GENDER-BASED COPING STRATEGIES AGAINST FOOD INSECURITY IN DODOMA RURAL DISTRICT, TANZANIA

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ABSTRACT

Drought, dependence on rainfall, poor storage and poor agricultural practices have been identified as the main contributing factors to food insecurity in the country. On the other hand, the Tanzania Government has made several policy declarations including carrying out a number of campaigns and mobilisation programs with the objective of attaining food security for the country. Dodoma region has been a victim of famine for many years. For example, at the end of 18th century the caravan trade increased food requirements for the thousands of travellers. This made the area face frequent famines which were mainly due to the successive lowering of the production potential including acceleration of soil erosion caused by deforestation and overexploitation of agricultural land due to marginal land cultivated without conservation measures. From the few studies that have assessed food security in Tanzania, the proportion of households in rural areas that suffer from food insufficiency, is very high being as high as 77%. However, less has been done in studying the role of gender in developing coping strategies against food insecurity. This study was conducted to assess the role played by men and women in developing coping strategies against food insecurity. More specifically, the study intended first, to identify the types of food insecurity in the area and their causes, second, to identify the coping strategies developed by men and women and third, to identify and assess the socio-economic factors that influence the choice of the key coping strategies. The study has focused on selected villages in Dodoma Rural District. The study was carried out in two phases. Phase one of the study involved reconnaissance survey together with Participatory Rural Appraisal (PRA) techniques. Other tools used were participant observation and checklists. The second phase was mainly

based on questionnaire survey. Questionnaire survey was done in Mzula, Mvumi Makulu and Ndebwe villages with a sample size of 120 households. Data collected by using PRA techniques in phase one were analysed with the help of the communities and the results were communicated back to them for verification. Data collected in phase two were analysed by using both quantitative and qualitative methods. The Statistical Package for Social Sciences (SPSS) was the main tool used for analysing quantitative data whereas descriptive statistics, cross tabulation and logistic regression were done. Content and Structural-Functional Analyses were used for qualitative data. The study revealed the presence of chronic food insecurity in Dodoma Rural District, which was mainly caused by drought and pests. In order to cope with food shortage, the study revealed a number of coping strategies employed by men and women in Dodoma Rural District. These included: collection of wild foods; doing casual labour, that is, selling labour in other peoples' farms; doing off-farm activities; food borrowing; crop diversification; migration to other areas and receiving remittances from relatives who stay in urban areas. Women were using most of the identified coping strategies. Three coping strategies were mostly used in the study area. These included: collecting wild foods, which was reported by 57 percent of women and 41 percent of men; doing casual labour which was reported by 51 percent of women and 34 percent of men, and doing off-farm activities reported by 39 percent of the women and 29 percent of the men. The study further revealed that the choice of these key coping strategies have been influenced by some socio-economic factors namely farm size, education level, age, amount of food stored and dependency ratio. Respondents who were having small farms of below 5ha tended to look for casual labour, that is, selling their labour to other people's farms. Heads of

during the period of the study. Others who have not been mentioned have been very helpful. To every one I say, thank you very much, you have been wonderful.

household who had formal education did not participate much on off-farm activities compared to those without formal education. It was also revealed that the higher the age of the head of household, the more was the tendency to participate in those key coping strategies. Having stored less amount of food to fulfil the minimum requirements of the household made the household members to participate more in those coping strategies. Having lower dependency ratio was another factor which influences people to participate in those coping strategies. The study concludes by pointing out that participation of women in coping with food shortage and their role in ensuring food security as discussed in this study provides the evidence that many differences between women and men are socially constructed and can be changed. Opportunities to training on food processing especially on how to preserve food to be used in time of food shortages can be a powerful incentive for women to ensure food security in their households. It is recommended that deliberate efforts to assist households that depend on rain fed production to diversify their sources of livelihood be taken. Diversification of sources of livelihood can be achieved through promotion of other sources of income generation. Promotion of off-farm activities coupled with policies designed to provide good rural markets for households that depend on food purchases are crucial. The study further recommends that training schemes targeting the rural poor households especially women on food processing be given due consideration in policy formulation. It is emphasised that those training should focus more on processing of wild foods.

DECLARATION

I, Merina Yared Mwagile, do hereby declare to the senate of the Sokoine University of Agriculture that this dissertation is my original work and has not been submitted for a degree in any other University.

Signature: ----------

Date: 4/9/2001

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CHAPTER 1

1.0 INTRODUCTION

1.1 Background

Tanzania covers an area of 942,784 square kilometres with an estimated population of 30 million with a growth rate of 2.8 percent per annum (UNDP, 1999). The climate of Tanzania is generally subtropical, sub-humid to semi-dry, allayed largely by variations of altitude, which influence both rainfall and temperature.

Agriculture forms the backbone of the Tanzania economy. It includes crops, livestock, fishing, forestry and hunting. The majority of Tanzanians virtually depend on agriculture as their main occupation and source of livelihood. Approximately 85% of the population live in the rural area and depend largely on agriculture for their well being (URT, 1990). Agriculture is the main source of food supply and raw materials for the industrial sector. In 1999, it grew by 4.1 percent and contributed about 48.9 percent to the Gross Domestic Product (GDP). It provides livelihood for almost 90 percent of the economically active population (URT, 2000). Other major economic sectors in Tanzania include mining and manufacturing industry. Tanzania is fairly rich in a variety of minerals which are yet to be fully exploited, contributing just 9.1 percent in 1999 of GDP (URT, 2000).

The economy of Tanzania is characterised by low industrialisation and high degree of external dependency on developed countries for capital, market for exports and

imported goods. The contribution of the manufacturing industry to the GDP was reported to be only 3.6 percent in 1999 (URT, 2000).

Despite the fact that Tanzanian economy is based on agriculture, there is a growing concern about the general food situation, where the declining production of food and cash crops per person has resulted into food insecurity for the major portion of the population. While the agricultural production is stagnating, population is growing fast and the available natural resources are also diminishing rapidly (Bennun *et al.*, 1992).

Drought, dependence on rainfall, poor storage and poor agricultural practices have been identified as the main contributing factors to food insecurity in the country (Ringio, 1990). On the other hand, the Tanzania Government has made several policy declarations including carrying out a number of campaigns and mobilisation programs with the objective of attaining food security for the country. The policy goals include: ensuring adequacy of food supplies, maintaining safe supply, stability and securing access to available supplies by all consumers according to their nutritional needs. Some of the major food security mobilising campaigns, policies and programs in Tanzania include: "Siasa ni kilimo" (Politics is agriculture) of 1972, the National Maize Program of 1978, Public Work for Food Security of 1978, the National Food Security Program of 1991 and the National Food and Nutritional Policy of 1992 (Kavishe and Mushi, 1993). The government has also established a Food Strategy Unit (FSU), which has been charged with the duty of formulating food policy and programs and to monitor and review their implementation (Biseko, 1989).

The FSU has already prepared drought resistant cereals strategy, which focuses on sorghum, millet, cassava and rice development program and village level storage.

The 1996 World Food Summit (WFS) in Rome which Tanzania took part, came up with several commitments such as to ensure an enabling political, social and economic environment so as to eradicate poverty and provide equal participation of women and men for achieving sustainable food security for all (Ishengoma, 1998). Certain conditions need to be met in order to enhance food security for both men and women in any community. These include the need to ensure adequate food supply and availability, stable supply and access to food at the household level by the poor (Makundi, 1996).

The Government of Tanzania accords high priority to improving food security and nutritional standards of its people. Faced with a rapidly growing population and fickle climate, which result into periodic food crises, a number of agencies offering assistance have come forward, but often with little co-ordination. The government therefore, saw the need to formulate an appropriate comprehensive food security program (Makundi, 1996). This is being used as a cohesive guide, or blueprint, for government planners and donors alike to ensure that the goal of food security is achieved as quickly and as efficiently as possible.

However, the Tanzania Food Security Program has yet to achieve its goal due to a number of constraints. Climatic factors still contribute greatly to food insecurity in Tanzania especially in semi-arid areas, such as in Dodoma region.

1.2 Problem Statement and Justification of the Study

Dodoma region has been a victim of famine for many years. For example, at the end of 18th century the caravan trade increased food requirements for the thousands of travellers (Kajembe, 1994). This made the area face frequent famines which were mainly due to the successive lowering of the production potential including acceleration of soil erosion caused by deforestation and overexploitation of agricultural land due to marginal land cultivated without appropriate conservation measures. By the early 19th century Dodoma had lost its role as an important food producer and became an area that imported large quantities of food in the form of famine relief (Kajembe, 1994). Despite of efforts carried out by a number of projects such as Hifadhi Ardhi Dodoma (HADO) in conserving the environment and to increase food production, very little has been achieved in terms of food security. This among other reasons is due to top-down interventions whereby the role of gender in food security was disregarded.

Despite of the fact that in the last fifteen years many researchers have referred to the gendered nature of ecological and agricultural science and practice in most cultures, it must be acknowledged that development efforts in general have typically not been gender-sensitive (Quiroz, 1994). When dealing with rural people with regard to food availability or production, men and women should be treated differently as they differ in the roles they play (Fernandez, 1994).

From the few studies that have assessed food security in Tanzania, the proportion of households in rural areas, which suffer from food insufficiency, is very high being as

high as 77% (TFNC, 1992). In those studies, less has been done in studying the role of gender in developing coping strategies against food insecurity

In most of the sub-Saharan countries including Tanzania, women play a triple role of producers, reproducers and general care of the household (Kavishe and Mushi, 1993). Despite this, they are not integrated fully in the food security related programs and projects (Mosha, 1990). Because of neglecting the importance of women, many opportunities are likely to have been lost in increasing food production and household food security which they hold the key.

This study intends to investigate the role of men and women in developing coping strategies against food insecurity in Dodoma Rural District, an area which is prone to frequent problems of food shortage.

1.3 Objectives of the Study

1.3.1 Overall Objective

The overall objective of this study is to assess the role played by men and women in developing coping strategies against food insecurity.

1.3.2 Specific Objectives

i. To identify types of food insecurity and their causes.

ii. To identify coping strategies for food insecurity as developed by men and women.

iii. To identify and assess socio-economic factors that underlie the key coping strategies.

1.4 Conceptual Framework

Occurrences of food shortages in the study area do affect both men and women. In order to cope with food shortage both men and women tend to develop coping strategies. These coping strategies are very much affected by socio-economic factors that prevail in the society. Figure 1 depicts a conceptual framework that puts into context the gender aspect in developing coping strategies against food insecurity.

