provided equitable voice in decision making.



Key: 1 - Choice of cash crops grown
2 - Choice of food crops grown
3 - When to perform a particular task
4 - Adoption of innovation
5 - Operation on your own field

Fig. 7: Production decisions on different activities in the study area



Key: 1 - Choice of field for a particular crop
2 - Labour allocation
3 - Hiring of labour
4 - Purchase of another plot
5 - Amount of excess food to be sold
6 - Choice of market

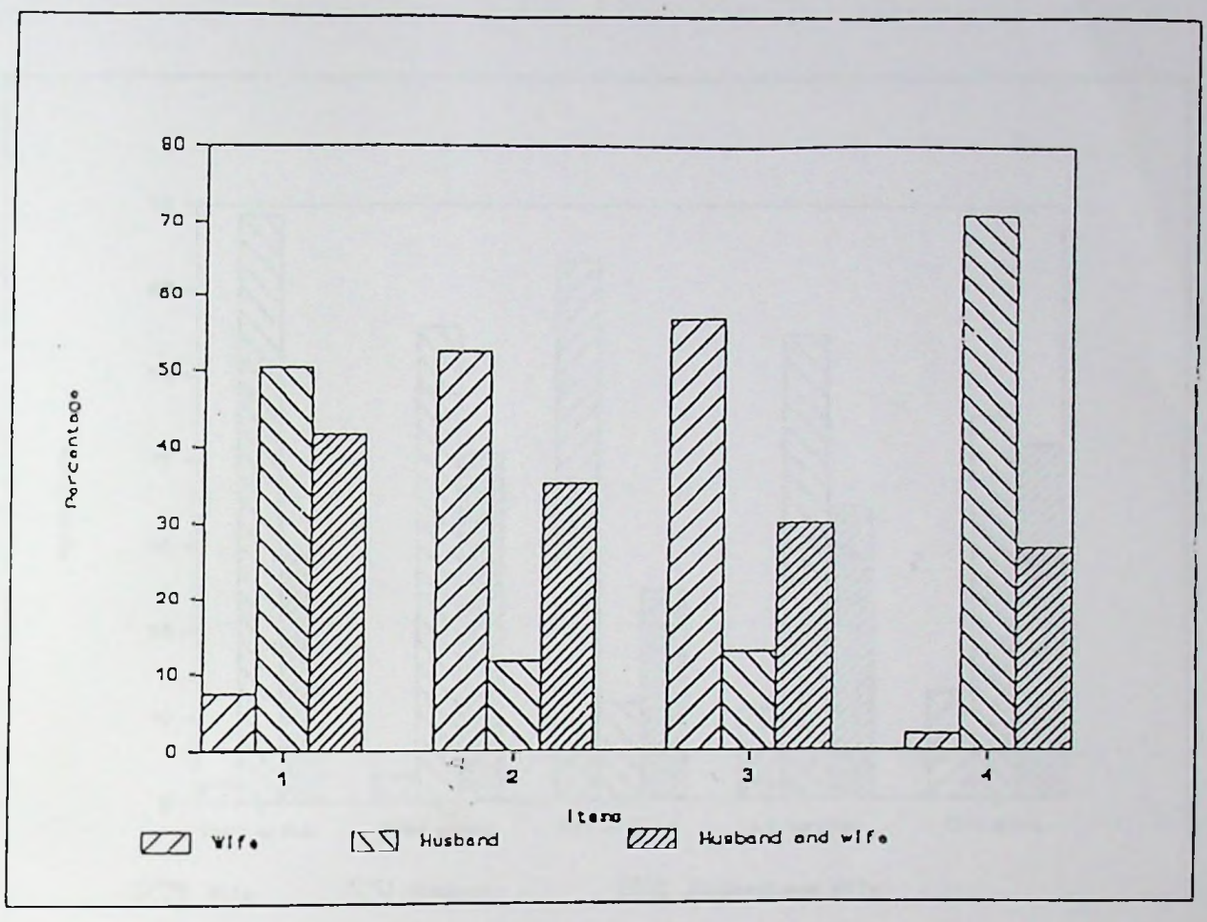
Fig. 8: Decision making related to resource allocation in the study area

4.6.3.3 Decision on Household Income Expenditure

The results in Fig.9 summarize the decisions on household income expenditure. Decisions on purchase of household necessities (like salt, sugar) and kitchen items (spoons) were dominated by women. Purchase of household items like furniture and purchase luxuries like radio were dominated by men. The findings of this study differ from those by Due *et al.* (1982) in Zambia and Phiri (1990) in Zambia, which reported that the decision of income expenditure was made jointly between spouses. From the results, it seems apparent that some of decisions were dominated by women while others were dominated by men. It is also a fact that some decisions in the study area are also jointly made between husband and wife.

4.6.3.4 Decision on Family Income: Who Keeps the Funds from the Different Sales?

In general, husbands dominated in keeping income from different sales (Fig.10) except off-farm income in which the wife dominated. This is because, most of off-farm income activities such as beer brewing are women oriented. This condition could easily contribute to household food insecurity, just because women do not have access to the major part of household income to the same extent as are men. Although the main producers are women, they do not



Key: 1 - Purchase of household items like funiture
2 - Purchase of household necessities (salt, sugar, food)
3 - Purchase of kitchen items (spoons)
4 - Purchase of luxuries like radio

Fig. 9: Decisions on household income expenditure in the study area

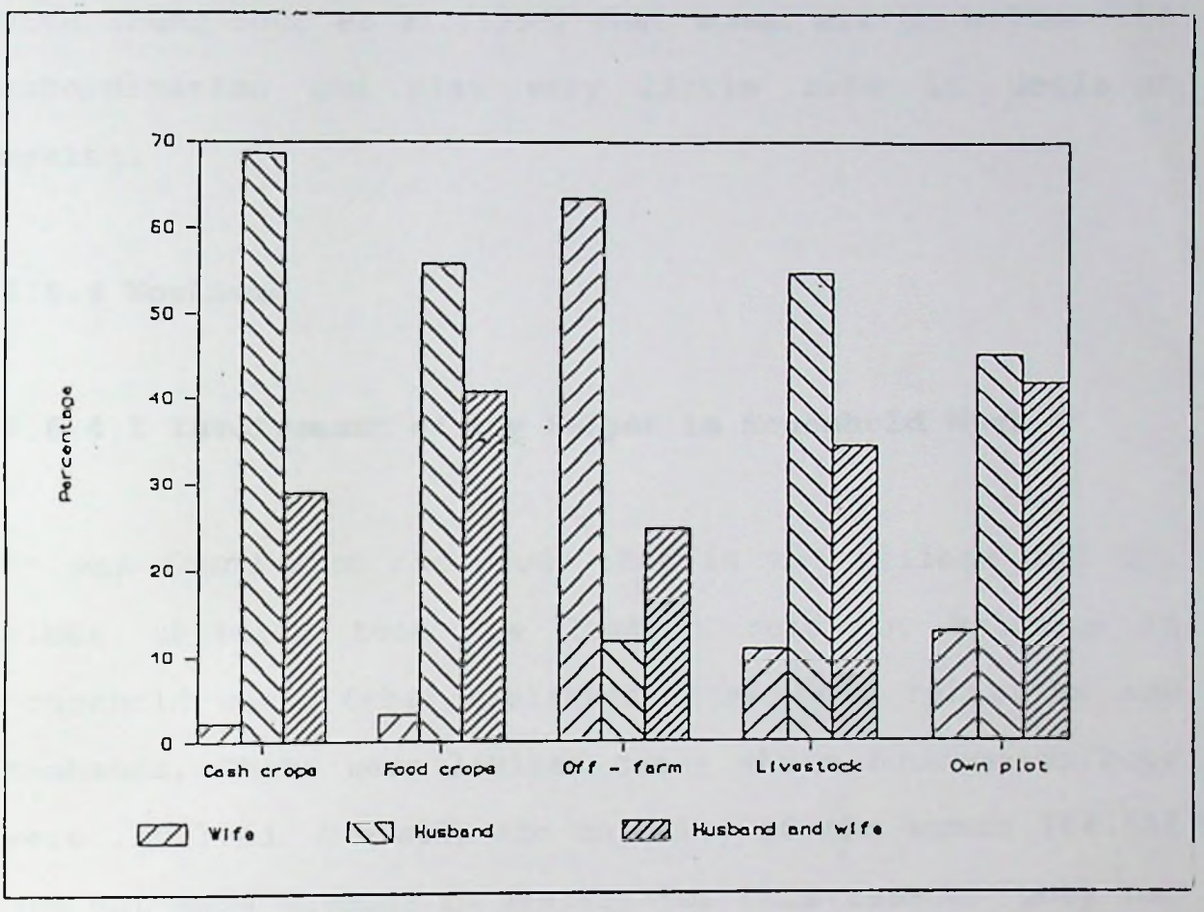


Fig. 10: Desicions on family income: who keeps the funds from different sales in the area

control the end results (FAO,1989). These findings compare with (Mung'ongo *et al.,1990)* that women are accustomed to subordination and play very little role in decision making.

4.6.4 Workload

4.6.4.1 Involvement of any Helper in Household Work

It was found from the study that in the village set up, older children took the leading role in helping in household work. Other assistance came from relatives and husbands. There were limited cases where housemaids/boys were involved. Overall, the majority of the women (64.5%) did not have anybody to assist. For this reason, they had a limited time to contribute fully to household food production which eventually may leads to food insecurity.

4.6.4.2 Type of Fuel Used in Cooking

Firewood was the major source (77.6%) of fuel used in cooking (Table 68).

Table 68. Type of fuel used in cooking

Type of fuel	percent
Firewood	77.6
Charcoal	6.6
Firewood and charcoal	15.8
Total	100.0

The only other source was charcoal (6.6%). As it was found from the survey there was a likelihood of tree falling, having a negative effect on the environment. To avoid environmental degradation, afforestation and agroforestry practices should be emphasized as a future strategy of ensuring reliable availability of fuel without causing serious damage on the environment. This has also been suggested (Ishengoma,1994) in view of the fact that the main source of energy for cooking in Tanzania rural areas was firewood. Women used more time in firewood collection instead of food production activities and this could affect household food security.

4.6.4.3 Firewood Collection and Fetching Water

Table 69 reveals that fetching water (52.6%) and firewood (65.8%) were activities of the wife. In firewood collection, some assistance came from the husband (13.2%). However, in fetching water more assistance came from children (13.2%).

Table 69. Firewood collection and fetching water

Involvement	Firewood	Water
	Percent	Percent
Children	7.8	13.2
Husband	13.2	3.9
Wife	65.8	52.6
Relatives	0.0	6.6
Children and wife	13.2	23.7
Total	100.0	100.0

Similar results have been reported by URT and UNICEF (1990) that in rural areas, women were primarily responsible for fetching firewood and water. Therefore training of husbands and children in assisting the women where possible, is necessary. The time used by the women in involvement in firewood collection and fetching water could be used effectively in food production or in income generating activities.

4.6.4.4 Distance from Home to the Source of Firewood

Table 70 indicates the distance from home to the source of firewood.