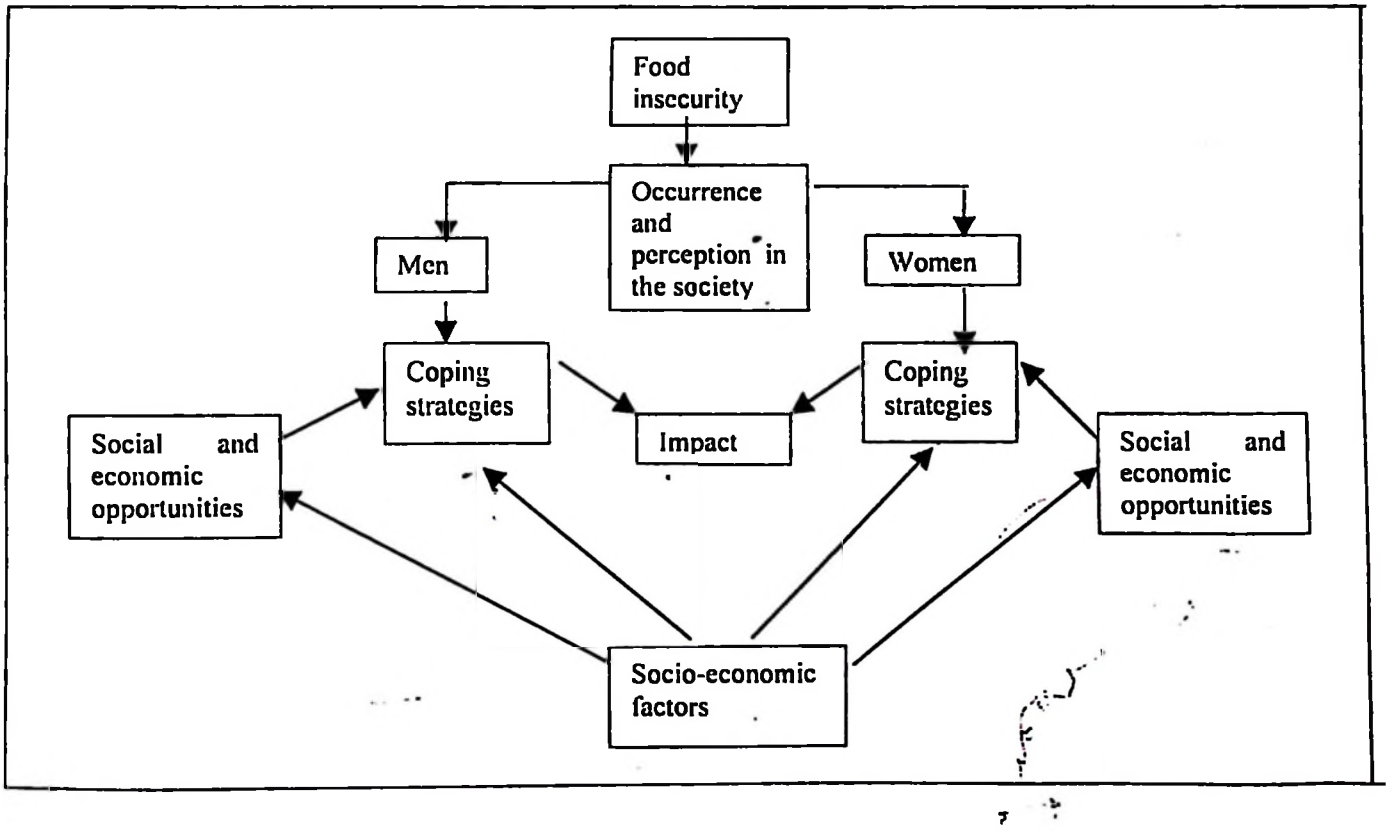

Figure 1: Conceptual framework depicting the place of men and women in developing coping strategies against food insecurity

1.5 Hypotheses Guiding the Study

On the light of the study objectives the following hypotheses were used to guide the study:

- Given the different social and economic opportunities that men and women have, they tend to develop different coping strategies against food insecurity.
- The coping strategies developed by both men and women pertaining to food insecurity depends to a large extent on socio-economic factors such as education and income levels, marital status, age, dependency ratio, farm size and duration of residence in the area.

1.6 Limitations of the Study

1.6.1 Recall Data

The study faced the problem of recall data. Data collection depended on the respondent's memory, as a result there was a notable difficulty on the part of the respondents to give correct account of some categories of data such as households' production data and income. The researcher tried to minimise this problem by asking some questions more than once in different ways.

1.6.2 Standard Units

Convention of units was also a problem since some respondents used local units, for example tins (*debe*), bags, *etc.*, which are not standardised. Also they tended to mix units, for example, acres and hectares. Actual observation was employed by the researcher to minimise the problem.

CHAPTER 2

2.0 LITERATURE REVIEW

2.1 The Concept of Food Security

Food security, as an issue, became prominent in the 1970s and has been a topic of considerable attention. Since then a number of definitions have been developed with regard to the concept. Maxwell and Frankenberger (1992) have identified thirty definitions. Initially food security was defined as national food self-sufficiency or food availability. This was later discarded after discovering that in some countries food might be available, but still there would be a prevalence of malnutrition and hunger. Despite of the substantial increase in food production in many countries, over 800 million people still suffer from malnutrition (FAO, 1989). Food security has been defined by the Committee on World Food Security as the "economic and physical access to food, of all people, at all times". The most frequently used definition is probably the one by the World Bank (1986) which states that "food security is access by all people at all times to enough food for an active healthy life". The definition therefore includes food availability and the ability to acquire it, which includes food production as well as food distribution and effective purchasing power. Other definitions have also been given. For example, Kajembe *et al.* (2000) defines food security as the balance of food supply (mainly cereal supply) and effective demand for food. The World Bank definition is adopted in this study.

2.2 Food Availability, Adequacy, Consumption, Stability and Accessibility

Food availability, accessibility and consumption are often used indiscriminately to mean the same thing (Makundi, 1996). In reality however, they refer to very different things. In pure subsistence societies, food availability would be equal to the food in stock plus what can be directly obtained from the fields and gardens as well as from foraging of wild foods. In more market-oriented societies, the situation is more complex, since food and other crops can be sold and cash income can be used to purchase food that is available in the market.

Adequacy refers to quantity and quality; that is, there should be enough food to meet daily requirements for all members of the household (Lorri, 1990). The food should also be of the right type to provide all essential nutrients to provide a balanced diet.

Stability of food supply on the other hand is the continuous flow of food in the homestead either through quantity stored or from external sources. The concerns are just income distribution and effective markets, together with various public and informal support and safety nets (Oshaug, 1994). The author further argues that, a society that can be said to enjoy food security is the one that has developed the internal mechanism that will enable it to sustain the food norm in the face of crises threatening to lower the achieved level of food consumption.

Access to food encompasses physical, economic and social aspects. It involves processes whereby food is reaching the people. Physical access to food relates both to the adequacy of supply and to the efficiency of the distribution system, including

storage, preservation, transport, marketing and processing. Economic access to food relates to the ability of groups of people to establish entitlement over a requisite amount of food, the ability to generate income, whether in cash or in kind and the proportion of income that is actually available for consumption purposes (Holmboe-Ottesen and Wandel, 1990).

2.3 Indicators for Assessing Household Food Security

To reduce and monitor food insecurity we must determine who is food insecure, why and how they become vulnerable, and where they reside? In the past, food security indicators have been measures of regional or national food supply (Frankenberger, 1985). Recently, however, many have begun to question the validity of commonly used indicators of food security measured at national level as representative of indicators for assessing food security at household level (Frankenberger, 1985).

Frankenberger (1985) pointed out a number of different indicators could be used for delineating household food security (HFS). These are divided into process indicators and outcome indicators. The former reflect both food supply and food access by pointing to the risk of event and the coping ability while the latter serve as proxies for food consumption. Each of these groups of indicators is briefly described in the next section.

2.3.1 Process Indicators

2.3.1.1 Risk of Event Indicators

One critical dimension of HFS is the ability of households to obtain food that is available in the area. A number of factors play a role in limiting food availability and the options households have for accessing the food. As such, there are indicators that provide information on the likelihood of a shock or disaster event that will adversely affect HFS and therefore reflect food supply (Burton and Shoham, 1991). They include measures of agricultural inputs and production including agro-meteorological data, access to natural resources, institutional development and market infrastructure, and exposure to regional conflict or its consequences (influx of refugees). Frankenberger (1985) cautions that these types of indicators are not mutually exclusive of food access indicators. Considerable overlap and interaction between the two categories may exist, which calls for care in using them and interpreting the results of such indicators.

2.3.1.2 Coping Ability Indicators

These types of indicators are also referred to as indicators that reflect food access (Burton and Shoham, 1991). They include socio-economic variables that represent the degree of stress being experienced by a population as economic and social condition change and how the households respond to the changes. Recognising that households are not passive to stress, a major aspect of vulnerability to HFS is the ability of a household to cope with the stress. These types of indicators provide information on the capacity of the population affected by a shock or disaster to

withstand the effects. For example, people who live in conditions that put their main source of income at recurrent risk tend to develop some self-insurance coping strategies to minimise risks of their HFS and livelihoods (Longhurst, 1986; Corbett, 1988). Such strategies may involve dispersed grazing, changes in cropping and planting practices, migration to towns in search for non-farm employment, increased petty commodity production, collection of wild foods, use of inter-household transfers and loans and use of credit from merchants and moneylenders. Others may include migration to other rural areas for employment, rationing of current food consumption, sale of possessions (e.g. jewellery), sale of firewood and charcoal, consumption of food distributed through relief programs, sale of productive assets, break-up of households and distress migration (Corbett, 1988).

2.3.2 Outcome Indicators

Outcome indicators are usually proxies for adequate food consumption, which can be grouped into **direct** and **indirect** indicators.

2.3.2.1 Direct Outcome Indicators

Direct outcome indicators of food consumption include those indicators that are closest to actual food consumption rather than to market channel information or medical status. These include household budget and consumption data, household perception of food security, and food frequency assessments. These types of indicators are relatively difficult to collect and they are not readily available.

2.3.2.2 Indirect Outcome Indicators

Indirect outcome indicators are generally used when direct outcome indicators are either unavailable or too costly (in terms of time and money) to collect. These indicators include storage estimates and Subsistence Potential Ratio (SPR). The latter compares the amount of food (calculated in energy), which a household can produce over a year or month with the energy requirements of the entire household for that year or month (Frankenberger, 1985). A more practical and simple form of the SPR is the use of a Household Food Security Card that has been designed by Tanzania Food and Nutrition Centre (TFNC) (Wagao, 1991).

2.4 Types of Food Insecurity

Food insecurity exists when members of a household have inadequate diet for part or throughout the year or face the possibility of inadequate diet in the future. Three forms of food insecurity can be distinguished. These include transitory, chronic and emergency. Each of the three types is briefly described below.

2.4.1 Transitory Food Insecurity

Transitory (current) food insecurity occurs when a population suffers a temporary decline in consumption. Transitory food insecurity can result from instability in food production, food prices, household incomes or health conditions and in its worst form it produces famine (FAO, 1992).

2.4.2 Chronic Food Insecurity

Chronic food insecurity occurs when households on more or less permanent basis lack the resources to acquire enough food for a healthy and active life, but the households are not directly threatened by starvation (Kennes, 1990). It is worthwhile to subdivide chronic food insecurity into lack of overall food quantity, normally measured in calories intake and insufficiencies at the level of particular nutrients. Lack of specific nutrient can as well be related to lack of information or knowledge and not necessarily lack of resources or income. It is now generally accepted that the problem of food insecurity is not just about food alone but also the problem of poverty and unequal distribution of purchasing power among and within regions and nations (UNECA, 1992). This chronic form can also be attributed by persistent drought (Liwenga, 1995). Food insecurity addressed in this study falls mainly in this category.

2.4.3 Emergency Food Insecurity

Emergency food insecurity is a situation of acute and unpredictable food shortage, which arise suddenly as a result of factors such as wars, hurricanes, earthquakes, floods and other spontaneous natural calamities (Temu, *et al.*, 1997). For instance, the unfavourable weather conditions in 1998 (*elinino* phenomenon) affected many countries in the sub-Saharan Africa, including Tanzania, in terms of food production, which was a big threat to food security.

2.5 Causes of Food Insecurity

TFNC (1992) has attempted to group the causes of food insecurity into five categories as follows:

a) *Inadequate food supply in rural households*: Crop failures, storage and production deficiencies and excessive sale of food are some of the causes that may lead to inadequate food supply in rural households.

b) *Lack of purchasing power*: The widespread hunger prevailing in many nations is not due to non-availability of food in the market, but to inadequate purchasing power among the rural and urban poor.

c) *Inflation*: Consumer purchasing power has been declining over the last years in most developing countries. The hardest hits are the urban low wage earners and the rural poor who are food deficit and have to buy food.

d) *Inappropriate feeding practices*: Inadequate feedings, especially for young children, or inadequate weaning foods, and low intake of animal protein by growing children, are major direct causes. The origin of such behaviours are sometimes deep rooted in the social and cultural systems.

e) *Women's workload*: Overworking resulting from the time, and energy expended in undertaking the numerous tasks, creates or amplifies the conditions of inadequate children's and female adult food intake by reducing the frequency of meals. During the peak period the number of daily meals can be as low as one and the care with which the food is prepared can be reduced during this time (Katani, 1999). Also due to too much work, women might not be able to produce enough food for their families.

2.6 Gender

Biological differences between men and women do not change, but the social roles that are acquired vary between different societies and cultures and at different periods of history. The term gender is used to describe this social differentiation (Mosha, 1990). It addresses the social relationship between men and women.

Gender is a cultural construct related to the behaviour learned by men and women; it affects what they do and how they do it within a specific social group. Gender differentiation comes about as a result of specific experiences, knowledge and skills which women and men develop as they carry out responsibilities assigned to them (Feldstien and Poats, 1988 as cited by Fernandez, 1994). The degree of gender specificity attached to the knowledge and skills within a society depends not only on the way responsibilities are allocated among men and women, but also on the degree of flexibility in which men and women have to carry out the other's assignments.

2.6.1. The Relationship between Gender and Food Security

Gender and food security are closely interrelated. In recent years there has been increased recognition of the crucial importance of women's contribution to food security. In most developing countries, rural women are the mainstays of small-scale agriculture, farm labour, and day-to-day family subsistence. Efforts to alleviate rural poverty and improve food security will not be successful unless issues relating to women as producers and providers of food are taken into account. These issues include the contribution of women to household food supply and income, access to

productive resources, and the impact of policy reforms on the economic and social roles of women and household food security.

Moreover, although women farmers play a predominant role in food production, they often lack access to agricultural services. For instance, lack of land ownership restricts women farmer's access to credit as land is often used as collateral. In addition, training and extension services have, in practice, been predominantly directed towards men. Since the possibility of improving household food security can only be realised if female farmers, in addition to their male counterparts, have access to agricultural services. The need to incorporate the constraints women face in obtaining such services in household food security policies and programmes should be emphasised.

The impact of structural adjustment programmes on household food security is a major area of policy concern. Changes in employment and income-earning opportunities, coupled with a reduction in government subsidy programmes, has had adverse affects on food consumption, both quantitatively and qualitatively. The role of women as producers and providers of food should be promoted and therefore the importance of gender to household food security emphasised. Governments should continue to facilitate and strengthen the contributions of women to agricultural growth and the alleviation of rural poverty. This in turn will enhance the availability and stability of food supplies while ensuring access to food by all.

2.6.2 Women as Food Producers

The major constraint to the effective recognition of women's actual roles and responsibilities in agriculture is the scarcity of gender-desegregated data available to technicians, planners, and policy-makers. Resource economists and development experts are now beginning to recognise and quantify the enormous contribution women make to food production and marketing in the developing world (WFS, 1996). It is well known that the African farmer is usually the woman whereby women produce nearly three-quarters of all food grown in Africa (World Bank, 1990). Approximately 98% of rural women who are classified as economically active are engaged in agriculture (FAO, 1994). Women carry the major responsibility for both subsistence agriculture, especially food crop production, and domestic work. Women's roles as food producers and providers are crucial among the poor. In virtually all the studies carried out, the number of women taking part in agricultural work has been found to be higher than that of men (Boserup, 1970 in Koda, 1999). The reasons are firstly, older men can often stop working leaving the work to their usually younger wives or to their children. Secondly, majority of old women are widows who must defend themselves, and thirdly, more boys than girls go to school and therefore tend to quit the agricultural sector. FAO studies confirm that while women are the mainstay of small-scale agriculture, farm labour force and day-to-day family subsistence, they have more difficulties than men in gaining access to resources such as land and credit and productivity enhancing inputs and services.

Food security' in fact, has been defined by the FAO not only in terms of access to, and availability of food, but also in terms of resource distribution to produce food

and purchasing power to buy food where it is not produced. Given women's crucial role in food production and provision, any set of strategies for sustainable food security must address their limited access to productive resources security must address their limited access to productive resources. Women's limited access to resources and their insufficient purchasing power are products of a series of interrelated social, economic and cultural factors that force them into a subordinate role, to the detriment of their own development and that of society as a whole.

2.6.3 The Role of Gender in Food Security

An understanding of the role of gender, as well as the intrinsic value of indigenous knowledge, is crucial to the solution of situation-specific problems (Fernandez, 1994). It is assumed in this study that the factors determining household food security can be understood better if examined in the context of gender relations, because men and women have different roles, needs and interests. While at the theoretical level 'gender' remains a culturally defined or determined state of being female or male, in this study the definition is operationalized to include the level of local knowledgability for women and men on issues pertaining to food security.

Gender is the primary social differentiation among adults and economically active members of a society. It is therefore logical that specific spheres of activity will become the specialised domains of different gender category as they increase their knowledge and skills over time. As a result of this gender specialisation, the knowledge and skills held by women often differ from those held by men. In addition, the kind of relationships which exist between these two sets of innovators

affects hierarchies of access, use and control, resulting in different perceptions and priorities for the innovation and use of technology by women and men (Appleton and Hill, 1994).

Women and men largely use their 'Indigenous knowledge' on local farming to elevate their socio-economic status. Knowledge on edible and cultivable fauna and flora, medicinal herbs and shrubs for instance, has contributed tremendously to the development of currently used agricultural systems both in terms of production techniques as well as in developing preservation and storage technologies or facilities (Appleton and Hills, 1994).

Such knowledge, which has been accumulated over years from practical experiences, has also contributed to the development and adoption of coping strategies during food shortages and at times of hardships (Koda, 1999). As such, women's and men's knowledge on drought resistant varieties, wild foods (including fruits, tubers or roots and vegetables) and medicinal plants has equally assisted in ensuring rural based household food security, human and animal health and agricultural development.

Tanzania is a huge country comprised of 25 regions inhabited by more than 120 ethnic groups. Each of these regions and its people is unique in terms of geographical and climatic specificity, cultural norms, beliefs and practices. Other variations are in terms of farming systems and hence the varied food habits, knowledge systems and to some extent also the system of social upbringing, socialisation of children and adults and consequential social relations (Koda, 1999). Essential variables in the

socialisation of children include 'gender', which is invariably used to determine role specificity for women and men in all Tanzanian communities (Kajembe, 1997). Hence the gendered knowledge systems are prominent in each ethnic group. While girls are socialised to become wives, mothers and custodians of household food security, boys are tuned to become public leaders, decision-makers and planners for their households' development and for public life. For the farming communities for instance, women and men have the general knowledge on the farming systems, yet women would be more conversant with issues related to food crops and vegetables, collectively termed as 'food basket' (Katani, 1999). In Tanzania for example, women are the ones who process food, collect vegetables and prepare or cook food for their families, usually with the assistance of the female children so they know more of the food plants than men. Invariably, men know more about hunting and related activities, housing construction (except for few ethnic groups which assign this role to women for example, the Maasai) and cash earning opportunities.

With the encroachment of the state and the market into the autonomous indigenous communities, women's indigenous knowledge is more likely nowadays to go unrecognised, remaining invisible to planners, policy makers and other agents of external change (Mishra, 1994). Women are not prepared to give up practices such as shifting cultivation and forest gathering as these farming systems provide food security and meet the subsistence needs of their family and community. Dankelman and Davidson (1988) argued that women spend a lot of time in the forests and thus they have a good knowledge on the use of many trees including those used as sources of food, such as vegetables, nuts, fruits and even vines.

Depending upon the culture, some types of knowledge may be complementary, meaning that both female and male knowledge systems are needed to understand food security dimension or decision-making. Other types of knowledge however, may be shared, although such 'shared knowledge' cannot be assumed. There are at least four ways of looking at the gender differences in knowledge systems (Norem *et al.*, 1988 as cited by Fernandez, 1994). The four ways assume that women and men may have:

- a different knowledge of similar things;
- a different knowledge of different things;
- different ways of organising knowledge; and
- different ways of preserving and transferring knowledge.

There is little or no reference to the differentiated role of men and women in the generation, transmission and use of knowledge (Fernandez, 1994). It is important to recognise the role that networks play or should play in the dissemination, valuing, and protection of indigenous knowledge system, especially those of women. Indigenous knowledge is often passed on by word of mouth from generation to generation. It is essentially local, in that it exists within, and is developed around, the specific conditions of men and women in a particular geographical area (Appleton and Hill, 1994).

Quiroz (1994) describes women's indigenous knowledge as being a different kind of knowledge and calls it a 'distinctive knowledge'. The holistic nature of this kind of knowledge is one of its major characteristics. Women relation with and perception of

their environment tends to be comprehensive and multidimensional, whereas men's knowledge tends to be one-dimensional, focusing on narrow areas such as the cultivation of certain kinds of high-yield, commercially profitable crops or look for the 'ideal' genetic materials for a more limited range of purposes, such as high yield and a good market price; while women tend to weigh a great many different complementary, interrelated advantages (like flavour and cooking time).

It should be kept in mind that there is no such thing as a set of universal gendered indigenous knowledge systems. The precise distribution of this kind of knowledge among men and women varies from place to place (Quiroz, 1994). Traditional knowledge is not generated or acquired equally throughout rural society, and this stock of existing knowledge is not distributed to all members of the community (Simpson, 1994). Gender plays a major role in the process of knowledge differentiation. The evidence from south western Mali shows that women and men not only possess knowledge about different things; they also possess knowledge about similar things and use different communication channels to transfer information (Simpson, 1994). Any intervention or development efforts aimed at engaging the local knowledge systems must give particular attention to 'whose knowledge' is being included. The beneficiaries will largely be determined by the inclusion of their local knowledge.

2.7 Coping Strategies Against Food Insecurity

2.7.1 Overview

One aspect of the food crisis that has received relatively little attention from the policy makers is the role and status of local village-based strategies for coping with food deficits (Zinyama *et al.*, 1987). It is now recognised that between the emergence of the problem and the arrival of external assistance, farmers tend to employ a variety of strategies to mitigate the food shortage. There is a general agreement that strategies for coping with recurrent food shortage are an integral part of the total rural socio-economic system (Matiza *et al.*, 1988). Coping strategies include activities which may appear insignificant and not identifiable from the overall rural food production system in years of plenty, but which assume increasingly greater importance in times of food deficits.

Food insecurity in semi-arid areas in particular has compelled men and women to develop different coping strategies to cope with the situation. Coping with food shortage thus refers to whole range of a typical behaviour exhibited by individuals or households whose aim is to enable them to endure the effects of adverse situations such as drought which bring about food shortage (Njiro, 1994). Coping ways can be viewed as adaptive devices which are culture specific which people use to accommodate themselves to a given environment. Rural farmers for instance, under the guidance of their culture, have ways for minimising the impact of hunger. These ways are reflected in their dietary habits and agricultural practises. The main tool for developing these strategies is the indigenous knowledge possessed by these key

actors (Katani, 1999). But due to differences in their socio-economic status, the coping strategies developed by men and women may also differ. These strategies vary with region, community, social class, ethnic group, household, gender, age, and season (Chambers, 1989).

In real life, whenever food is scarce, people respond in various ways to reduce consumption. For example, taking one or two main meals per day instead of the normal three main meals (Katani, 1999), or taking the so-called inferior foods more frequently than before. Due to the severe drought in 1998 in some parts of Tanzania such as Dodoma, it was reported that people were consuming roots of trees, wild fruits and even maize husks. However, due to gaps of knowledge about the famine foods some people died on consumption of poisonous roots and mushrooms. It should be noted here that despite rapid rates of deforestation, the availability of wild fruits is not significantly affected as people tend to protect preferred fruit trees while land is being cleared either for cultivation or for firewood (Dewees, 1989). One way of improving food security in the household is by broadening the food base with known forest food products. Some of the wild foods have characteristic features suitable for drought and storage and also have good nutritional qualities (Urio *et al.*, 1996).