Table 70. Distance from home to the source of firewood

Distance (Km)	Percent
Less 1	14.5
1 - 2	19.7
More than 2	65.8
Total	100.0

Firewood was collected more than 2 km away from the households in 65.8% of the households and more than 1 km from the households in more than 85% of the cases. Efforts to establish family forests or tree planting for the supply of firewood and also increasing income to afford electricity are very crucial. Time saving efforts in collection of fuelwood and water would benefit

agricultural production activities that will eventually help in ensuring food security in the households, if man will assist some in each.

4.6.4.5 Source of Water for Home Use and Distance from Household

Table 71 shows that more than 70% of the respondents collected water in a distance of less 1 km from their households.

Table 71. Source of water for home use and the distance in the sampled households

Source of water	Number	Percent	Distance (Km)	Number	Percent
Water tap	50	65.8	Less 1	55	72.4
Wells	8	10.5	1 - 2	15	19.7
Streams / rivers	3	3.9	More than 2	6	7.9
Water tape and wells	15	19.7			
Total	76	100.0		76	100.0

Possibly, this included those respondents whose water source was a water tap (65.8%). For those who collected water from a distance of more than 2 km, there is need for consideration by Government of constructing of wells or connection of water taps within the village at shorter distances from the households. If wells are to be constructed in the village, the time of women can be saved

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and this time can be utilized in food production, which will contribute to household food security.

4.6.4.6 Women Assistance in Collecting Firewood and Fetching Water

These activities were not done by women alone. There was always assistance in 47.4% of the cases. The majority of the women (52.6%), had no assistance in collecting firewood and fetching water. These might contribute to food insecurity as the women use large amounts time in these activities.

4.6.5 Access to Extension Advice

4.6.5.1 Respondents' Possibility of Getting Extension Advice

It was recognized from the results that there was limited possibility of getting extension advice. This is supported by Makundi (1996). The main reasons cited by the respondents for such situation were as follows:

a) There was an inadequate number of extension workers as also reported by Wambura (1992).

b) Available extension workers concentrated only on targeted groups/contact farmers who formed only a small proportion of the rural population in any village.

c) Unreliable transport for the village extension workers to give extension advice to these farmers.

d) Extension workers devoted more time struggling to earn their living, because they were poorly paid.

Such a situation with no agricultural extension services contributes to food insecurity as it discourages increasing productivity. There was no improved technology that reached the women farmers in time, a fact that again reinforces this point of discouraging increased productivity. Those respondents who received the extension worker's advice, did not feel satisfied. The possible reason could be due to demoralized poorly paid agricultural extension workers. The fact that extension workers were also too busy struggling for their living possibly limited their effectiveness in advising farmers, the consequences of which could be seen in the deteriorating food security situation in the area.

4.7 Women's Involvement in Household Coping Strategies During Food Shortages

It was observed from Table 72 that reduction of meal frequency and amount of food consumed, casual labour, involvement in business and purchase of food were the main dominant coping strategies during times of food shortages. Borrowing food/money and sale of animals normally made minor contributions. These coping strategies compare with

those reported by Rahmato (1987); Eide *et al.* (1986); Wagao (1991); Mngodo *et al.* (1996) and CARE International in Tanzania (1995). It is a necessity to improve food storage facilities, the food distribution system and maldistribution of food within households if household food security is to be ensured.

Table 72. Coping strategies during food shortages

Strategies	Number	Percent
Reduction of meal frequency	52	21.5
Reduce amount of food	23	9.5
Casual labour	44	18.2
Borrowing of food/money	4	1.7
Buying food	24	9.9
Sale of animals	1	0.4
Petty business	43	17.8
Reduction of meal frequency, amount of food and buy food	3	1.2
Reduction of meal frequency and amount of food	8	19.8
Total	242	100.0

4.7.1 The Main Groups susceptible to Food Shortages

Table 73 shows the main groups susceptible to food shortages. Food shortages adversely women (21.5%), children under five years (32.2%) and men seldom were adversely affected (only 3.3%).The extent was variable depending on the group of household members in question, as also reported by Kavishe (1993).

Table 73. The main groups in the family which are mostly affected during food shortages

Individual groups	Number	Percent
Men	8	3.3
Women	52	21.5
Female children above 5 years	9	3.7
Underfive year old children	78	32.2
All groups	73	30.2
Women, girls and underfive children	12	5.0
Women and underfive children	2	0.8
Female above 5 and underfive	2	0.8
Women and female children above 5 years	6	2.5
Total	242	100.0

4.7.2 Gathering Wild Food

More than 50% of the women in the households gathered wild foods. Most wild foods gathered in the survey area were vegetables (92.2%) and to a much lesser extent fruits (4.7%). This gathering is a common practice that adds to total food found in the household. Gathered foods were accepted as part of the diet and as an option during food shortages. Although in this study gathered foods were used as part of the diet, other studies have indicated gathered foods were used as a coping strategy in food shortages (Corbett,1988).

4.8 The Role of Women Relative to Men in Household Food Security

4.8.1 Labour Involvement in Production of Food Crops

In this study, crop production activities included all operations from land preparation to marketing of the produce (Tables 74 and 75). All these tasks were taken as a general trend for production of both non-food and food crops. From the results it was observed that both women and men contributed labour to every activity, more or less on egual basis. However, women dominated in harrowing, planting, weeding, harvesting, threshing and storage of the food.

Men contributed more labour in land preparation, transporting crops home and marketing surplus crops. Women provided 48.6% of all labour in food crop production in the sampled households plus providing labour for fuel, water, child rearing and meal preparation.

Table 74. Labour involvement in production of food crops

Task	Female	Male	Total
	Percent		
Site clearing/land preparation	43.3	56.7	100.0
Turning soil/harrowing (tillage)	52.7	47.3	100.0
Planting	50.8	49.2	100.0
Weeding	51.6	48.4	100.0
Harvesting	50.5	49.5	100.0
Transporting crops home	42.2	57.8	100.0
Threshing and storage	50.5	49.5	100.0
Marketing surplus crops	47.2	52.8	100.0
Average (unweighted)	48.6	51.4	100.0

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Planting	50.8	49.2	100.0
Weeding	51.6	48.4	100.0
Harvesting	50.5	49.5	100.0
Transporting crops home	42.2	57.8	100.0
Threshing and storage	50.5	49.5	100.0
Marketing surplus crops	47.2	52.8	100.0
Average (unweighted)	48.6	51.4	100.0

Table 75. Labour involvement in production of non-food crops

Task	Female	Male	Total
	Percent		
Site clearing/ land preparation	47.1	52.9	100.0
Turning soil/ harrowing (tillage)	50.4	49.6	100.0
Planting	51.4	48.6	100.0
Weeding	50.4	49.6	100.0
Harvesting	51.3	48.7	100.0
Transporting crops home	44.8	55.2	100.0
Threshing and storage	48.4	51.6	100.0
Marketing	33.3	66.7	100.0

4.8.2 Labour Involvement in Production of Non-food Crops

The tasks involved in production of non-food crops are enumerated in Table 75. Whereas men played a slightly bigger leading role in site clearing, crop transport, threshing, storage and marketing than women, women were relatively more involved in ploughing the land, planting, weeding and harvesting. It was, however, quite surprising, to note that the involvement in marketing of the produce and collection of the income was very conspicuous for men who unfortunately did not dominate in the production activities.

4.8.3 Labour Involvement in Household Activities

All tasks in labour involvement in household activities were dominated by females (Table 76).

Table 76. Labour involvement in household activities

Task	Female	Male	Total
	Percent		
Food preparation and cooking	78.9	21.1	100.0
House/compound cleaning	52.4	47.6	100.0
Child caring	72.1	27.9	100.0
Fetching water	82.4	17.6	100.0
Collecting firewood	91.7	8.3	100.0
Milling/processing food crops	60.6	39.4	100.0

Such activities included food preparation and cooking, house/compound cleaning, child caring, fetching water, collecting firewood and milling/processing of food crops. All these same tasks were also shared with men to some extent although the extent of involvement was not so convincing except for house/compound cleaning. These findings agree with Musoke *et al.* (1988) and Makundi (1996). Women play a big role in household food security as they perform all tasks in food crop production, cash crop production, income generating activities and in household activities.

4.8.4 Labour Involvement in Other Income Generating Activities

The study findings showed that women dominated in fruit growing, brewing and baking buns (Table 77).

Table 77. Labour involvement in other income generating activities

Task	Female	Male	Total
	Percent		
Petty business	41.7	58.3	100.0
Vegetable growing	45.8	54.2	100.0
Fruit growing	58.0	42.0	100.0
Brewing	60.4	39.6	100.0
Baking	56.5	43.5	100.0
Crafts	42.5	57.5	100.0

In order to generate the income, women have to put more effort in income generating activities. Men dominated in petty business, vegetable growing, and crafts. This will help to improve the household food security situation. Lack of income generating activities contributes to household food insecurity and poverty.

4.9 Results of Nutritional Status Studies

4.9.1 Nutritional Status of the Under Fives During the Period of Scarcity and Abundance of Food

Table 78 shows the nutritional status of the under fives during the period of scarcity and abudance of food.

Table 78. Nutritional status of under fives during the period of scarcity and abundance of food

Nutritional Status	Period of Food							
	1995/96				1996/97			
	Scarcity		Abundance		Scarcity		Abundance	
	Number	%	Number	%	Number	%	Number	%
Wellnourished	76	61.8	78	63.4	76	61.8	81	65.9
Malnourished	47	38.2	45	36.6	47	38.2	42	34.1
Total	123	100.0	123	100.0	123	100.0	123	100.0