The types of strategies employed by households also tend to vary depending upon the severity and duration of the potentially disruptive conditions (Zinyama *et al.*, 1987). In the earliest stages of the crisis (stage one), households employ risk and loss minimising management strategies. These involve low commitment of domestic

resources, enabling speedy recovery once the crisis has ceased. As the crisis persists, households are increasingly forced into a greater commitment of domestic resources just to meet subsistence needs (stage two). There may be a gradual disposal of key productive assets making it harder to return to a pre-crisis state. At this stage, a household's vulnerability to food insecurity is extremely high. Stage three consequences include failure to cope with the crisis and usually involve destitution and distress migration (Corbett, 1988).

Studies of coping strategies conducted in the SADCC region confirm the general findings for rural Africa as a whole. Studies in Tanzania, Botswana and Zimbabwe have shown that rural societies incorporate a variety of coping strategies (Zinyama *et al.*, 1987). The contemporary pattern is different from that in the past as many traditional coping strategies have been undermined or modified by the impact of colonialism, land alienation by Europeans, settlement and the resultant redistribution of the indigenous population in increasingly overcrowded reserves, the introduction of the cash economy, and changing socio-economic values (Zinyama and Whitlow, 1986).

The coping strategies which arise from the interaction of rural society and its environment and are integral to rural systems, assume greater significance during times of acute food shortage. As many different peoples live in the SADCC region, variations in coping strategies exist in the region--both within and between countries. Table 1 summarises the range of strategies that may be adopted by households threatened by an imminent food crisis. People turn to a variety of coping strategies

available within the environmental, economic, and social milieu to enable them to cope with the food shortage.

Table 1: Traditional household coping strategies in the SADCC region

Environmental	Economic	Social
Stream bank cultivation	Trade	Extended family links (borrow food)
Gathering of wild fruits	Crafts	Pray to rainmakers
Hunting and fishing	Beer Brewing	Raiding
Control of access to water and pasture	Sale of livestock and household effects	Sharing
Mobility	Store food (grain and tubers such as Sweet potatoes)	Reduce meals
Growing of drought resistant crops (e.g. cassava)	Migration	Splitting herds
		Arranged marriages
		Begging
		Stealing

Source: Campbell (1986)

2.7.2 Types of Coping Strategies

Coping strategies represent adjustments, which societies have made either in their socio-economic and political systems or in their interaction with their environment to reduce the risks of food shortages most of which are associated with environmental hazards such as drought and crop damage by pests. In a review of societal responses to natural hazards, Burton *et al.* (1978) as cited by Zinyama *et al.* (1987) categorised coping strategies based in the totality of the societies' economic, social, political, and environmental resources reflecting their role as integral component of the system. The categories are described briefly in the following sub-sections.

2.7.2.1 Economic Strategies

Economic strategies for coping with food insecurity include the diversification of activities in terms of crop grown, animals owned, and both on-farm and off-farm supplements to household income. By diversifying the household's activities, the risk of food insecurity is reduced, as a downturn in one activity can make up for another. Diversification also allows for some flexibility in the allocation of household resources such as labour. Other economic strategies are based on the liquidation either for own-consumption or through selling of household assets such as livestock, or stored grains. Changing economic conditions and the incorporation of villages into the wider national and international economy have extended the geographical area of operation of these economic strategies to include interregional trade, labour migration to urban areas as well as cash cropping. The money earned from these activities is then used to purchase food in times of deficits. Kajembe and Munyikombo (1998) have shown that this type of income diversification is often a function of adaptation to food insecurity.

2.7.2.2 Social Strategies

Social responses to food shortages are found in reciprocal arrangements based on membership in institutions such as family, clan and age set (Zinyama *et al.*, 1987). Such institutions have fundamental roles in the organisation of societies, among which is developing coping strategies against food insecurity.

Social strategies include labour sharing (e.g. in tending crop fields or caring animals); gift or loaning food, livestock, or cash; and in some cases sending members

of a distressed family to live with more fortunate relatives or friends (Zinyama *et al.*, 1987). Such strategies are reciprocal in that assistance given at any time may represent repayment of past kindness; or a commitment on the part of those being helped to assist the help-givers should they experience problems at a future time. The pattern of reciprocity is complex across and over time; assistance may even be repaid across generation boundaries (Cashdan, 1985).

Another good example of social strategy is the cattle trusteeship system found in Dodoma. Cattle trusteeship means that the stockowner gives temporary disposition of one or more animals to stock trustee (Kajembe, 1994). The systems mainly operate during food shortage as one cattle may be exchanged by certain amount of food on a trust that after harvesting the cattle-owner will return the food and have his or her cattle back. The same system is found in Babati, Arusha, Tanzania whereby a cattle owner in need of food aid entrusts a cow to a neighbour or friend against food. The food giver keeps the cow until the cow gets a calf. The borrower keeps the calf as a payment for the food loan. When the calf grows, the cow is returned to the original owner and the deal is finalised (Loiske, 1991).

2.7.2.3 Environmental Strategies

Communities selectively use their physical resources base to reduce the likelihood of food shortage. Different localities, valleys, and hills provide different ecological potential, which permits farmers to diversify crop production and allow herders to move their animals from one area to another in response to the availability of pasture and water. For example, to minimise crops loss due to unfavourable environment,

farmers have undertaken such measures as mixed cropping (Ngana, 1983). Fallow and uncultivated lands offer resources such as wild fruits, berries, roots, and wildlife, which supplement the food supply. While these may be used as food flavourings during good conditions, in food shortages they are used as famine foods. Table 1 summarises the range of strategies that may be adopted by households threatened by an imminent food crisis. People turn to a variety of coping strategies available within the environmental, economic, and social milieu to enable them to cope with the food shortage. Kajembe (1994) noted that the Wagogo of Dodoma are familiar with different grains suited to different soil types and also resistant in varying degrees to pests.

2.8 Socio-economic Factors Influencing the Choice of Different Coping Strategies

Most studies on coping strategies have stressed the sequence in their adoption by households. Women may bear the initial responsibility of guiding the family through the crisis, whereas men become involved only if the shortage persists and intensifies (Campbell and Trechter, 1982). This gender differentiation may be a fairly recent phenomenon as there is evidence that prior to the widespread practice of labour migration men were involved in provisioning the family at all times.

Thus, the types of strategies and their adoption within a country varies with local socio-cultural, geographical, environmental and political circumstances, while within the same community they will also vary with respect to economic status, gender, and

age. Some of the socio-economic factors influencing the choice of coping strategies, which are explained below, include education, population size and land tenure.

2.8.1 Education

Education alone is not a shield against hunger. It should nevertheless be a key ingredient in any policy that aims to reduce poverty, dependence, environmental degradation, excessive population growth and other factors that are most often the direct causes of hunger. Education allows farmers to make use of new farming techniques and technologies. Research demonstrates that basic education has a clear effect on agricultural productivity (WFS, 1996)

A World Bank study conducted in 1990 found that farmers in all countries when armed with a minimum of four years of primary education are able to increase their productivity by an average of 8.7 percent (WFS, 1996). Rural primary education is sometimes more efficient and or cost-effective when it adapts a non-formal approach and relies on:

- Flexible timetables and school calendars that follow the rhythm of the farming year;
- Mass campaigning via the radio or television;
- Locally-recruited teachers;
- Village schools that encourage participation by the entire community;
- Educational and skill-training programmes specifically designed for women.

As a consequence of longstanding imbalance in participation in formal education, the literacy rate of the world's women (71.2 percent) is significantly lower than that of men (83.6 percent), although the gap is slowly closing (WFS, 1996). Nearly two-thirds of the world's illiterate adults are women (565 million); most of them live in the developing regions of Africa, Asia and Latin America (FAO, 1997). Practices leading to soil erosion or water pollution could be considerably reduced through education. As a general rule education:

- Improves the prospect of finding and maintaining employment for both men and women, and thus increases per capita household income;
- Increases worker productivity and economic growth;
- Increases the chances of successful self-employment;
- Reduces nation-wide gaps in income.

The illiteracy rate in Tanzania for the last two decades showed a declining trend. It was expected to be reduced to 24.8% by the year 2000. Educational attainment is higher in urban areas than in rural areas on the Tanzanian Mainland. The proportion of women with no education in urban areas is lower (25%) than in rural areas (46%); among men, the proportion with no education in urban areas is 19% compared to 35% in rural areas (URT, 1997).

2.8.2 Population Size

High rates of population growth put increasing stress on available food resources both at the global level and within households and communities. There are clearly

established inverse correlation between a population's rising level of educational attainment and declining fertility and child mortality rates (WFS, 1996). Educated women tend to marry late, are more likely to use family planning methods and consequently to give birth to fewer children. Large families are still the rule in most developing countries. Although large families have in some cultures been considered a blessing, a change in economic patterns and life style has created a lot of economic hardships to larger families, as children are no longer an economic asset. Population increase has rendered some rural families to have less land to cultivate (Mosha and Suanberg, 1983; Jonsson, 1986), and less food to eat. Findings from studies conducted in thirteen survey areas in Africa, Asia and Latin America reported that food insecure households tended to be larger and have higher number of dependants and younger age composition (FAO, 1992). In Tanzania the rural households are larger than urban households, the mean household size is 5.1 in rural areas and 4.3 in urban areas (URT, 1996).

2.8.3 Land Tenure

In Tanzania, the issue of women and land ownership touches traditions and customary law. These are shaped by tribal customs and traditions which often create barriers for women to equal rights of access to land, property ownership and inheritance. History shows that Tanzanian women have been deprived of their rights to acquire, hold and own land the same as women in most other African societies (Tesha, 2000). The National Land Policy of 1995 recognises the existence of discrimination of women in matters related to access and ownership of land. It asserts the right of every citizen to have access to and to own land. It declares land to

be a constitutional right. The Land Policy of 1995 was the basis for the new land legislations, namely the Land Act No. 4 of 1999 and the Village Land Act, No. 5 of 1999.

Both the Policy and Land Acts clearly provide for equal rights of every citizen to have access to and to own land. Furthermore section 3(2) of both Land Act 1999 and Village Land Act 1999 emphasises the right of every woman to acquire, hold, use and deal with land to the same extent as men. This right should further be subject to the same restrictions as the right of every man. For a long time women have been discriminated against in the acquisition and ownership of land (Tesha, 2000). The Land Policy notes that under the customary land tenure women have not been treated equally to men as far as access and ownership of land is concerned. Their opportunity for acquiring and using land was not clearly defined under customary land tenure. Even the local government authorities at village level, by using customary tenure in allocating land, have denied women the right to acquire and own land.

Therefore these provisions have elaborated clearly the position of women and put them on a par with men in regard to security of land tenure. Longstanding occupation or use of land has also been recognised and is to be secured by the law. This is envisaged under S.3 (1) Land Act 1999 which protects people who have acquired land and are using the land without apparent lawful title to its use and occupation.

The Land Acts also provide security of land tenure under the system of ownership of land through title deeds. Gender equality is one of the most fundamental principles that form the basis of secure land tenure for all people irrespective of gender. As stated earlier women's rights to acquire, hold, use and deal with land is given the same weight as that of men under various provisions of Land Act 1999 and Village Land Act 1999.

CHAPTER 3

3.0 MATERIALS AND METHODS

3.1 Description of the Study Area

3.1.1 Location

The study was conducted in Dodoma rural district, Dodoma region. The district lies between Latitudes 4^0 and 8^0 South and Longitude 34^0 and 38^0 East. Dodoma rural district boarders Manyoni district of Singida region to the west, Kondoa district to the North and North West, Mpwapwa district to the East and Iringa region on the South and South West (Figure 2). Dodoma rural district covers an area of 14,004 sq.km. equivalent to 39% of the total area of Dodoma region. Administratively, it is divided into 8 divisions, 48 wards and 124 villages.