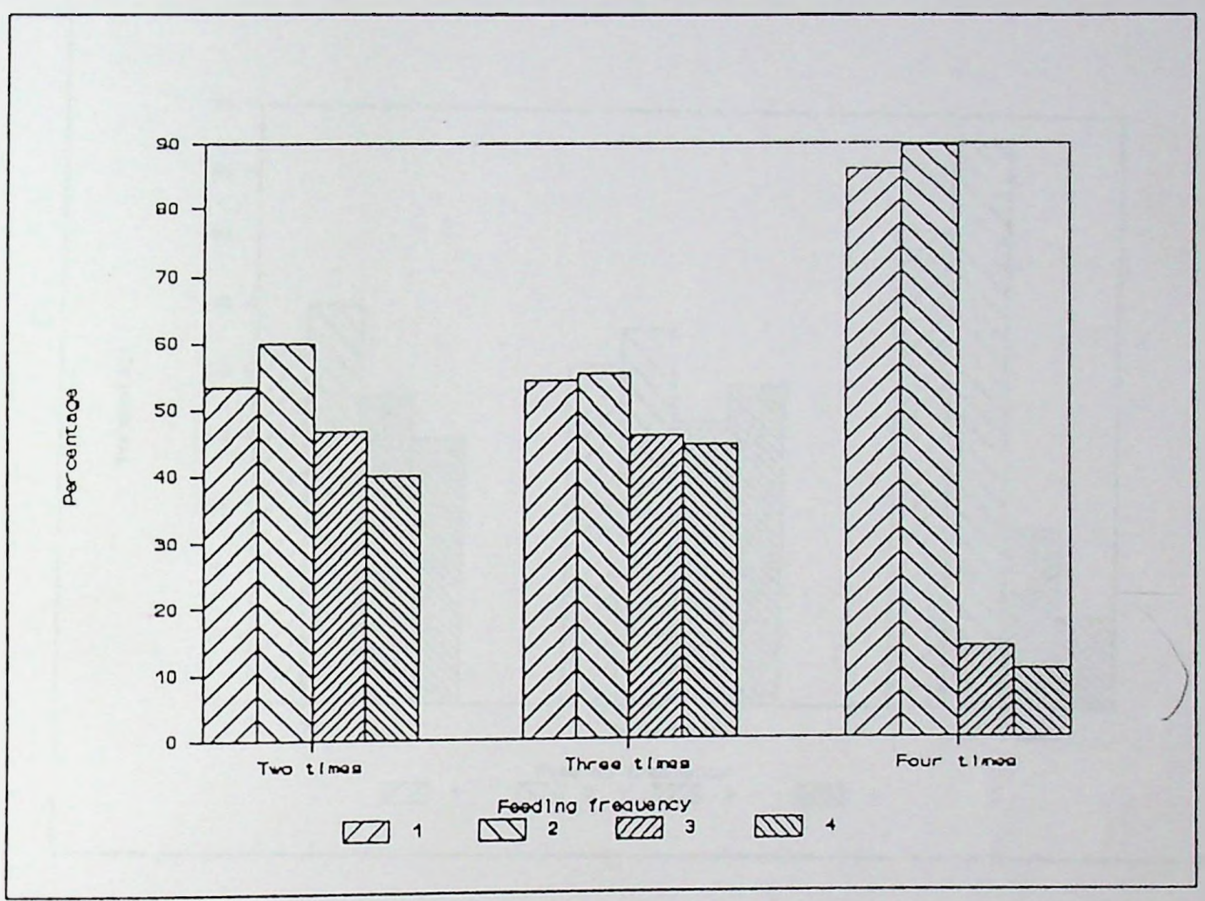
The under fives nutritional status data was collected in two seasons (1995/96) and (1996/97) each of which covering the food scarcity and abundance periods. The results showed that there was a slight improvement of nutritional status during the period of food abundance compared to the food scarcity period.

Therefore, the results imply that nutritional status depends on the availability of food. Malnutrition level was higher when the food was scarce than when this was

abundant. When there was abundance of food, the malnutrition level was slightly lower. These findings compare with those reported by FAO/TFNC (1992) that the difference in the nutritional status level was likely to be due to seasonal effects. After harvest, the malnutrition level was lower than during the months when the food was scarce.

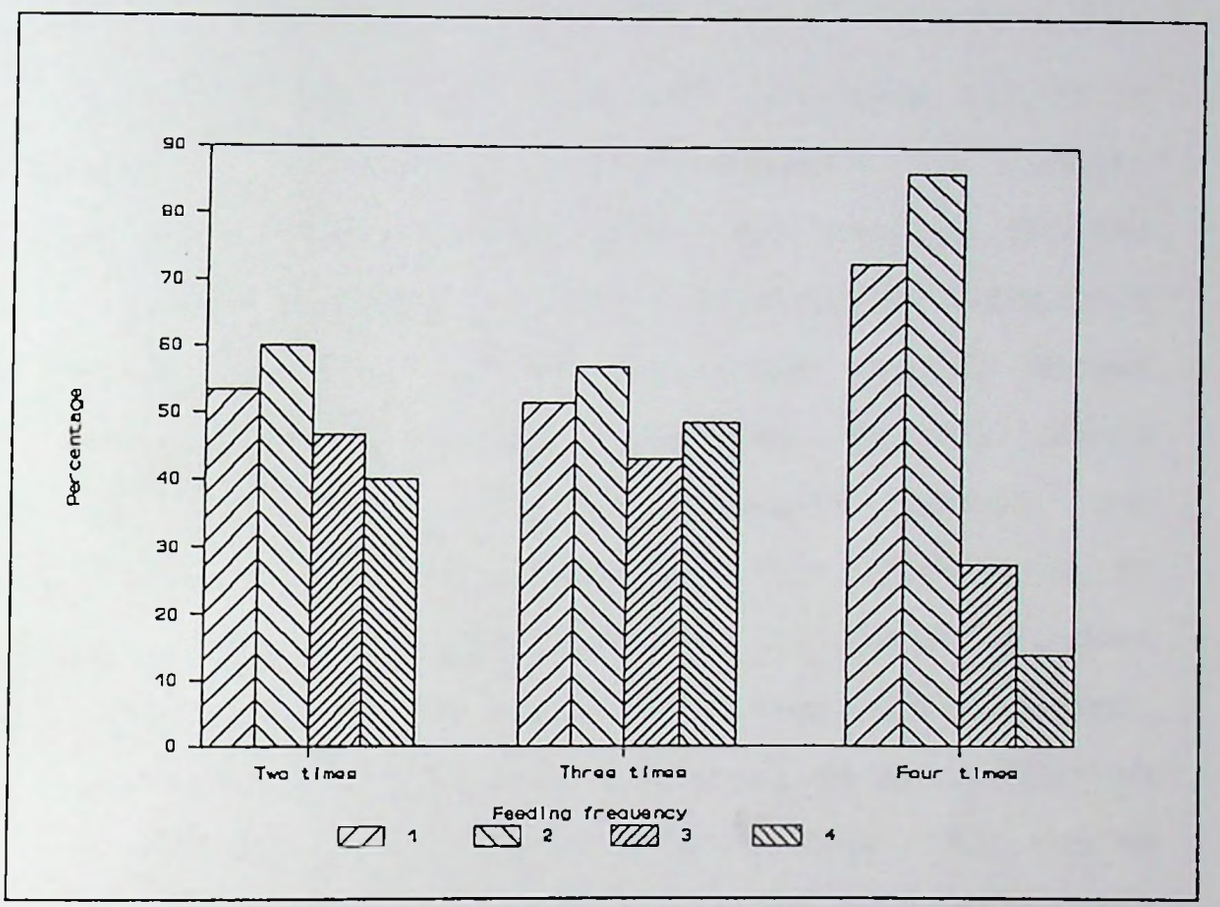
4.9.2 Feeding Frequency as Associated with Proxy for Nutritional Status of Under Fives During Food Scarcity and Abundance

Generally, the results showed that in all feeding frequencies, the level of malnutrition seemed to be lower during the abundance period and higher in scarcity period (Fig.11 and 12). The proportion of well nourished under fives was higher when the feeding frequency was four times per day than when this was two times or three times per day. Therefore, feeding frequency and availability of food are crucial with regard to the difference in seasons. Chi-square results showed that, variation in feeding frequency was not statistically significant ($P>0.05$) between seasons. This could be influenced by type of weaning foods used in the area and the quantity of food given to the children.



Key: 1 - Well nourished: scarcity of food
2 - Well nourished: abundancy of food
3 - Malnourished: Scarcity of food
4 - Malnourished: abundacy of food

Fig.11: Feeding frequency as associated with nutritional status during the scarcity and abundance of food periods (1995/96) in the study area



Key: 1 - Well nourished: scarcity of food
2 - Well nourished: abundancy of food
3 - Malnourished: scarcity of food
4 - Malnourished: abundancy of food

Fig.12: Feeding frequency as associated with nutritional status during the scarcity and abundance of food period (1996/97) in the study area

4.9.3 Household Weekly Off-farm Income as Associated with Proxy for Nutritional Status of Under Fives During Food Scarcity and Abundance

In total 58.7% of children were well nourished and 43.3% malnourished in the point of food scarcity. The results showed that as the household income increased so did the level of well nourished children regardless of difference in seasons (Tables 79 and 80). Chi-square results showed that the difference was not significant ($P>0.05$). There was no correlation between household income and nutritional status, regardless of the difference in seasons. Therefore, more emphasis in off-farm/income generating activities is required and need encouragement. In order to sustain household food security hence improve nutritional status, adequate food is required. This can be achieved by producing enough of it or purchasing the amount that cannot be produced by the household. In this study, only the income of off-farm activities was included because women dominated in decision making of income from these activities (Fig.10). Being a decision maker it is easy to devort this income for under five childrens' food and hence improvement in their nutritional status.

Table 79. Household weekly off-farm income as associated with nutritional status (Scarcity and food abundance period 1995/96)

Nutritional status	Level of Income per Week (Tsh)															
	Below 500		501 to 1000		1001 to 2000		2001 to 3000		3001 to 4000		4001 to 5000		Above 5000		Total	
	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2
Well-nourished	37.5 (3)	50.0 (4)	58.3 (21)	66.7 (24)	62.2 (23)	62.2 (23)	73.3 (11)	80.0 (12)	0.0 (0)	100.0 (1)	75.0 (3)	75.0 (3)	0.0 (0)	0.0 (0)	58.7 (61)	64.4 (67)
Malnourished	62.5 (5)	50.0 (4)	41.7 (15)	33.3 (12)	37.8 (14)	37.8 (14)	26.7 (4)	20.0 (3)	100.0 (1)	0.0 (0)	25.0 (1)	25.0 (1)	100.0 (3)	100.0 (3)	41.3 (43)	35.6 (37)
Total	100.0 (8)	100.0 (8)	100.0 (36)	100.0 (36)	100.0 (37)	100.0 (37)	100.0 (15)	100.0 (15)	100.0 (1)	100.0 (1)	100.0 (4)	100.0 (4)	100.0 (3)	100.0 (3)	100.0 (104)	100.0 (104)

Key 1: Period of food scarcity
2: Period abundance of food
( ): Numbers not in brackets indicate percentage
: Numbers in brackets indicate number of cases

Chi-square	Value	DF	Significance
Pearson	7.9	6	0.25
	10.3	6	0.11

Table 80. Household weekly off-farm income as associated with nutritional status among the population (scarcity and abundance period 1996/97)

Nutritional status	Level of Income per Week (Tsh)															
	Below 500		501 to 1000		1001 to 2000		2001 to 3000		3001 to 4000		4001 to 5000		Above 5000		Total	
	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2
Well-nourished	37.5 (3)	50.0 (4)	66.7 (24)	75.0 (27)	62.2 (23)	59.5 (22)	80.0 (12)	80.0 (12)	100.0 (1)	75.0 (3)	75.0 (3)	33.3 (1)	33.3 (1)	0.0 (0)	64.4 (67)	67.3 (70)
Malnourished	62.5 (5)	50.0 (5)	33.7 (12)	25.0 (14)	37.8 (14)	40.5 (15)	20.0 (3)	20.0 (3)	0.0 (0)	25.0 (0)	25.0 (1)	66.7 (2)	66.7 (2)	100.0 (3)	35.6 (37)	32.7 (34)
Total	100.0 (8)	100.0 (8)	100.0 (36)	100.0 (36)	100.0 (37)	100.0 (37)	100.0 (15)	100.0 (15)	100.0 (1)	100.0 (4)	100.0 (4)	100.0 (3)	100.0 (3)	100.0 (3)	100.0 (104)	100.0 (104)

Key: 1: Period of food scarcity
2: Period of abundance of food
( ): Number in brackets indicate number of cases
: Numbers not in brackets indicate percentage

Chi-square	Value	DF	Significance
Pearson	6.29	6	0.39
	6.39	6	0.38

4.9.4 Cultivated Hectareage for Food Crops as Associated with Proxy for Nutritional Status of Under Fives

From Tables 81 and 82, in the category where households had small cultivated hectareages, regardless of the season of food availability, the number of well nourished children was lower than for those households which had more cultivated hectareage. The results of chi-square test revealed that it was not significant ($P>0.05$). This means that during this season (1995/96), there was no association between the hectareage cultivated regardless of the differences in seasons. The small cultivated hectareage with low technology use, contributed to low production. But, it was significant at ($P<0.05$) during the abundance of food period in the year 1996/97. It implies that the more the land area cultivated the more the number of well nourished children and the lower the number of malnourished cases.