The study was conducted in Mvumi division (Figure 3), which is located about 42 kilometres south-east of Dodoma town. Mvumi division is basically a semi-arid area with a total area of 730 square kilometres, which is heavily populated with an average of 71 inhabitants per square km. One third of the area is an arable land under cultivation and the remaining area is a marginal land under conservation.

3.1.2 Climate

Dodoma rural district has a dry savannah type of climate, which is characterised by a long dry season lasting between late April to early December and a short single wet

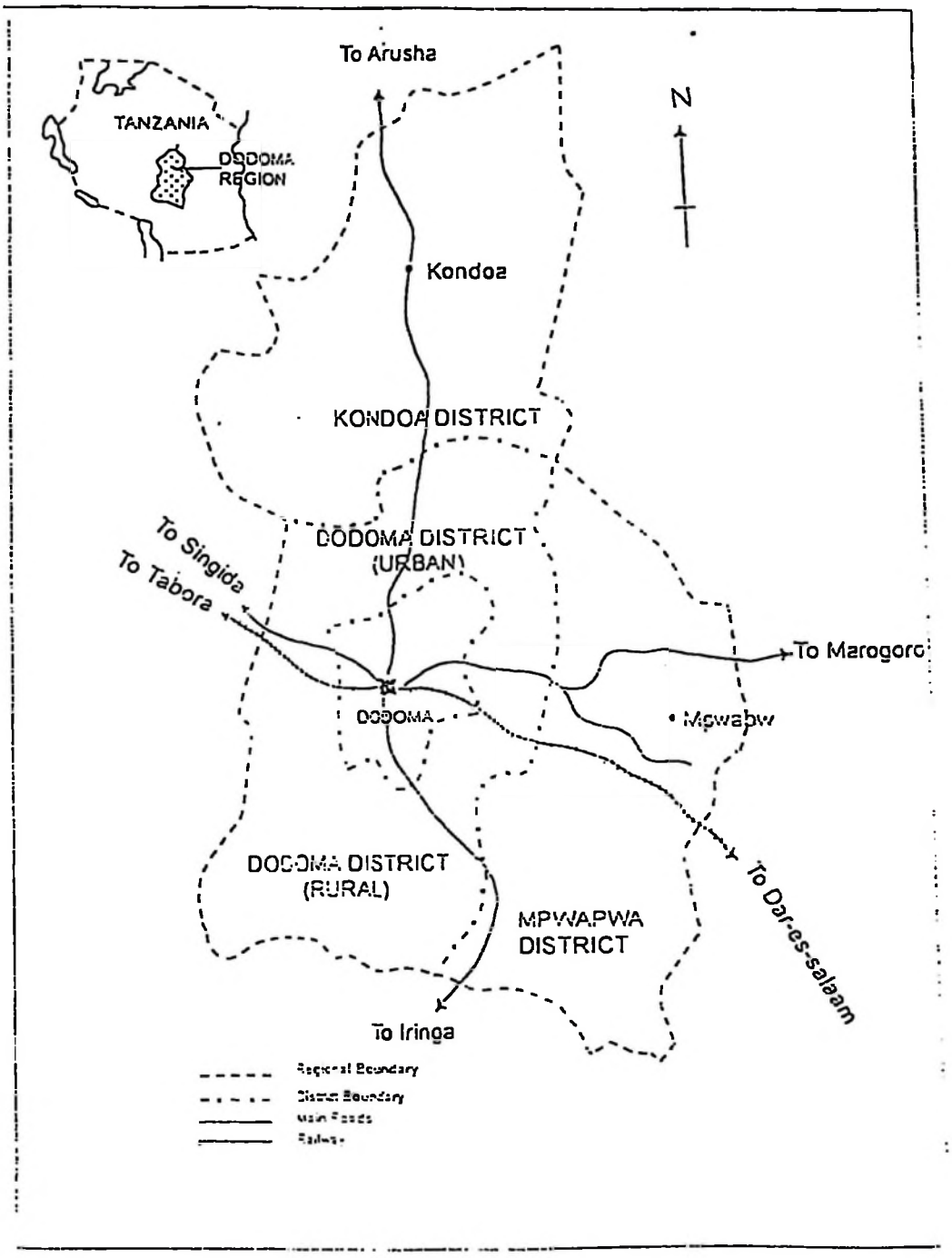

Figure 2: The sketch map of Dodoma Region showing the location of Dodoma Rural District

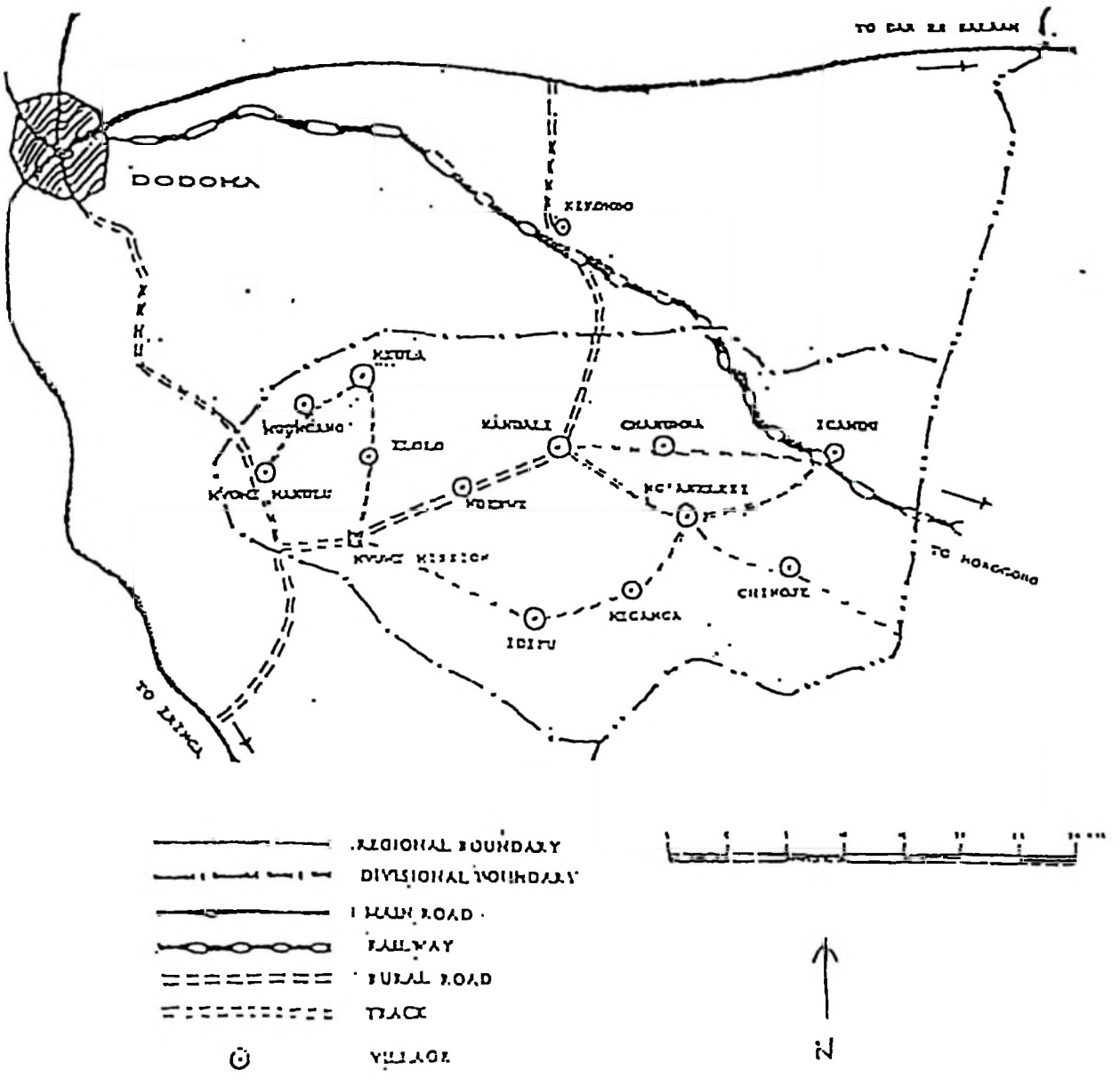

Figure 3: A sketch map of Mvumi Division showing the study villages

season occurring from December through March/April. The district is characterized by having erratic and unevenly distributed rainfall, which ranges from 500-700 mm annually, and periodic droughts, floods and famine. For example, in 1993 the rainfall distribution was as shown in figure 4 (Holtland, 1994). Total rainfall has been recorded to be 566mm per annum on average. These environmental factors have distinct consequences upon residence, spatial mobility and social relationships among the inhabitants of the area. The district has the average temperature of 22.6^{0}C.

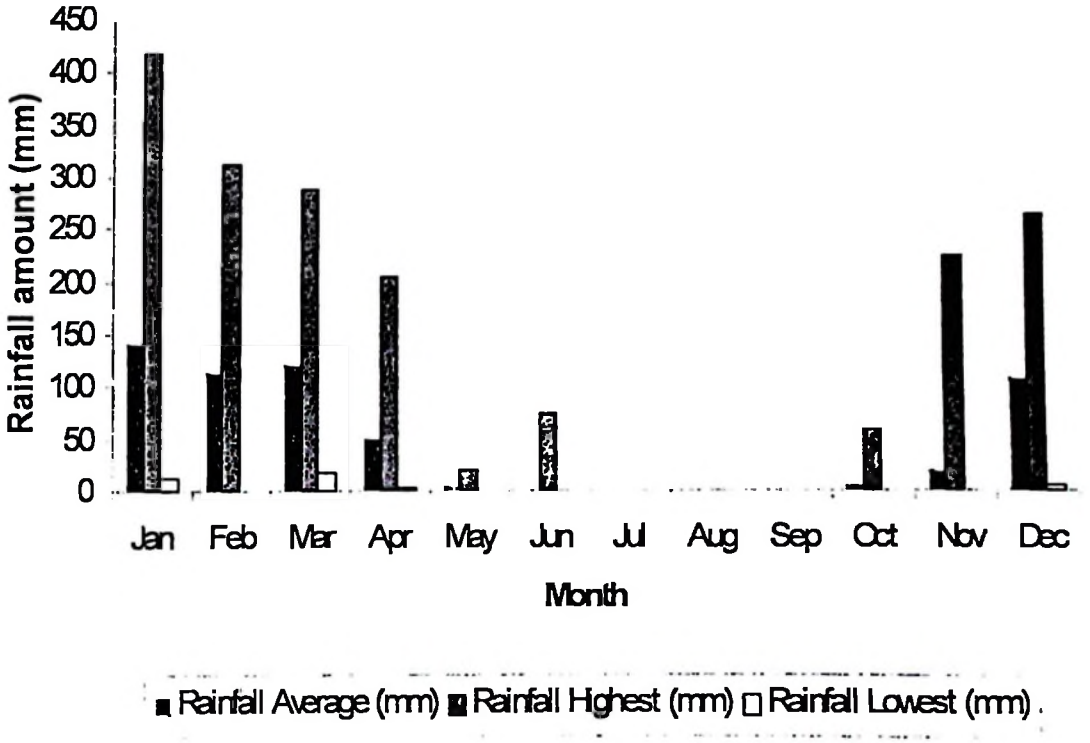

Figure 4: Distribution of rainfall in Dodoma Rural District in 1993
Source: Hotland, 1994.