4.9.5 Food Crop Production as Associated with Proxy for Nutritional Status of Under Fives

In Tables 83 and 84 The results showed that when the production was more, the number of well nourished children also increased and the number of malnourished children decreased. Statistically, the variation between seasons was not significant ($P>0.05$).

Table 81. Cultivated hectareage for food crops as associated with nutritional status (1995/96)

Nutritional status	Cultivated hectareage (ha)													
	Less 0.4		0.4 to 0.8		0.9 to 1.3		1.4 to 1.8		1.9 to 2.3		Above 2.3		Total	
	1	2	1	2	1	2	1	2	1	2	1	2	1	2
Well-nourished	48.0 (3)	50.0 (3)	48.0 (24)	52.0 (26)	71.4 (35)	73.5 (36)	55.6 (5)	77.8 (7)	100.0 (1)	100.0 (1)	75.0 (6)	87.5 (7)	60.2 (74)	65.0 (80)
Malnourished	52.0 (3)	50.0 (3)	52.0 (26)	48.0 (24)	28.6 (14)	26.5 (13)	44.4 (4)	22.2 (2)	0.0 (0)	0.0 (0)	25.0 (2)	12.5 (1)	39.8 (49)	35.0 (43)
Total	100.0 (6)	100.0 (6)	100.0 (50)	100.0 (50)	100.0 (49)	100.0 (49)	100.0 (9)	100.0 (9)	100.0 (1)	100.0 (1)	100.0 (8)	100.0 (8)	100.0 (123)	100.0 (123)

Key:
1: Period of food scarcity
2: Period of abundance of food
( ): Numbers in brackets indicate number of cases
: Numbers not in brackets indicate percentage

Chi-square	Value	DF	Significance
Pearson	8.49	5	0.13
	8.23	5	0.14

Table 82. Cultivated hectareage for food crops as associated with nutritional status (1996/97)

Nutritional status	Cultivated hectareage (ha)													
	Less 0.4		0.4 to 0.8		0.9 to 1.3		1.4 to 1.8		1.9 to 2.3		Above 2.3		Total	
	1	2	1	2	1	2	1	2	1	2	1	2	1	2
Well-nourished	50.0 (3)	50.0 (3)	52.0 (26)	52.0 (26)	75.5 (37)	79.6 (39)	55.6 (5)	66.7 (6)	100.0 (1)	100.0 (1)	75.0 (6)	87.5 (7)	63.4 (78)	66.7 (82)
Malnourished	50.0 (3)	50.0 (3)	48.0 (24)	48.0 (24)	24.5 (12)	20.4 (10)	44.4 (4)	33.3 (3)	0.0 (0)	0.0 (0)	25.0 (2)	12.5 (1)	36.6 (45)	33.3 (41)
Total	100.0 (6)	100.0 (6)	100.0 (50)	100.0 (50)	100.0 (49)	100.0 (49)	100.0 (9)	100.0 (9)	100.0 (1)	100.0 (1)	100.0 (8)	100.0 (8)	100.0 (123)	100.0 (123)

Key: 1: Period of food scarcity
2: Period of abundance of food
( ): Numbers in brackets indicate number of cases
: Numbers not in brackets indicate percentage

Chi-square	Value	DF	Significance
Pearson	7.64	5	0.18
	11.34	5	0.05

Table 83. Food crop production as associated with nutritional status (1995/96)

Nutritional status	Production (bags)									
	Below 2		2 - 4		5 - 10		Above 10		Total	
	1	2	1	2	1	2	1	2	1	2
Well-nourished	53.3 (40)	56.0 (42)	65.4 (17)	69.2 (18)	80.0 (12)	86.7 (13)	85.7 (6)	85.7 (6)	61.0 (79)	64.2 (75)
Malnourished	46.7 (35)	44.0 (33)	34.6 (9)	30.8 (8)	20.0 (3)	13.3 (2)	14.3 (1)	14.3 (1)	39.0 (48)	35.8 (44)
Total	100.0 (75)	100.0 (75)	100.0 (26)	100.0 (26)	100.0 (15)	100.0 (15)	100.0 (7)	100.0 (7)	100.0 (123)	100.0 (123)

Key: 1: Food Scarcity Period
2: Period of abundance of food
( ): Numbers in brackets indicate number of cases
: Numbers not in brackets indicate percentage

Chi-square	Value	DF	Significance
Pearson	6.69	3	0.08
	6.82	3	0.08

Table 84. Food crop production as associated with nutritional status (1996/97)

Nutritional status	Production (bags)									
	Below 2		2 - 4		5 - 10		Above 10		Total	
	1	2	1	2	1	2	1	2	1	2
Well-nourished	57.3 (43)	61.3 (46)	65.4 (17)	65.4 (17)	80.0 (12)	86.7 (13)	85.7 (6)	85.7 (6)	63.4 (78)	66.7 (82)
Malnourished	42.7 (32)	38.7 (29)	34.6 (9)	34.6 (9)	20.0 (3)	13.3 (2)	14.3 (1)	14.3 (1)	36.6 (45)	33.3 (41)
Total	100.0 (75)	100.0 (75)	100.0 (26)	100.0 (26)	100.0 (15)	100.0 (15)	100.0 (7)	100.0 (7)	100.0 (123)	100.0 (123)

Key: 1: Food Scarcity Period
2: Period of abundance of Food
( ): Numbers in brackets indicate number of cases
: Numbers not in brackets indicate percentage

Chi-square	Value	DF	Significance
Pearson	4.52	3	0.21
	4.82	3	0.19

The variables were not dependent. Through observations in the study area it was found that there was more sale of food crops implying that, more food was sold instead of being kept for home use. Nutritional education and emphasis on the recomended amount of food (three bags per person per year) was a necessity in order to ensure a healthy community.

4.9.6 Duration in Months of Food Storage (Months After Harvest) as Associated with Proxy for Nutritional Status of Under Fives

The findings of this study (Tables 85 and 86) revealed that level of malnourished as well nourished children depended on the duration of food stored (months after harvesting). Generally, the number of well nourished children was slightly higher during the period of food abundance than during scarcity periods. Also, the number of malnourished children was slightly higher during the food scarcity periods than when the food was in abundance. There was no significance ($P>0.5$) in the association of duration of storage foods in months after harvesting with the seasons. The implication is that even if the food was available, what as important was food accessibility: feeding frequency, quantity and quality of food consumed.

Table 85. Duration in months of food storage as associated with nutritional status (1995/96)

Nutritional status	Months of food storage after harvest															
	1		2 - 3		4 - 5		6 - 7		8 - 9		Above 9		Next harvest		Total	
	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2
Well-nourished	50.0 (1)	50.0 (1)	50.0 (3)	66.7 (4)	55.0 (11)	60.0 (12)	50.0 (11)	50.0 (11)	58.8 (10)	64.7 (11)	66.7 (10)	73.3 (11)	68.3 (28)	73.2 (30)	60.2 (74)	65.0 (80)
Malnourished	50.0 (1)	50.0 (1)	50.0 (3)	33.3 (2)	45.0 (9)	40.0 (8)	50.0 (11)	50.0 (11)	41.2 (7)	35.3 (6)	33.3 (5)	26.7 (4)	31.7 (13)	26.8 (11)	39.8 (49)	35.0 (43)
Total	100.0 (2)	100.0 (2)	100.0 (6)	100.0 (6)	100.0 (20)	100.0 (20)	100.0 (22)	100.0 (22)	100.0 (17)	100.0 (17)	100.0 (15)	100.0 (15)	100.0 (41)	100.0 (41)	100.0 (123)	100.0 (123)

Key: 1: Food scarcity period
2: Period of abundance of food
( ): Numbers in brackets indicate number of cases
: Numbers not in brackets indicate percentage

Chi-square	Value	DF	Significance
Pearson	4.62	6	0.59
	3.06	6	0.8

Table 86. Duration in months of food storage as associated with nutritional status (1996/97)

Nutritional status	Months of food storage after harvest															
	1		2 - 3		4 - 5		6 - 7		8 - 9		Above 9		Next harvest		Total	
	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2
Well-nourished	50.0 (1)	50.0 (1)	66.7 (4)	66.7 (4)	65.0 (13)	60.0 (12)	45.5 (10)	54.5 (12)	70.6 (12)	70.6 (12)	73.3 (11)	73.3 (11)	65.9 (27)	73.2 (30)	63.4 (78)	66.7 (82)
Malnourished	50.0 (1)	50.0 (1)	33.3 (2)	33.3 (2)	35.0 (7)	40.0 (8)	54.5 (12)	45.5 (10)	29.4 (5)	29.4 (5)	26.7 (4)	26.7 (4)	34.1 (14)	26.8 (11)	36.6 (45)	33.3 (41)
Total	100.0 (2)	100.0 (2)	100.0 (6)	100.0 (6)	100.0 (20)	100.0 (20)	100.0 (22)	100.0 (22)	100.0 (17)	100.0 (15)	100.0 (15)	100.0 (15)	100.0 (41)	100.0 (41)	100.0 (123)	100.0 (123)

Key: 1: Food scarcity period
2: Period of abundance of food
( ): Numbers in brackets indicate number of cases
: Numbers not in brackets indicate percentage

Chi-square	Value	DF	Significance
Pearson	4.38	6	0.63
	3.3	6	0.77

4.9.7 The Type of Food Taken in the Household as Associated with Proxy for Nutritional Status of Under Fives

In the households whose type of food was basically animal protein and starch (Tables 87 and 88), the nutritional status was higher during scarcity and abundance of food periods than in those households consuming other food types. This was because protein food is very good for body building, if consumed together with cereal at the required quantity. Consequently, they help to raise the nutritional status of a child in the household. The very malnourished ate legumes and starch. In order to improve the nutritional status of the children, there is a need for households to increase cereal production and to keep small animals and poultry as a source of good quality protein. Also, there is a need to educate people on the use of fruits. From the observations during the survey period, respondents seemed not to regularly consume fruits as part of their diet. There was a statistical significance ($P< 0.05$) in 1995/96 between the nutritional status and the type of food taken irrespective of the season.

Table 87. The type of food taken in the household as associated with nutritional status (1995/96)

Nutritional status	Type of foods											
	Legumes + Starch		Vegetable + Starch		Animal protein + starch		Vegetable + animal prot. + starch		Legumes + vegetable + starch		Total	
	1	2	1	2	1	2	1	2	1	2	1	2
Well-nourished	41.4 (12)	48.3 (14)	70.4 (19)	77.8 (21)	66.7 (26)	79.5 (31)	57.1 (8)	64.3 (9)	42.9 (6)	57.1 (8)	57.7 (71)	67.5 (83)
Malnourished	58.0 (17)	51.7 (15)	29.6 (8)	22.2 (6)	33.3 (13)	20.5 (8)	42.9 (6)	35.7 (5)	57.1 (8)	42.9 (6)	42.3 (52)	32.5 (40)
Total	100.0 (29)	100.0 (29)	100.0 (27)	100.0 (27)	100.0 (39)	100.0 (39)	100.0 (14)	100.0 (14)	100.0 (14)	100.0 (14)	100.0 (123)	100.0 (123)

Key: 1: Food scarcity period
2: Period of food abundance
( ): Numbers in brackets indicate number of cases
: Numbers not in brackets indicate percentage

Chi-square	Value	DF	Significance
Pearson	8.6	4	0.07
	10.56	4	0.03

Table 88. The type of food taken in the household as associated with nutritional status (1996/97)

Nutritional status	Type of Foods											
	Legumes + Starch		Vegetable + Starch		Animal protein + starch		Vegetable + animal prot. + starch		Legumes + vegetable + starch		Total	
	1	2	1	2	1	2	1	2	1	2	1	2
Well-nourished	55.2 (16)	55.2 (16)	66.7 (18)	70.4 (19)	76.9 (30)	82.1 (32)	57.1 (8)	57.1 (8)	42.9 (6)	50.0 (7)	63.4 (78)	66.7 (82)
Malnourished	44.8 (13)	44.8 (13)	33.3 (9)	29.6 (8)	23.1 (9)	17.9 (7)	42.9 (6)	42.9 (6)	57.1 (8)	50.0 (7)	36.6 (45)	33.3 (41)
Total	100.0 (29)	100.0 (29)	100.0 (27)	100.0 (27)	100.0 (39)	100.0 (39)	100.0 (14)	100.0 (14)	100.0 (14)	100.0 (14)	100.0 (123)	100.0 (123)

Key: 1 : Food scarcity period
2 : Period of food abundance
( ): Numbers in brackets indicate number of cases
: Numbers not in brackets indicate percentage

Chi-square	Value	DF	Significance
Pearson	6.83	4	0.15
	8.37	4	0.08

4.9.8 Number of People in the Household as Associated with Proxy for Nutritional Status of Under Fives

Tables 89, 90, 91 and 92 show that the number of people in the households ranged from 2 to 20. From the results there was no consistency of well nourished/malnourished underfives as the size of the household increased. Generally, the level of the well nourished children increased in the household size of 2, 6, 9,10, 13, 17 and 20. Based on food storage of 2 to 10 bags, which was common in the sampled area, this amount was only enough for the family of two people. According to Mosha (1990a) food recommendations, of 3 bags/person/year, 2 people need 6 bags of cereals per year. With large families (for example family of 9 and 10), reasons for high percentage well nourished children could be that in these families: (1) It was expected to find older children working together with their parents (labour factor; Milich (1997) (2) Older children if employed, could support their parents in cash remittances. (3) Older children take care of their young. In such situation, there might be more production per household, therefore high number of well nourished children. In other households, where the nutritional status was not good, this could have been contributed by other factors such as household low cultivated hectarage, low food production, short duration of stored foods, poor quality of food taken,

Table 89. Number of people in the household as associated with nutritional status during food scarcity period (1995/96)

Nutritional status	Size of the family															
	2	3	4	5	6	7	8	9	10	11	12	13	14	17	20	Total
Well-Nourished	100.0	30.0	25.0	30.4	50.0	26.3	46.7	75.0	66.7	16.7	0.0	50.0	0.0	50.0	100.0	37.7
	(2)	(3)	(3)	(7)	(3)	(5)	(7)	(9)	(2)	(1)	(0)	(0)	(0)	(1)	(2)	(46)
Malnourished	0.0	70.0	75.0	69.6	50.0	73.7	53.3	25.0	33.3	83.3	100.0	50.0	100.0	50.0	0.0	62.3
	(0)	(7)	(9)	(16)	(3)	(14)	(8)	(3)	(1)	(5)	(6)	(1)	(2)	(1)	(0)	(76)
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	(2)	(10)	(12)	(23)	(6)	(19)	(15)	(12)	(3)	(6)	(6)	(2)	(2)	(2)	(2)	(122)

Key:
( ): Numbers in brackets indicate number of cases
: Numbers not in brackets indicate percentage

Chi-square	Value	DF	Significance
Pearson	24.56	14	0.04

Table 90. Number of people in the household as associated with nutritional status during period of abundance of food (1995/96)

Nutritional status	Size of the family															
	2	3	4	5	6	7	8	9	10	11	12	13	14	17	20	Total
Well-Nourished	50.0 (1)	30.0 (3)	41.7 (5)	26.1 (6)	33.3 (2)	35.0 (7)	60.0 (9)	58.3 (7)	100.0 (3)	16.7 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	50.0 (1)	36.6 (45)
Malnourished	50.0 (1)	70.0 (7)	58.3 (7)	73.9 (17)	66.7 (4)	65.0 (13)	40.0 (6)	41.7 (5)	0.0 (0)	83.3 (5)	100.0 (6)	100.0 (2)	100.0 (2)	100.0 (2)	50.0 (1)	63.4 (78)
Total	100.0 (2)	100.0 (10)	100.0 (12)	100.0 (23)	100.0 (6)	100.0 (20)	100.0 (15)	100.0 (12)	100.0 (3)	100.0 (6)	100.0 (6)	100.0 (2)	100.0 (2)	100.0 (2)	100.0 (2)	100.0 (123)

Key:

( ): Numbers in brackets indicate number of cases
: Numbers not in brackets indicate percentage

Chi-square	Value	DF	Significance
Pearson	20.91	14	0.1

taboos and beliefs, low income level, low feeding frequency and/or when a good number in the family are underfives or elders. Chi-square results showed to be significant ($P<0.05$) as associated with the nutritional status and the number of people in the household during the scarcity period.

4.10 Results of the Regression Analysis and Discussion

Table 93 presents the estimated coefficients for the variables hypothesized to influence the total maize production (bags), with their standard errors and t-statistics. Maize is the main food and cash crop in the study area, therefore, it was taken to represent other crops. Ordinary least square method was used to estimate the coefficients.

The common problems of multicollinearity were examined. The presence of multicollinearity was checked through correlation coefficient analysis for all independent variables. In most cases, these were found significant indicating the absence of serious multicollinearity problems.

Table 91. Number of people in the household as associated with nutritional status during period of abundance of food (1996/97)

Nutritional status	Size of the family															
	2	3	4	5	6	7	8	9	10	11	12	13	14	17	20	Total
Well-Nourished	50.0 (1)	30.0 (3)	25.0 (3)	21.7 (5)	33.3 (2)	40.0 (8)	60.0 (9)	58.3 (7)	66.7 (2)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	50.0 (1)	33.3 (41)
Malnourished	50.0 (1)	70.0 (7)	75.0 (9)	78.3 (18)	66.7 (4)	60.0 (12)	40.0 (6)	41.7 (5)	33.7 (1)	100.0 (6)	100.0 (6)	100.0 (2)	100.0 (2)	100.0 (2)	50.0 (1)	66.7 (82)
Total	100.0 (2)	100.0 (10)	100.0 (12)	100.0 (23)	100.0 (6)	100.0 (20)	100.0 (15)	100.0 (12)	100.0 (3)	100.0 (6)	100.0 (6)	100.0 (2)	100.0 (2)	100.0 (2)	100.0 (2)	100.0 (123)

Key:
(): Numbers in brackets indicate number of cases
: Numbers not in brackets indicate percentage

Chi-square	Value	DF	Significance
Pearson	21.39	14	0.09

Table 92. Number of people in the household as associated with nutritional status during food scarcity period (1996/97)

Nutritional status	Size of the family															
	2	3	4	5	6	7	8	9	10	11	12	13	14	17	20	Total
Well-Nourished	50.0	40.0	18.2	22.7	50.0	42.1	60.0	66.7	100.0	16.7	16.7	0.0	0.0	50.0	0.0	38.3
	(1)	(4)	(2)	(5)	(3)	(8)	(9)	(8)	(3)	(1)	(1)	(0)	(0)	(1)	(0)	(46)
Malnourished	50.0	60.0	81.8	77.3	50.0	57.9	40.0	33.3	0.0	83.3	83.3	100.0	100.0	50.0	100.0	61.7
	(1)	(6)	(9)	(17)	(3)	(11)	(6)	(4)	(0)	(5)	(5)	(2)	(2)	(1)	(2)	(74)
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	(2)	(10)	(11)	(22)	(6)	(19)	(15)	(12)	(3)	(6)	(6)	(2)	(2)	(2)	(2)	(120)

Key:
( ): Numbers in brackets indicate number of cases
: Numbers not in brackets indicate percentage

Chi-square	Value	DF	Significance
Pearson	22.85	14	0.06

Table 93. Results of the regression model

Independent variables	B	SE	T	Significance t-statistic
P_f	2.785432	0.636587	4.376	0.0000*
P_m	1.222423	0.250449	0.056	0.7699
W_f	1.764507	0.546889	3.226	0.0018*
W_m	1.663433	0.386271	0.066	0.8122
H_f	0.101580	0.566110	3.179	0.0204*
H_m	0.050891	0.007022	0.077	0.9388
T_f	0.414257	0.197483	0.326	0.7389
T_m	1.168884	0.239408	3.701	0.0039*
PC_f	2.964905	0.840913	4.674	0.0000*
PC_m	1.344202	0.364782	0.323	0.7476
M_f	0.036126	0.162530	0.222	0.8461
M_m	0.112791	0.121080	4.336	0.0010*
E_f	1.147557	4.597514	0.250	0.0315*
E_m	0.164310	0.175076	2.948	0.0438*
Fert	0.472789	0.045726	2.552	0.0301*
B_o	108.605525	123.393490	0.880	0.3813

* = Significant (P<0.05)

R Square = 0.67340
Adjusted R Square = 0.63203
Standard Error = 36.41446
F-Statistics = 4.91402
Significancy F = 0.0002*

The results in Table 93 show that the independent variables included in the regression model explained only 63% (adjusted R Square 0.63203) of the variation in contribution of women to crop production hence to household food security. As it was assumed, among the variables, six of them were statistically significant. These included hours spent by females in planting (P_f), weeding (W_f), harvesting (H_f) and processing of food crops (PC_f). Education level (E_f) and quantity of fertilizer (Fert) (in bags of 50 kg applied) were also significant

($P<0.05$). Labour hours spent in transporting crops from field to homestead (T_f) and marketing of surplus crops (M_f) were not significant ($P>0.05$).

Labour hours spent in processing food crops (PC_f) had the highest (B= 2.964905) predictive effect on the contribution of women to crop production hence to household food security. Labour hours spent in planting (P_f) had the second highest (B= 2.785432) predictive effect on the contribution of women to crop production hence to household food security. Labour hours spent in weeding (W_f) had the third highest (B= 1.764507) predictive effect on the contribution of women to crop production hence to household food security among the statistically significant variables. Statistically positive values implied a positive effect of contribution to crop production hence to household food security. Labour hours in harvesting (H_f) had the fourth highest (B= 0.181580) predictive effect on the contribution of women to crop production hence to household food security among the statistically significant variables.