3.1.3 Vegetation

The characteristic vegetation of the district is 'bush' or thicket type, which is widespread throughout the district. Where the natural vegetation has been modified by agricultural activities, regenerating bushes mixed with annual herbs and grasses form a type of induced vegetation. Most of the hill ranges, steep slopes and protected forest reserves are covered with large woody plants that form good watershed protective covers.

3.1.4 Inhabitants and Their Eating Habits

Nearly all inhabitants in the study area are Wagogo, a tribe of agropastrolists. The other ethnic groups include Wakaguru, Wahehe and Wazigua. About 40% of the economically active male individuals have migrated to seek urban employment leaving behind women with children struggling themselves for their well-being (Holtland, 1994).

The study was conducted in three villages namely Mzula, Mvumi-Makulu and Ndebwe. The population profile of the study villages is given in table 2.

Table 2: Population profile of three study villages

Village	Number of households	Number of Men	Number of Women	Total Number
Mzula	500	687	823	1510
Mvumi Makulu	1080	2907	3773	6680
Ndebwe	820	1418	1761	3179

Source: Compiled from the villages' official records

The local people in Dodoma rural district have varying eating habits depending on the availability of food. Three meals per day are taken when food is plenty and only

1 or 2 meals are taken when food is of short supply. The morning meal (breakfast) normally is soft porridge (uji in swahili) made from millet, sorghum or maize flour. The type of food that is normally eaten for lunch or dinner is stiff porridge (ugali in swahili) made from millet, sorghum or maize flour. 'Ugali' is normally taken with green vegetables as relish. A number of local green vegetables are commonly consumed. These include two *Cruciferea* spp (mlenda and cichwili in Gogo language), *Gynandropsis gynandra* (mzimwe in Gogo language), and *Ipomoea* spp (chiwandagulu in Gogo language). Proteinous foods such as meat are rarely taken.

3.2 Methodology

3.2.1 Research Design

Cross sectional design (Casley and Kumar, 1988) was adopted during data collection. The design allows collection of information at one point in time. This design is appropriate when time of research is limited as in the case of this study.

3.2.2 Sampling Procedure

A multi-stage sampling technique was employed. Mvumi division, was purposely selected on the basis of ease communication. From that division three villages were selected randomly. These were: Mzula, Mvumi-Makulu and Ndebwe. Interviews were carried out with randomly selected households. The household is regarded in this study as the unit of analysis because it is where all decisions about production, investment and consumption are taking place (Corbett, 1988).

A household is defined as the members of the household who dwell under the same roof and share the same bowl (Brydon and Chant, 1958 as cited by Makundi, 1996) and may cultivate the same land. They also recognize the authority of one person, the household head who is ultimate decision-maker for the household (Poate and Daplyn, 1988 as cited by Kajembe, 1994). Heads of the households were the key respondents but other members of the household were encouraged to attend so as to supplement information.

The village executive officers assisted in compiling lists of the households. Wealth was used as a criterion to group households. In this case households were categorised according to their wealth status which included poor, moderate and rich (Table 3).

Table 3: Wealth categories in the study villages

Item	Poor	Moderate	Rich
Housing	Mud house roofed by mud (Tembe)	Mud brick house with corrugated iron sheets	Bricks (block/burnt) houses with corrugated iron sheets
Farm size	Very small plots	Plots of 5 to 10ha	Plots of more than 10ha
Source of income	Casual labour	Agriculture and off-farm activities	Agriculture and business (shops, milling machines, etc.)
Fuel energy	Firewood only	Firewood and charcoal	Charcoal and electricity

Source: Own Survey Data, 1999/2000

Thereafter, 5% of households from each wealth category were selected randomly for interviews. This procedure was adopted from Boyd *et al.* (1981) who argued that significant population representation is achieved when a random sample of at least 5% of the total population is taken for the study. It can therefore be observed in table 2 that 5% of the total number of households sampled were 25, 54 and 41 for Mzula, Mvumi Makulu and Ndebwe respectively as shown in table 4.

Table 4: The sampled respondents

Village	Male	Female	Total Sample size
Mzula	15	10	25
Mvumi Makulu	21	33	54
Ndebwe	12	29	41
Total	48	72	120

Source: Own Survey Data, 1999/2000

3.2.3 Data Collection

3.2.3.1 Primary Data

Collection of primary data was done by the researcher assisted by two recruited extension officers. The extension officers had form four level of education with a good command of the local language. The workers were trained for two days on how to administer the questionnaires and facilitate discussions. Data collection involved visiting individual farmers at their homes, on farms and at informal gatherings. Physical observation was also employed in individual farms to verify and supplement some of the information given by the respondents.

3.2.3.2 Secondary Data

Secondary data was collected through informal discussion with staff in the District and Village offices, reports from regional and district agricultural offices in Dodoma region and documents from Sokoine National Agricultural Library (SNAL) at Sokoine University of Agriculture, Morogoro and from the Library of the University of Dar-es-Salaam.

3.4 Research Phases and Methods

The study was carried out in two phases. Phase one of the study involved a reconnaissance survey together with a Participatory Rural Appraisal (PRA) to collect basic information about the study area. The second phase was mainly based on questionnaire survey. The aim of doing this research under two phases was that, firstly due to shortage of time it was necessary for the researcher to have a clear picture about the study area. Therefore, through PRA the researcher was able to explore the local situation and at the same time have qualitative data on basic issues pertaining to the study. Questionnaire surveys conducted in phase two provided detailed information including qualitative and quantitative data.

Prior to carrying out the PRA, a reconnaissance survey was done to provide a general picture of the research area. Reconnaissance survey enabled the researcher to know the population size, ethnicity and economic activities. The sections below elaborate on the basic research techniques employed in this study.

3.4.1 Participatory Rural Appraisal

A total of 15 people for each village constituted a PRA group. The group included elders, middle aged, youth and village government leaders. PRA is based on interactive learning, shared knowledge and flexible, yet structured analysis (Kajembe, 1994). It involves self-critical awareness on the attitudes and behaviour of the researcher towards the people. It is this relaxed rapport, open dialogue and mutual sharing that makes the approach effective. The methods applied were designed in such a way that they quickly generated information about local

conditions and livelihoods. The methods used in PRA included observing directly, activity profiles, participatory mapping and modelling, local histories, *chapatti* (or Venn) diagrams, direct matrix and pair-wise ranking and scoring.

Through PRA the researcher was in a position to constantly evaluate and assess the situation on the ground and, over time, the researcher became familiar and a trusted appearance in the community.

3.4.2 Participant Observation

Participant observation as the name implies, is distinguished by the fact that the observer himself/herself forms a part of the situation he/she is studying (Martin, 1995). Much information can be obtained simply by observing what goes on in village. What farmers say and the way they act may not necessarily be the same; sometimes they report what others do rather than themselves. Observing how people do gives an opportunity to discuss with farmers what, how and why things are done the way they are done. It is always essential to keep an eye open when visiting a farmer and to check what you are told against what you see (Mettrick, 1993). Curiosity, willingness to learn from other people and ability to adapt to their rhythm and life style were the main tools used as suggested by Martin (1995).

This method was used to tie together the more discrete elements of the data collected by other methods. Thus, an iterative process between participant observation and other research methods evolved. While other methods allowed aspects of life in the study area to be isolated and studied out of context of the community life, participant

observation permitted these elements to be examined within the context of the social system.

3.4.3 Checklist

The checklist was used to collect information from key informants. A key informant was considered to be an individual who was accessible, willing to talk and has great depth of knowledge about issues in question. Key informants are not only members of the clientele, but are most often informed outsiders (Mettrick, 1993). For this study an open-ended discussion was made with the village leaders, village elders (men and women), village executive officers and environmental committee members (Appendix 1).

3.4.4 Questionnaire Survey

The questionnaire was designed based on the specific objectives and hypotheses. The questions were set so that they could be in a form suitable for addressing the research hypotheses and the methods of analysis used. Pre-testing of the questionnaire was done during PRA exercises to check reliability and validity of the questions. Pre-testing was conducted to 15 randomly selected households in the study area. Most of the questions were responded and therefore very little modifications were done to the original questions.

Both closed and open-ended questions were used to collect the data. In closed or forced questions, a number of alternative answers were provided while in the open-ended questions respondents were required to give their own answers (Appendix 2).

3.5 Data Analysis

3.5.1 Descriptive and Inferential Statistics

Data collected by using PRA techniques in phase I were analysed with the help of the communities and the results were communicated back to them for verification. Data collected in phase II were analysed by using both quantitative and qualitative methods. The Statistical Package for Social Sciences (SPSS) was the main tool used for analysing quantitative data. Content and Structural-Functional Analyses were used for qualitative data.

In using SPSS, data coding was the first task, whereby variables had to be defined by giving them numeric values. The second step was to explore the data for distribution of responses, central tendency and dispersion. For every question, the range of distribution of replies given, the existence of any concentration or central tendency in those replies and the shape of distribution or extent to which replies were clustered around the central point were sought. Third step was to carry out inferential statistical analysis. The function of inferential statistics was to provide an idea about whether the pattern described in samples were likely to apply in the population from which the samples were drawn (de Vaus, 1986). In this regard, cross tabulation and logistic regression analyses were employed.

Cross tabulation is both a powerful way of communicating information and the commonest form of data presentation (Casey and Kumar, 1988). Logistic regression is useful for situations in which one wants to predict the presence or absence of a

characteristic or outcome based on values of a set of predictor variables. It is similar to a linear regression model but is suited to models where the dependent variable is dichotomous. Independent variables can be interval level or categorical. Logistic regression coefficients can be used to estimate odds ratios for each of the independent variables in the model. Logistic regression is applicable to a broader range of research situations than discriminant analysis.

Logistic regression models were estimated using the household survey data. The models estimated the probability of a respondent to do practice casual labour, off-farm activities and collection of wild foods as coping strategies for food insecurity.

The general model used in logistic regression was:

$$\Pr ob(event) = \frac{1}{1+e^{-z}}$$

Where Z was the linear combination

$$Z = B_0 + B_1X_1 + B_2X_2 + \ldots + B_pX_p$$

The probability of the event not occurring was estimated as:

$$\Pr ob\ (no\ event) \quad = \quad 1 - \Pr ob\ (event)$$

Where,

Event = dependant variables which were the key coping strategies (casual labour, off farm activities and collecting wild foods).

B_1 to B_p = coefficients estimated from data

e = the base logarithms, approximately 2.718.

X_1 to X_n = independent variables including: education level, age, sex, farm size, household size, dependant ratio, marital status, amount of food stored, residence duration (years), income from labour or small businesses.

H_o: $b = 0$; (Meaning that there is no relationship between dependent and independent variables), against

H_1: $b \neq 0$; (Meaning that there is positive or negative relationship between dependent and independent variables).

A two-tailed t-test at 0.05 level of significance was used to test the hypotheses.

Logistic regression was used due to the fact that, first it almost inevitably offers a fuller explanation of the dependent variable (key coping strategies), since coping strategies employed for food shortage are influenced by many variables. Second, the effects of a particular independent variable is made more certain for the possibility of distorting influences from other independent variables is removed.

3.5.2 Content and Structural-Functional Analyses

Content and Structural-Functional analyses techniques were used to analyse qualitative data and information. The components of verbal discussion held with key informants were analysed in detail with the help of content analysis method. In this way the recorded dialogue with respondents was broken down into smallest meaningful units of information or themes and tendencies. These helped the researcher in ascertaining values and attitudes of the respondents. Structural-Functional analysis sought to explain social facts by the way in which they relate to

each other within the social system and to the physical surrounding. This type of analysis helped the researcher to distinguish between manifest and latent functions. Manifest functions are 'those consequences which are intended and recognised by actors in a system'. Latent functions are 'those consequences which are neither intended nor recognised' (Thomlison, 1965 as cited by Kajembe and Luoga, 1996).