Education level (E_f) had (B= 0.147557) predictive effect on the contribution of women to crop production hence to household food security. Quantity of fertilizer (in bags of 50 kg) applied was positively significant $P<0.05$ (B= 0.472789). These results implied that, excluding the other factors, total production depended on the amount of

artificial fertilizer applied. In conclusion, women contributed more to household food security than men.

In the study area, maize, rice and sorghum are treated as well as main food and cash crops, therefore, they contribute a lot in household food security. The inhabitants rarely keep animals and income generating activities are in small amounts. Therefore, household food security in this area depends a lot on the production of maize, rice and sorghum as both as food and cash crops.

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

1. The results of this study on the proportion of active labour, both on the basis of age and sex, made the study area to be treated as being in a good food security situation.
2. It was noted that in the study area the families were large, ranging between 5.3 - 8.2 with the entire population average of 6.6. Large family size is difficult to feed, especially when comprised of too many children or too many old people.
3. Male dominated (93.8%) as heads of households. This could affect household food security in the study area taking into account that women are the main crop producers.
4. Household food security was inadequate in some 63% of the households mainly due to inadequate production (77.2%) and early sale of produce (17.2%). The majority (99%) of the respondents sold their produce within six months of the harvest.

5. The main reasons for early sale of the produce and green maize was to obtain cash for purchase of household needs and to avoid losses due to pests or lack of durable storage facilities.
6. The cultivated land (0.9 - 1.3 hactares) for 40.4% of the households was too small for household needs and the poor technology used worsened further this situation.
7. For most (49.1%) of those respondents with farms outside the village, the distance was more than 4 km from their homestead. The means of transport for the majority (40.2%) was on foot, and the time spent on walking to and from the farm was 1 to 6 hours daily. This has a negative effect on household food security.
8. Inorganic fertilizers were marginally used (3.1% of the respondents) due to their high cost and unavailabilty. On the contrary, improved seeds were used by many farmers (69.2% of the respondents).
9. Kimamba village was the main producer of maize. Dumila village was the main producer of rice and Melela village the largest producer of sorghum.
10. There was a decrease in food production in 1994, 1995 and 1996. The main reason for the decrease in production was drought. Other reasons, such as insects, diseases and wild animals were also reported.

11. Majority of the respondents (over 80%) usually, supplemented the food from their own farms with that they purchased from markets.
12. More than 50% of the respondents exhausted their food stocks within nine months. It was also noted that in some households (3.5%), this stock was exhausted within a month of harvesting.
13. Storage of food crops was inadequate and clearly an indication of food insecurity at the household level. Most of the households (66.2%) relied on purchasing food for their families to make for this deficit.
14. The commonest storage method was the use of gunny bags and plastic bags.
15. Rodents and insects were equally important and common crop pests in the study area. There was limited use (33.1%) of pesticides as a control measure because of the high cost of pesticides.
16. Use of food crops in brewing traditional beers, was limited in this study area but with negative effect to food security.
17. Off-farm activities, such as sale of foods, local beer, mats, vegetables and fruits, employment (for few respondents) and casual labour added to household income. The income generated from these sales was generally low (Tsh 12,000/= per month) was also used to buy food for the household.

18. The frequency of feeding of a majority of adults was three times per day. Similar feeding frequency pattern was also noted for children but to a lesser extent. Feeding frequency of two to three times per day is considered inadequate, especially for growing children. The main weaning food was plain maize porridge that is generally limited in nutrients.
19. Religious beliefs were among the dominant factors limiting consumption of different foods.
20. All the respondents confirmed availability of food in the village market. However, for the few respondents who could afford to buy the available food, the main problem was high cost and fluctuations in market prices.
21. Seasonal variations in production and prices were often important factors contributing to transitory food insecurity in poor households in the study area.
22. Access to capital was a major factor limiting the contribution of women to household food security. Other factors, such as lack of time, limited access to decision making power, agricultural knowledge and drought were also reported. Access to land was important although this factor was mainly in Kimamba village.
23. Off-farm activities for women included petty business, sale of cooked foods, mats, local beer, cash crops and casual labour. Sale of livestock,

which was another potential source of income was less important, since most of these respondents were not livestock keepers.

24. In all cases, decisions were made by the family (jointly between husband and wife), but with husband always taking the leading role. All decisions on domestic activities were dominated by women.

25. Control of cash obtained from sale of cash crops, food crops, livestock and land was a responsibility of men. Women only handled cash obtained from sale of local beer and crafts.

26. The majority (77.6%) of women used firewood as a source of energy in cooking. Consequently, a lot of time was lost in firewood collection and this greatly affected food production activities. Most (50-70%) of the women did not have extra help to assist in household chores, such as collecting firewood and fetching water.

27. Possibilities of getting extension advice, were limited. Of those respondents who received extension advice, none felt satisfied due to the fact that the training offered by these extension workers was not so focused to solve their pressing problems.

28. Reduction of meal frequency and amount of food consumed, involvement casual labour, petty business and buying of food were the main dominant coping strategies during food shortages. Borrowing of food or money and sale of animals contributed little to

these coping strategies.

29. More than 50% of the women in the households gathered wild foods. Gathered foods are accepted as part of the diet and as an important option during food shortages in the study area.

30. Underfive children and women were the most affected of all the household groups during food shortages.

31. Women played a greater role in household food security in terms of food and cash crop production, livestock production, income earning and household activities. In crop production activities, from land preparation to marketing, women contributed labour to every activity. Women contributed most labour in harrowing (52.7%), planting (50.8%), weeding (51.6%), threshing and storage (50.5%). Men contributed most labour in land preparation (56.7%), transporting crops to the homestead (57.8%) and marketing (52.8%).

32. This study concludes that males and females in Morogoro Rural and Kilosa district, shared the same tasks on more or less equal basis. Women dominated in all activities of food crop production with the exception of site clearing (43.3%), transporting crops (42.2%) and marketing surplus food crops (47.2%). Marketing has been observed as man's task.

33. Labour involvement in cash crop production and income generating activities was moreless equally shared. Generally, labour for household activities,

was dominated by females, although in all activities this were shared with men. The results imply that women play a bigger role in household food security than men.

34. Multiple Regression analysis indicated that the contribution of women in household food security was high. Women contributed more in processing, planting, weeding and harvesting than men. Education and quantity of fertilizer application also associated positively with the total production.

35. The malnutrition level was higher when food was scarce. When there was abundance of food, this level was slightly lower.

36. Feeding frequency, women household income, crop production and duration of food storage were not serious factors associated with nutritional status of children, regardless of the variations in seasons of food availabilty. There was a strong association between type of food taken, the number of people in the household and cultivated hectareage.

5.3 Recommendations

1. It is necessary to improve and consolidate the production of various food-stuffs, especially, maize, rice and sorghum in the study area.

2. Drought resistant crops, such as sorghum, millet, cassava and sweet potatoes and informal

supplementary crops around the home (vegetables and fruits) should been encouraged in the study and other similar areas. This will add to the list of food available and for income generation for the household.

3. Households should be motivated and encouraged to stock their crops after harvest. They should be discouraged from their practice of early sale of food crops and purchase the same later.
4. Every household should be encouraged to construct its own simple, low cost but durable granary, which minimizes damage of crop by insects, rodents, birds and micro-organisms. In order to store enough food, communal village granary need consideration.
5. Measures such as; stocking enough food for home consumption and sale of the surplus when prices are conducive should be taken.
6. To assist the majority of the farmers who fail to purchase agricultural inputs, the Government is advised to explore the possibility of introducing barter system of harvested food/cash crops with such inputs. Given the outstanding contribution of women in agricultural development communities need to be sensitized on the importance of women in household food security. Together with this, they be pursuaded on the need to exercise flexibility to facilitate achievement of this goal.

Rural development programmes should assist in initiating changes that will increase their accessibility to women as means of increasing household food security. Planners at all levels of the planning cycle need to be sensitized on the importance of women's contribution to household food security. There should be deliberate efforts by the extension service to reach more women through dialogue with the involved parties.

7. Food security will only be realised if constraints facing rural women farmers are removed. These would include improving their decision making power, access to capital, time and land.

8. To encourage parents and guardians in the study area or other similar areas to feed their young children, at least four times a day.

9. Community and government assistance are needed in the construction of water wells or taps within reach of the households in the villages. Tree planting within the villages for firewood and other uses is also recommended.

10. Given the outstanding contribution in agricultural production activities women need to be empowered in decision making.

11. Recommended areas for further research in relation to this study:

    i) The effect of local beer brewing on household food security.

ii) Improvement of storage as a measure to ensure household food security.

iii) The impact of early sale of food crops including green maize in the household food security.

iv) Household income and their contribution to food security with special reference to women.

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Appendix 1

QUESTIONNAIRE: BASIC SURVEY - DATA COLLECTION

SOKOINE UNIVERSITY OF AGRICULTURE

FACULTY OF AGRICULTURE

DEPARTMENT OF AGRICULTURAL EDUCATION AND EXTENSION

TITLE: THE ROLE OF WOMEN IN HOUSEHOLD FOOD SECURITY IN MOROGORO RURAL AND KILOSA DISTRICTS, TANZANIA.

1. GENERAL INFORMATION

1.1 Respondent Serial Number ..... Date .....

1.2 Name of Respondent .....

1.3 District ..... Division .....

Ward ..... Village .....

1.4 Ten cell Leader .....

1.5 Age of respondent (check one)

.....01. Under 18 years old (children)
.....02. Between 18 - 25 years old (young, adults)
.....03. Between 26 - 55 years old (adults)
.....04. Above 55 years old (old)

1.6 Sex of respondent (check one)

..... 01. Female
..... 02. Male

1.7 Marital Status (Check one)

..... 01. Single
..... 02. Married
..... 03. Widowed
..... 04. Divorced/Separated

1.8 Number of People in the household

Years	Female	Male
01. Less than 5		
02. 5 - 18		
03. Above 18		

1.9 Are you the head of this household?

01. Yes ..... 02. No .....

1.10 Respondents level of education

..... 01. No formal schooling
..... 02. Adult literacy classes
..... 03. Primary School
..... 04. Secondary School
..... 05. Beyond Secondary School

2.0 FOOD PRODUCTION AND SUPPLY

2.1 Do you produce your own food?

..... 01. Yes
..... 02. No.

2.2 If yes, how many hectares of cultivable land do you own?

1. Here in the village

..... 01. Less than 0.4
..... 02. 0.4 - 0.8
..... 03. 0.9 - 1.3
..... 04. 1.4 - 1.8
..... 05. 1.9 - 2.3
..... 06. Above 2.3

2. Elsewhere

..... 01. Nil
..... 02. Less than 0.4
..... 02. 0.4 - 0.8
..... 03. 0.9 - 1.3
..... 04. 1.4 - 1.8
..... 05. 1.9 - 2.3
..... 06. Above 2.3

2.3 What is the total cultivated area (hectare)?

1. Here in the village

..... 01. Less than 0.4
..... 02. 0.4 - 0.8
..... 03. 0.9 - 1.3
..... 04. 1.4 - 1.8
..... 05. Above 1.8

2. Elsewhere

..... 01. Nil
..... 02. Less than 0.4
..... 03. 0.4 - 0.8
..... 04. 0.9 - 1.3
..... 05, 1.4 - 1.8
..... 06. Above 1.8

2.4 If elsewhere, how far is it from your home?

01. Less a km
..... 02. 1-2 km
..... 03. 3-4 km
..... 04. More than 4 km

2.5 How do you reach there?

..... 01. Walking
..... 02. Bicycle
..... 03. Bus
..... 04. Others (specify)

2.6 How many minutes/hours do you take to reach there?

..... 01. Less 30 minutes
..... 02. 30 minutes - 1 hour
..... 03. 2 hours - 3 hours
..... 04. More than 3 hours

2.7 Do you cultivate all your area here in village?

..... 01. Yes
..... 02. No

2.8 If no why do you not cultivate the rest of the land here in the village?

..... 01. Low fertility
..... 02. Labour shortage
..... 03. Low capital
..... 04. Low technology
..... 05. Animals

..... 06. Others (specify)

2.9 Do you cultivate all your area elsewhere?

..... 01. Yes
..... 02. No

2.10 If no why do you not cultivate the rest of the land?

..... 01. Low fertility
..... 02. Labour shortage
..... 03. Low capital
..... 04. Low technology
..... 05. Too far
..... 06. Thieves
..... 07. Animals
..... 08. No rainfall
..... 09. Others (specify)

2.11 When do you harvest?

Crop	Month
01. Maize	
02. Rice	
03. Sorghum	
04. Others	

2.12 When do you start eating green maize (month)?
.....

2.13 What are the main food crops for home consumption? (list in order of importance)

..... 01. Maize
..... 02. Rice
..... 03. Sorghum
..... 04. Cassava
..... 05. Yams
..... 06. Sweet potatoes
..... 07. Others (specify)

2.14 What are the main non-food crops do you produce?

..... 01. Cotton
..... 02. Simsim
..... 03. Sunflower
..... 04. Others (specify)

2.15 How much food did you produce this year?

(1995)			(1996)		
Crop	Local Units (specify)	Gunny/Plastic bags	Crop	Local Units (specify)	Gunny/Plastic bags
01. Maize			01. Maize		
02. Rice			02. Rice		
03. Sorghum			03. Sorghum		
04. Others (specify)			04. Others (specify)		

2.16 How much non-food crops did you produce this year?

(1995)			(1996)		
Crop	Local Units (specify)	Gunny/Plactic bags	Crop	Local Units (specify)	Gunny/Plactic bags
01. Cotton			01. Cotton		
02. Simsim			02. Simsim		
03. Sunflower			03. Sunflower		
04. Others (specify)			04. Others (specify)		

2.17 Did you sell some of your food produce this year?

(1995)	(1996)
..... 01. Yes	..... 01. Yes
..... 02. No.	..... 02. No.

2.18 If yes, why did you sell some of your food produce?

Reasons	
1995	1996
01. To obtain cash	01. To obtain cash
02. Unable to keep crops due to pests	02. Unable to keep crops
03. Surplus	03. Surplus
04. Lack of storage facilities	04. Lack of storage facilities
05. Others (specify)	05. Others (specify)

2.19 After how long did you sell your food crops? (specify months after harvesting)

1995	1996
..... 01. Less a month	..... 01. Less a month
..... 02. 1-2 month	..... 02. 1-2 month
..... 03. 3-4 month	..... 03. 3-4 month
..... 04. 5-6 month	..... 04. 5-6 month
..... 05. 7-8 month	..... 05. 7-8 month
..... 06. 9-10 month	..... 06. 9-10 month
..... 07. Above 10 month	..... 07. Above 10 month

2.20 Did you sell green maize?

..... 01 Yes
..... 02 No

2.21 If yes how much did you sell as green maize?

1995	1996
..... 01. Less 0.1 (hactare)	..... 01. Less 0.1 (hactare)
..... 02. 0.2	..... 02. 0.2
..... 03. More than 0.2	..... 03. More than 0.2
..... 04. All area	.....04. All area

2.22 Why did you sell as a green maize

..... 01. For household income
..... 02. No storage facilities
..... 03. Others (specify)

2.23 Do you use fertilizer?

..... 01. Yes
..... 02. No

2.24 If no why?

..... 01. Costly
..... 02. Not available
..... 03. Low technology
..... 04. Others (specify)

2.25 If yes how much did you buy last season (1994)?

..... 01. 1 bag of 50 kgs
..... 02. 2 bags of 50 kgs
..... 03. 3 bags of 50 kgs
..... 04. Above 3 bags of 50 kgs

2.26 Do you use improved seed?

..... 01. Yes
..... 02. No

2.27 If yes how much did you buy last season?
..... 01. 0.5 kg
..... 02. 1 kg
..... 03. 2-3 kgs
..... 04. 4-5 kgs
..... 05. Above 5 kgs

2.28 If no why?

..... 01. Costly
..... 02. Not available
..... 03. Beliefs and taboos
..... 04. Others (specify)

2.29. Do you purchase any food item?

..... 01. Yes
..... 02. No

2.30 If yes what type of food do you usually purchase?

..... 01. Maize
..... 02. Rice
..... 03. Others (specify)

2.31 If yes how much food purchased per month?

.....
.....

2.21 If yes how much did you sell as green maize?

1995	1996
..... 01. Less 0.1 (hactare)	..... 01. Less 0.1 (hactare)
..... 02. 0.2	..... 02. 0.2
..... 03. More than 0.2	..... 03. More than 0.2
..... 04. All area	.....04. All area

2.22 Why did you sell as a green maize

..... 01. For household income
..... 02. No storage facilities
..... 03. Others (specify)

2.23 Do you use fertilizer?

..... 01. Yes
..... 02. No

2.24 If no why?

..... 01. Costly
..... 02. Not available
..... 03. Low technology
..... 04. Others (specify)

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..... 04. Above 3 bags of 50 kgs

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..... 02. No

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..... 02. No

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..... 01. Maize
..... 02. Rice
..... 03. Others (specify)

2.31 If yes how much food purchased per month?

.....
.....

3.0 FOOD STABILITY.

3.1. During the past three years how did your food crops production perform? (1994; 1995; 1996)

..... 01. Increase
..... 02. Same/No change
..... 03. Decrease
..... 04. Fluctuated/Unreliable

3.2 If decreased state the reasons

..... 01. Drought
..... 02. Insects
..... 03. Diseases
..... 04. Animals
..... 05. Animals and drought
..... 06. Others (specify)

3.3. Which method do you use to store your food crops after harvesting?

..... 01. Gunny/Plastic bags
..... 02. Drums
..... 03. Traditional granary
..... 04. Ceiling
..... 05. On floor
..... 06. Others (specify)

3.4. How much do you normally store? (specify which crop)

..... 01. Below 2 bags
..... 02. 2-4 bags
..... 03. 5-6 bags
..... 04. 7-8 bags
..... 05. 9-10 bags
..... 06. Above 10 bags

3.5 How many bags did you store last year, 1994? (specify which crop)

..... 01. Nil
..... 02. Below 2 bags
..... 03. 2-4 bags
..... 04. 5-6 bags
..... 05. 7-8 bags
..... 06. 9-10 bags
..... 07. above 10 bags

3.6 Was the amount stored enough for the family until the next harvest (1995)?

..... 01. Yes
..... 02. No

3.7 If no why?

..... 01. The storage amount was not enough
..... 02. Some harvest sold for income
..... 03. Storage losses
..... 04. Others (specify)

3.8 If no what measures did you take to make sure you have enough food until next season?

..... 01. Buying some food
..... 02. Casual labour
..... 03. From friends/relatives
..... 04. Aid from the Government
..... 05. Others (specify)

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..... 01. Increase
..... 02. Same/No change
..... 03. Decrease
..... 04. Fluctuated/Unreliable

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..... 03. 2-4 bags
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..... 05. 7-8 bags
..... 06. 9-10 bags
..... 07. above 10 bags

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..... 01. The storage amount was not enough
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..... 03. Storage losses
..... 04. Others (specify)

3.8 If no what measures did you take to make sure you have enough food until next season?

..... 01. Buying some food
..... 02. Casual labour
..... 03. From friends/relatives
..... 04. Aid from the Government
..... 05. Others (specify)

3.9 When did you exhaust your stock?

..... 01. A month after harvesting
..... 02. 2-3 months after harvesting
..... 03. 4-5 months after harvesting
..... 04. 6-7 months after harvesting
..... 05. 8-9 months after harvesting
..... 06. Above 9 months after harvesting
..... 07. Did not exhaust at all

3.10 Did you experience some storage losses last year? (1994)

..... 01. Yes
..... 02. No

3.11 What were the causes of these losses? (Start with the most severe)

..... 01. Rodents
..... 02. Insects
..... 03. Others (specify)

3.12 Do you use any of the grains for brewing?

..... 01. Yes
..... 02. No

3.13 If yes, how much per year?

..... 01. Less a bag
..... 02. 1 bag
..... 03. 2-3 bags
..... 04. 4-5 bags
..... 05. Above 5 bags

3.14. What measures do you use to control pests?

..... 01. No measure
..... 02. Chemical pesticides
..... 03. Traditional methods
..... 04. Others (specify)

3.15 If chemical do you afford for treating your whole produce?

..... 01. Yes
..... 02. No.

3.16 If no why?

..... 01. Chemical not available
..... 02. Expensive
..... 03. Low technology
..... 04. Others (specify)

3.17 What are the other factors that limit the contribution of women to household food security?

..... 01. Drought
..... 02. Pests
..... 03. Diseases
..... 04. Wild animals
..... 05. No money
..... 06. Low technology
..... 07. Others (specify)

4.0 FOOD ACCESSIBILITY.

4.1. Where do you get extra income outside the farm?

..... 01. Employment
..... 02. Casual labour
..... 03. Selling food
..... 04. Selling of mats and baskets

..... 05. Selling local beer
..... 06. Selling fruits and vegetables
..... 07. Others (specify).

4.2 What is the average weekly income from supplementary activities above?

..... 01. Below 500 Tsh.
..... 02. 501 - 1,000 Tshs.
..... 03. 1,001 - 2,000 Tshs.
..... 04. 2,001 - 3,000 Tshs.
..... 05. 3,001 - 4,000 Tshs.
..... 06. 4,001 - 5,000 Tshs.
..... 07. Above 5,000 Tshs.

4.3. What is the main source of your daily food?

..... 01. Own produce
..... 02. Purchased from the market
..... 03. Gathering from the wild
..... 04. Own produce and purchase from the market
..... 05. Others (specify)

4.4. How many times per day do you take your food? (a) Adults

Meals per day	Adults	Under fives
01. Once per day		
02. 2 times per day		
03. 3 times per day		
04. 4 times per day		
05. Above 4 times per day		

4.5 What are the main ingredients of your daily family meals?

..... 01. Only starch foods
..... 02. Legumes and starch foods
..... 03. Vegetables and starch foods
..... 04. Animal protein foods and starch foods
..... 05. Others (specify).