CHAPTER 4

4.0 RESULTS AND DISCUSSION

4.1 Historical Background of Food Shortage in Dodoma Rural District

The problem of food shortage has long history in Dodoma Rural District. The historical time with regard to food security in the district can be divided into five periods, namely: pre-colonial era; colonial era; the independence era; villagelization era and the present era. Severe famines that could be recalled in Dodoma Rural District happened as early as 1918 (Table 5).

Table 5: Historical Profile for Famine Occurrence in Dodoma Rural District

Period	Reason for famine	Coping Strategy	Name in Gogo
1918-20	First World War and construction of central railway	Use of stored food	Mutunya
1942-43	Rain shortage	Rice was brought as relief food	*Michele*
1945-47	Rain shortage	-	*Hambaya*
1953	Rain shortage	Livestock died and people sold their hides & skins to get money for food	*Machingo*
1956-58	Rain shortage	-	*Mgangule*
1969	Rain Shortage	Yellow-corn flour brought from America	*Manoma*
1984	Rain shortage	Red sorghum from Kondoa District and dried cassava were brought by the government	*Maudo & Makopa*
1997-98	*Elnino* and pests (*Nghombelele* in Gogo)	Relief food was brought for vulnerable groups of people	*Walengwa*

Source: Own Survey Data, 1999 /2000

By the end of the nineteenth century the Wagogo were already exposed to the outside world by the many caravan traders passing through the area on their way to Tabora (for iron, slaves, *etc*). The large quantities of grain that the Wagogo sold to these caravan traders led to over-exploitation of the available resources and hence soil erosion along the caravan routes. This engraved the periodic famines in the area and

forced many families to move away from the caravan routes. At the same period rinder pest hit the herds of cattle of the Wagogo, and possibly they never recovered completely.

Table 5 shows that a severe drought decimated both human and the cattle population in 1918/19. It was estimated that about 30,000 people died from hunger and influenza at that time (Hotland, 1994). This must have been a quarter of the population. This famine (known as '*Mutunya*') was considered to be the last great famine by the local people of Dodoma Rural District. Afterwards they got used to food relief from government and other agencies.

During the colonial time the colonial government severely restricted exploitation of any natural resource. Also the population by that time was small and sparse. Consequently, farmers were able to produce enough food as climate was favourable and land was fertile. Forests were perceived to be fairly dense and rivers that flowed out from them were more reliable. There were also a wide variety of wild animals and fruits, which could be used as sources of food by local people.

The period following the gaining of independence in 1961 was characterised by the relaxation of the natural resources protection rules to the extent that local people were clearing large areas of land to open new farms and this was accelerated by the introduction of cash crops like grapes. As a result a number of wild fruit species are thought to have disappeared and crop yield became low.

Then came the villagelization era where residents were required to shift to new predetermined sites. Given time constraints, proper site selection was not given adequate supervision nor was the natural resource base or the environmental impacts of such village settlements considered (Kajembe and Munyikombo, 1998). The villagelization programme was thought to enhance easy access to social facilities such as reliable land for cultivation. The purposes of the villagelization programme were, first of all, to provide a population large enough for social services; second, to act as agents of land reform (that is, to allocate land among private cultivators). Other purposes of villagelization programme included acting as the primary units for marketing (as collection points) and provision of potential units for communal production.

Since the whole community had to start constructing shelters/houses, which was the first priority demand at the new sites, crop cultivation was delayed. As a consequence a severe food shortage occurred. Wild foods collection became far more concentrated in whatever forest areas existed close to the villages and this led to loss of control over those resources in areas distant from the villages, such as hill-tops (Katani, 1999). In the present era, the situation is worse mainly due to erratic climatic conditions with frequently recurring severe droughts.

4.2 Types of Food Insecurity in the Study Area

The types of food insecurity were determined by asking the respondents about the occurrence of food shortages. Results in table 6 show that 75 percent of the respondents indicated that food shortages was happening on period intervals (that is,

not often). Twenty five percent of the respondents reported their experience of food shortage as being frequent. This could be explained by the fact that some households are prone to food insecurity due to their high level of poverty.

Table 6: Distribution of respondents by the experience of food shortage

Frequency	Number and % of respondents							
	Mzula		MvumiMakulu		Ndebwe		Total	
	No.	%	No.	%	No.	%	No.	%
Often	5	20.8	8	15.7	16	39.0	29	25.0
Sometimes	19	79.2	43	84.3	25	61.0	87	75.0
Total	24	100.0	51	100.0	41	100.0	116	100.0

Source: Own Survey Data, 1999/2000

The above findings suggest that about quarter of the population in the Dodoma rural district had chronic food insecurity. Liwenga (1995) indicated that persistent drought could lead to chronic food insecurity. Chronic food insecurity as discussed in section 2.5.2 occurs when households on more or less permanent basis lack the resources to acquire enough food for a healthy and active life, but the households are not directly threatened by starvation.

4.2.1 Critical Food Shortage Period

Table 7 shows that about 45 percent of the respondents had food deficit during the rainy season (Jan-March), 44 percent experience food shortages at pre-harvest period (April-May) and about 12 percent experience food shortages during post-harvest season (August-December). This means that in aggregate, about 89 percent of respondents face food shortages during the pre-harvest period (January-May). This is the season whereby people cultivate their farms, plant and wait for harvesting. In the study area it is the so-called 'hungry season'.

Table 7: Distribution of respondents by their reported critical food shortage periods

Food shortage period	Number and % of respondents							
	Mzula (n=25)		Mvumi Makulu (n=54)		Ndebwe (n= 41)		Total (N=120)	
	No.	%	No.	%	No.	%	No.	%
Aug-Dec			4	8.0	8	19.5	12	11.5
Jan-Mar			34	68.0	13	31.7	47	45.2
Apr-May	13	100.0	12	24.0	20	48.8	45	44.3
Total	13	100.0	50	100.0	41	100.0	104	100.0

Source: Own Survey Data, 1999/2000

Similar results were reported by Ashimogo (1995) that it is the pre-harvest period, which is dominated by food shortages. Mhinte (2000) also reported that during this season the majority of the rural people are food insecure.

An interesting observation was that it is at the same season when labour demand in farm operations is at its peak. Therefore, it was observed in the study area that due to food shortages, people tend to sell their labour to other people so as to have food for sustaining their families.

4.2.2 Contemporary Causes of Food Shortage in the Study Area

Table 8 shows that drought is the major cause of food shortage in the study area as indicated by nearly 73 percent of the respondents. Pests was reported by about 21 percent of the respondents followed this. The study also indicated that lack of seeds and small farm sizes were also causes of food shortage.

Drought was mentioned as a major constraint to crop production as it was reported on section 5.1. Climatic factors do contribute to food insecurity in some parts of Tanzania due to the unprotected nature of smallholder peasant agriculture (Biseko,

1989). Drought is a common cause of disaster in the study area as it occurs more frequently.

Other causes mentioned during focus group discussions include: inadequate purchasing power among the local communities, lack or inadequate of extension services and lack of agricultural inputs.

Table 8: Distribution of respondents by causes of food deficit

Causes of food deficit	Percentage of the respondents			
	Mzula	Mvumi Makulu	Ndebwe	Total
Drought	56.0	72.2	82.9	72.5
Pests	32.0	22.2	12.2	20.8
Small farm size	12.0	0	2.4	3.3
Lack of seeds	0	5.6	2.4	3.3
Total	100.0	100.0	100.0	100.0

Source: Own Survey data, 1999/2000

4.2.3 The Use of Drought Resistant Crops

Due to severe famine, farmers tend to choose drought resistant crops so as to overcome the situation. The key informants ranked bulrush millet the highest among the drought resistant crops (Table 9).

Table 9: The reported ranking of the used drought resistant crops in the study villages

Food crop	Village		
	Mzula	Mvumi Makulu	Ndebwe
Bulrush millet	1	1	1
Sorghum	3	3	5
Maize	6	7	7
Cassava	2	2	2
Sweet potatoes	n.m	4	3
Groundnuts	5	6	6
Bambara nuts	4	5	4

Key: n.m. = Not mentioned

Source: Own Survey Data, 1999/2000

Cassava (*Manihot esculenta*) and then sorghum (*Sorghum bicolor*) followed it. Others included: sweet potatoes (*Ipomea batatas*), bambara nuts (*Vigna subterranea*), and lastly maize (*Zea mays*).

4.2.4 Food Sufficiency

Food security at household level is not only affected by the composition and quality of the daily meals but also, the quantity and seasonal availability of staple food in the farm households. When farmers were asked if the food produced in the last cropping season was enough at least until the next harvest, 13 percent of the respondents reported that it was enough while the rest (87 percent) indicated that it was not (Table 10).

Table 10: Response of farmers on whether food harvested was enough till next harvest

Village	Response (%)					
	Yes		No		Total	
	Number	%	Number	%	Number	%
Mzula	6	24.0	19	76.0	25	100.0
Mvumi Makulu	10	18.5	44	81.5	54	100.0
Ndebwe	0	0	41	100.0	41	100.0
Total	16	13.3	104	86.7	120	100.0

Source: Own Survey Data, 1999/2000

4.3 Gender-based Coping Strategies against Food Insecurity

Most of the households in the study area had experienced food insecurity due to the recurrent drought of recent years; this raises the question as to what coping strategies they normally use in order to guard themselves against those shortages. The respondents were asked a series of questions to establish how, both as individuals and as family heads they had coped with recent as well as past food shortages. Their

responses are summarised in table 11. The key coping strategies mentioned were collecting of wild foods (98%), doing casual labour (85%) and doing off-farm activities (68%).

Table 11: The reported coping strategies against food shortage that were used by male and female respondents (N = 120)

Strategy	Male		Female		Total	
	No.	%	No.	%	No.	%
Collecting wild food	48	41.0	67	57.3	115	98.3
Casual labour	40	33.6	61	51.3	101	84.9
Off-farm activities	35	29.2	47	39.2	82	68.3
Food borrowing	24	20.0	21	17.6	45	37.8
Crop diversification	15	12.6	24	20.2	39	32.8
Migration	6	5.0	19	16.0	25	21.0
Remittances	4	3.4	9	7.6	13	10.9
Begging/Prostitution	5	4.2	7	5.9	12	10.1
Do nothing	5	4.2	0	0	5	4.2

Source: Own Survey Data, 1999/2000

4.3.1 Collection of Wild Foods

Table 11 shows that about 57 and 41 percent of female and male respondents respectively, did collect wild foods. Furthermore, table 12 shows that greater proportion of women (46%) followed by children (28%) was involved in collecting wild foods. In other words, it was the women who dominated the activity. Only small proportion of men (19%) were involved. Normally girls along with their mothers collect wild vegetables, occasionally also young boys may accompany them (Kajembe *et al.*, 2000).

Table 12: Reported involvement in the collection of wild foods by the various members of households in the study area

Person	Number of respondents	Percentage
Woman	56	45.9
Man	23	18.9
Children	35	28.3
Whole family	6	4.9
Total	120	100.0

Source: Own Survey Data, 1999/2000

Kajembe (1994) and Kessy (1998) pointed out the importance of wild foods and argued that wild foods are as important to the diets today as they were before. The most favoured and important wild foods mentioned by respondents during the discussions included *Cruciferea spps*, *Gynandropsis gynandra* and *Ipomoea* spp. (cichwili and mlenda, mzimwe and chiwandagulu in Gogo language) used as vegetables. It was reported that in a normal season people could collect enough vegetables for the whole year. In the dry climate of Dodoma not many fruit species perform well. The wild fruits include 'Mbuyu' (Baobab or *Adansonia digitata*), 'Mzambarau' (*Syzygium cumii*), 'Mlumba' (*Ficus* spp), 'Furu' and many others. Wild vegetables are eaten in a form of a sauce or relish which is taken together with the staple food, most commonly maize, sorghum or millet stiff porridge (ugali in Swahili). Table 13 shows that about 89 and 58 percent of the female and male respondents respectively, were knowledgeable about the most common edible and non-edible wild plant species in the study area.