4.6. What type of weaning food do you give to your baby?

..... 01. Maize flour porridge
..... 02. Maize flour porridge with milk
..... 03. Rice flour porridge
..... 04. Maize flour porridge mixed with groundnut flour.
..... 05. Maize flour porridge mixed with small fish.
..... 06. Power flour porridge.
..... 07. Others (specify)

4.7. What are the religious beliefs/taboos limiting consumption of different foods? (explain)

.....01. Pork (for Islams)
..... 02. Power flour porridge
..... 03. Left overs
..... 04. Others (specify)

4.8 Is food available in the village market (Genge)?

.....01. Yes
.....02. No

4.9 Are the prices affordable?
.....01. Yes
.....02. No

4.10 If no why?

..... 01. Expensive
..... 02. Fluctuation of food prices
..... 03. Others (specify)

5.0. FACTORS LIMITING THE CONTRIBUTION OF WOMEN TO HOUSEHOLD FOOD SECURITY. (Specifically for women)

5.1. What are the factors limiting the contribution of women to household food security? (Tick)

..... 01. Access to land
..... 02. Access to capital
..... 03. Decision making power
..... 04. Time for child care and family (work load)
..... 05. Knowledge about food and agriculture.
..... 06. All above
..... 07. Others (Specify)

5.2. If land, who owns the land?

..... 01. The village
..... 02. Husband
..... 03. Others (specify)

5.3. If husband does he restrict use?

..... 01. Yes
..... 02. No

5.4. If yes, why? (explain)
.....
.....

5.5. If capital, what are the other sources of income

..... 01. Beer brewing
..... 02. Petty business
..... 03. Crafts
..... 04. Hired labour
..... 05. Cash crop
..... 06. Livestock/product.
..... 07. Selling of cooked foods
..... 08. Others (specify).

5.6. If decision making power, indicate who usually makes decision in the following.

KEY: Myself = 1, my husband = 2,
both = 3, others (specify) = 4.

5.6.1. Production decision.

..... 01. Choice of cash crops grown
..... 02. Choice of food crops grown
..... 03. When to perform a particular task e.g. Ploughing, sowing, weeding.
..... 04. Adoption of innovations e.g. hybrid seeds, fertilizer application
..... 05. Operations on your own field.

5.6.2. Decision related to resource allocation

..... 01. Choice of a field for a particular crop.
..... 02. Labour allocation
..... 03. Hiring of labour
..... 04. Purchase of another plot
..... 05. Amount of excess food to be sold
..... 06. Choice of market.

4.10 If no why?

..... 01. Expensive
..... 02. Fluctuation of food prices
..... 03. Others (specify)

5.0. FACTORS LIMITING THE CONTRIBUTION OF WOMEN TO HOUSEHOLD FOOD SECURITY. (Specifically for women)

5.1. What are the factors limiting the contribution of women to household food security? (Tick)

..... 01. Access to land
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..... 03. Decision making power
..... 04. Time for child care and family (work load)
..... 05. Knowledge about food and agriculture.
..... 06. All above
..... 07. Others (Specify)

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..... 01. The village
..... 02. Husband
..... 03. Others (specify)

5.3. If husband does he restrict use?

..... 01. Yes
..... 02. No

5.4. If yes, why? (explain)
.....
.....

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5.6.2. Decision related to resource allocation

..... 01. Choice of a field for a particular crop.
..... 02. Labour allocation
..... 03. Hiring of labour
..... 04. Purchase of another plot
..... 05. Amount of excess food to be sold
..... 06. Choice of market.

5.6.3. Decision on Household income expenditure

..... 01 Purchase of household items like furniture
..... 02. Purchase of household necessities e.g. salt, sugar, food
..... 03. Purchase of kitchen items e.g. spoons.
..... 04. Purchase of luxuries like radio.

5.6.4. Decision on family income, who keeps the funds from:

..... 01 Sale of cash crops
..... 02. Sale of food crops
..... 03. Off-farm sales e.g. beer brewing, crafts
..... 04. Sale of livestock.
..... 05. Sale from own plot.

5.7. If time for child care and family (work load)

5.7.1. Who else is involved in household work?

..... 01. Older children
..... 02. Husband
..... 03. Housemaid/boy
..... 04. Relatives
..... 05. No body
..... 06. Others (specify).

5.7.2. What type of fuel do you use for cooking?

..... 01. Firewood
..... 02. Charcoal
..... 03. Cowdung
..... 04. Firewood and charcoal
..... 05. Others (specify)

5.7.3. If firewood, who collects?

..... 01. Children
..... 02. Husband
..... 03. Myself
..... 04. Others (specify)

5.7.4. How far from your home?

.....01. Less km
.....02. 1-2 km
.....03. More than 2 km

5.7.5. Where do you get water for home use?

..... 01. Water tap
..... 02. Wells
..... 03. Streams/rivers

5.7.6 Do you normally get any assestence in collecting firewood and fetching water?

..... 01. Yes
..... 02. No

5.7.7. If wells, or streams/rivers or tap who fetch the water

..... 01. Children
..... 02. Husband
..... 03. Myself
..... 04. Others (specify)

5.7.8. How far from your home?

.....01. Less km
.....02. 1-2 km
.....03. More than 2 km

5.7.9 Is there a water tap in the village?

..... 01. Yes
..... 02. No

5.8. If knowledge.

5.8.1. Do you have any access to your extension agents?
..... 01. Yes
..... 02. No

5.8.2. If yes are you satisfied?

..... 01. Yes
..... 02. No

5.8.3. If no explain.
.....
.....

6.0. WOMEN INVOLVEMENT IN HOUSEHOLD COPING STRATEGIES DURING FOOD SHORTAGIES. (Specifically for women)

6.1. How do you cope during food shortages?

..... 01. Reduction of meal frequency
..... 02. Reduce amount of food
..... 03. Do casual labour
..... 04. Borrowing of food or money
..... 05. Buying food from others / local markets
..... 06. Sale of animals
..... 07. Petty business (selling of buns)
..... 08. Others (specify)

6.2. What are the main groups in the family which face the problem during the food shortages.

..... 01. Men
..... 02. Women
..... 03. Female children above 5 years
..... 04. Underfive year old children
..... 05. Both
..... 06. Others (specify).

6.3 Do you collect foods from the wild?

..... 01 Yes
..... 02 No

6.4 Which foods do you collect from the wild?

.....
.....

6.5. If wild food are collected, give reasons for the choice.

..... 01. Accepted as part of the diet
..... 02. An option during shortages
..... 03. Source of income
..... 04. Others (specify).

SOKOINE UNIVERSITY OF AGRCULTURE,
FACULTY OF AGRICULTURE,
DEPARTMENT OF AGRICULTURAL EDUCATION AND EXTENSION

TITLE: THE ROLE OF WOMEN IN HOUSEHOLD FOOD SECURITY IN MOROGORO RURAL AND KILOSA DISTRICTS, TANZANIA.

Questionnaire on the role played by women relative to men in household food security: continous data collection.

1. GENERAL INFORMATION

Respondent Serial Number .....Date: 1994

Name of Respondent .....

District .....Division ..... Ward.....

Village.....

Name of ten cell leader .....

2. What is the total size (hectares) of the familly farm for food crops?

..... 01. Less than 0.4
..... 02. 0.4 - 0.8
..... 03. 0.9 - 1.3
..... 04. 1.4 - 1.8
..... 05. 1.9 - 2.3
..... 06. Above 2.3

3. What is the total size (hectares) of the family farm for non-food crops?

..... 01. Less than 0.4
..... 02. 0.4 - 0.8
..... 03. 0.9 - 1.3
..... 04. 1.4 - 1.8
..... 05. 1.9 - 2.3
..... 06. Above 2.3

4. Labour involvement in production of food crops.

Task	Female (hours)	Male (hours)
Site clearing		
Turning soil		
Planting		
Weeding		
Harvesting		
Transporting crops home		
Threshing		

5. Labour involvement in production of non-food crops.

Task	Female (hours)	Male (hours)
Site clearing		
Tuning soil		
Planting		
Weeding		
Harvesting		
Transporting crops home		
Threshing		

6. Labour involvement in household activities

Task	Female (hours)	Male (hours)
Food preparation and cooking		
House/compound cleaning		
child caring		
Fetching water		
Securing firewood.		
Milling/processing food crops		
Marketing surplus crops		

7. Labour involvement in other income generating activities.

Task	Female (hours)	Male (hours)
Petty business		
Vegetable growing		
Fruit growing		
Brewing		
Baking buns		
Crafts		
Others (specify)		

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DEPARTMENT OF AGRICULTURAL EDUCATION AND EXTENSION

TITLE: THE ROLE OF WOMEN IN HOUSEHOLD FOOD SECURITY IN MOROGORO RURAL AND KILOSA DISTRICTS, TANZANIA.

Anthropometric measurement to identify the Malnutrition rate of the under five year old: Continuous data collection.

1. GENERAL INFORMATION

Respondent Serial Number ..... Date: .....

Name of Respondent .....

District ..... Division .....

Ward ..... Village .....

Ten cell leader .....

2. WEIGHT FOR AGE (Growth Monitoring Chart)

Child Serial No. (1)	Age (Month) (2)	Birth Weight (Kg) (3)	Present Weight (Kg) (4)	Position: Green/Grey/ Red (5)	Well-nourished/ Malnourished (6)	Remarks in general health (7)

Appendix 2a. Females and males under 5 years of age in the sampled households

Village	Females		Males	
	Mean ± SD	Cases	Mean ± SD.	Cases
Fulwe	1.4 ± 0.7	59	1.4 ± 0.7	61
Melela	1.3 ± 0.9	35	1.3 ± 0.9	42
Msufini	1.0 ± 0.6	20	1.4 ± 0.5	26
Kidoma	1.2 ± 0.0	25	1.3 ± 0.5	26
Kimamba	1.3 ± 0.5	46	1.4 ± 0.5	33
Dumila	1.6 ± 0.8	64	1.4 ± 0.8	66
Entire population	1.4 ± 0.7	249	1.4 ± 0.7	254

Appendix 2b. Females and males between 5 - 18 years of age in the sampled households

Village	Females		Males	
	Mean ± SD.	Cases	Mean ± SD.	Cases
Fulwe	1.8 ± 0.9	75	2.2 ± 1.5	86
Melela	1.4 ± 0.7	53	1.6 ± 0.6	38
Msufini	2.1 ± 1.5	21	1.2 ± 0.4	30
Kidoma	1.5 ± 0.8	45	1.9 ± 1.0	41
Kimamba	2.3 ± 1.3	72	2.4 ± 1.5	73
Dumila	2.2 ± 1.3	46	2.1 ± 1.0	60
Entire population	1.9 ± 1.1	312	2.0 ± 1.2	328

Appendix 2c. Females and males above 18 years in the sampled households

Villages	Females		Males	
	Mean ± SD	Cases	Mean ± SD	Cases
Fulwe	1.2 ± 0.6	110	1.2 ± 0.6	110
Melela	1.1 ± 0.3	80	1.1 ± 0.3	80
Msufini	4.2 ± 0.5	39	1.2 ± 0.5	39
Kidoma	1.1 ± 0.3	62	1.1 ± 0.3	62
Kimamba	1.6 ± 1.0	86	1.6 ± 2.0	86
Dumila	1.4 ± 0.8	102	1.4 ± 0.8	102
Entire population	1.3 ± 0.7	479	1.3 ± 0.7	479