Table 13: Distribution of male and female respondents with respect to knowledge about edible wild plants

Response	Male		Female		Total	
	No.	%	No.	%	No.	%
Knowledgeable	28	58.3	64	88.9	92	79.7
Not knowledgeable	20	41.7	8	11.1	28	23.3
Total	48	100.0	72	100.0	120	100.0

Source: Own Survey Data, 1999/2000

It is obvious from table 13 that women know more of wild foods than men. Astolfi (1995) argues that women have developed a thorough knowledge of plant species through their daily occupation as food gatherers. Dankenlman and Davidson (1988) noted that women spend a lot of time in the forests and thus they have a good

knowledge on the use of many trees including those which are suitable as source of food, offering vegetables, nuts, fruits and even vines. In African societies, and Tanzania in particular, it is always the mother who makes the food and therefore whenever other members of the family have picked the wild foods to be cooked, it is the mother who is responsible for checking them before processing (Kajembe *et al.*, 2000).

On the other hand, as men collect building materials and burn charcoal they become knowledgeable in selecting durable and pest resistant poles and good tree species for charcoal. This implies that gender division of labour is the one, which differentiate men and women on their knowledgebility about wild foods.

4.3.1.1 Preservation of Wild Food Plants

Most of the wild foods especially leafy vegetables do appear during rainy season whereby local people in Dodoma rural district, tend to preserve them so as to be used in the future. Sun drying is the method of preservation widely used. Some of the leafy-vegetables are boiled first before being dried. The study revealed that the majority of the respondents (84%) preserve wild vegetables (Table 14).

Table 14: Distribution of respondents on whether they were preserving wild vegetables or not.

Response	%
Preserved	83.8
Did not preserve	16.2
Total	100.0

Source: Own Survey Data, 1999/2000

The dried vegetables like 'mlenda' *(Cruciferea spp)* and 'mzimwe' *(Gynandropsis gynandra)* are usually stored in calabash containers. Respondents reported that the well-dried vegetables could be stored for more than a year (Table 15).

Table 15: Distribution of the respondents by the reported length of time in which preserved wild vegetables can be kept in the study area

Response	%
Less than a year	3.2
One year	63.2
More than a year	33.6
Total	100.0

Source: Own Survey Data, 1999/2000

4.3.1.2 Contribution of Wild Foods on the Livelihood

Participant observation showed that baobab fruits were collected in mass and stored on top of the houses for future consumption and/or marketing. It was further noted that most of the fruit trees in the study area were indigenous. As Kajembe *et al.*, (2000) argued, where a large number of indigenous fruit trees have been retained or planted, the variety of exotic fruits is small. Generally, wild products are known to play direct and indirect roles in food security (Makonda, 1997). Direct role is by consumption and indirect role is by selling to generate cash income for food or other expenditure. Baobab fruits were reported to be a source of income, especially during the dry seasons.

In general, difference in gender roles in the use of wild products for household food security seems to be based on the role played by that particular product. For that matter, products that are for direct consumption are in most cases under the control

of women while men tend to deal with those products that have indirect contribution through cash income earning.

4.3.2 Casual Labour as a Coping Strategy

Casual labour is that kind of labour offered in exchange for cash or food at an agreed rate. Casual labour as a strategy to cope with food deficit was reported by about 34 and 51 percent of male and female respondents respectively (Table 11). The wage rate in terms of the food quantity offered depends on the size of work rather than on the number of hours worked. Generally, food surplus households were the major employers while the food deficit households were the main providers of casual labour.

The main economic activity for most of the respondents is farming. Labour selling in this case was done in farms. The use of labour for food access implies two important things. Firstly, the way income from labour selling was flowing, it did allow for its use to cover domestic needs including food. The flow was not in lump sum but rather in small amounts just enough to purchase food to feed a family in a day or two. This kind of income flow could not be diverted to capital investment or to purchase luxury items. Secondly, the period in which food deficit occurred was coinciding with the time of high labour demand on farm operations such as, cultivation, planting and weeding. During this period a household, which would prefer using hired labour, could employ members from food deficit households.

The relationship between casual labour and critical farm operations has important implications to rural household food security. Rural agricultural production is labour intensive in the sense that any rural household needs to utilise the whole of its family labour in order to be self sufficient in food production. A food deficit household, which coped with food shortage by selling labour, was likely to face another deficit in the following year. Labour selling in critical periods of farm operations was therefore making such households to have lesser labour for their own farm operations, something that implies an unbreakable cycle of food insecurity. But on the other hand, if a household decides not to utilise this strategy it will have less energy intake thus reduce the work capacity of the family labour. Consequently, less food will be produced for consumption in the coming year. If such a cycle persists, food shortage can become an endless phenomenon.

4.3.3 Off-farm Activities

Off-farm activities were found to be another most important source of income/food after selling labour. Surveyed households have different off-farm activities. Table 11 shows that about 29 and 39 percent of the male and female respondents, respectively, were involved in doing off-farm activities. These activities were done mainly during the dry period when there were no farm work to be done. Such activities included burning and selling charcoal and fuel-wood, collection of wild fruits and selling them especially baobab fruits, and doing some petty businesses like selling of local brews and cooked foods. Men did charcoal burning and collection of fuel-wood for selling. However, it was found that men spent a disproportionate amount of income from those activities on non-essentials, including tobacco, liquor and leisure.

It is interesting to note that though women were highly involved in the collection of most of the wild foods, they were not dealing with the baobab fruits. The collection and selling of the baobab fruits has remained men's activity. The baobab fruits have gained importance in urban areas as potential marketable wild fruits. Normally, the fruits are sold in nearby towns as well as far away towns such as Dar es Salaam and Arusha.

Petty trade was another important off-farm activity that was mentioned as a coping strategy for food shortage. Reported prominent petty trades were selling of local brews and cooked foods. This strategy was found to be practised by most of the women. Their main concern in selling food is to earn some cash so that their families can have variety of food to eat. This confirms the fact that in virtually all parts of the world women traditionally have major responsibilities for feeding their families, thus their priority is towards the food needs of their households (Shah, 1983). Most of the women in the study area were selling cooked sweet potatoes obtained from Mtatangwi dam. The potatoes were sold as snacks, but sometimes they were used as full meals by passer-by people. Local brews were sold during the evening hours mostly by women to men who have cash money. The money earned by women was found to be used mostly to purchase food for the family.

Mascarenhas (1983) observed that women who were engaged in local brewing earned good income despite their low level of education. However, the selling of local brew as a strategy has drawbacks because it utilises cereal grains such as sorghum and maize. This strategy, therefore, may reduce household food stocks.

4.3.4 Food Borrowing

Table 11 shows that about 20 and 18 percent of the male and female respondents respectively did borrow food either from relatives or friends in order to protect their families against food shortages. Borrowing food in the context of this study is that kind of informal food loan among households. Food surplus households give food to deficit ones with the expectation of repayment in the next harvest. The mode of food repayment depends on the mutual agreement between the households involved. Generally, loans are paid immediately after harvest. One form of payment is based on the same amount of food borrowed. For this type of arrangement, the repayment is done on volume basis regardless of the monetary value at the time of payment. The other form of repayment is that whereby a food deficit household repays the loan with an interest, for example paying double the amount of cereals borrowed.

4.3.5 Crop Diversification

More female respondents (20%) than male ones (13%) reported to practice crop diversification as a strategy to prevent occurrence of food insecurity (Table 11). As explained in section 5.3.1.1, different types of food crops such as bulrush millet, sorghum, maize and cassava were grown as major crops. Some of the minor crops included groundnuts, bambara nuts, sunflower, cucumber-like crops, cowpea, pigeon pea, and watermelon. Normally, the main crops were intercropped with the minor ones. Another form of diversification was to plant crops in varied plots to reduce the risk of localisation. It was observed that whatever the case, almost all people did plant bulrush millet as their main food crop.

4.3.6 Migration

Perhaps contrary to what many would tend to think, greater proportion of women (16%) reported to out migrate as a way of coping with food insecurity compared to only 5% male. Majorities of women migrate to nearby villages looking for paid labour so that they feed their children. Others the young ones migrate to town for housemaids' jobs. Most of the migrating young men were reported to go to Dar es Salaam to work in the butcheries owned by people from Dodoma. Others tended to go to other urban centres where they often work in restaurants, grain mills or housekeeping.

Apart from this rather permanent more migration, many men were reported to leave the study area for temporary jobs during the dry season, or even during the rainy season if the harvest has been very poor. They usually work as daily labourers in places such as Mpwapwa, Kilosa and Morogoro.

A more positive aspect of migration was that migrants often sent home a portion of their earnings. The income of this group was very important for the food security in the study area. This is called "remittance". It is an income received by household from relatives or friends living in urban areas as an assistance or gift. Katunzi (1999) reported that women migrants often send back more money than their male counterparts.

Another observation made was that even those who were migrating to urban areas for begging were also sending money for cultivation during rainy seasons (Mr.

Mazengo, personal communication). It can therefore be said that, although remittance depends on a person's willingness to provide help, it is still an important strategy to cope with food shortage for rural households.

The remaining coping strategies are not very common. A small proportion of respondents (4% and 6% for male and female, respectively) mentioned stealing and prostitution respectively as coping strategies for food shortages. This might be due to the fact that begging, stealing and prostitution are socially humiliating, and so the respondents may have deliberately avoided mentioning them. But during focus group discussion the key informants mentioned begging as a coping strategy for some people. About 5 percent of male respondents mentioned not to practice any of the coping strategies when food shortage was occurring, that is, they did nothing. This is a rather strange result.

4.4 Socio-economic Factors Underlying the Key Coping Strategies

Logistic regression analysis equations were developed to depict influences of socio-economic factors on the key coping strategies. The key coping strategies were chosen based on the number of respondents that reported to use them whereby only those which were used by more than 50 percent of the sampled population were included (Table 11). These were casual labour (85%), off-farm activities (68%) and collecting of wild foods (98%). Table 16 summarises the results.

The results showed that education level, age, farm size, major food crops, age by gender, food stored and dependant ratio had significant influence to the key coping

Table 16: Parameter Estimates for Logistic Regression Model

Independent Variable	Collecting Wild Foods	Doing Casual Labour	Doing Off-farm Activities
Education level	2.651 (2.349)^{ns}	-0.214 (0.112)^{ns}	-1.263 (4.723)**
Age	-0.073 (1.512)^{ns}	1.168 (3.564)*	1.767 (3.439)*
Gender	2.551 (1.442)^{ns}	0.482 (0.436)^{ns}	1.090 (1.309)^{ns}
Farm size	14.674 (0.111)^{ns}	-2.2245 (10.571)***	0.219 (0.110)^{ns}
Marital Status	1.289 (0.219)^{ns}	1.127 (1.645)^{ns}	0.326 (0.291)^{ns}
Major food crops	-	-1.3024 (4.041)**	-0.331 (0.432)^{ns}
Food stored	-1.824 (7.885)***	-	-0.087 (0.288)^{ns}
Dependant ratio	-3.169 (3.938)**	-	-0.117 (0.052)^{ns}
Age by Sex		-	-0.039 (4.013)**
Constant	12.523 (0.285)^{ns}	1.299 (1.352)^{ns}	3.461 (7.538)***
	-2 Log likelihood 22.93	-2 Log likelihood 77.129	-2 Log likelihood 112.562
	Goodness of fit 22.77	Good ness of fit 112.91	Goodness of fit 117.024
	Overall classification 93.02	Overall classification 87.96%	Overall classification 75.93%
	Number of cases 120	Number of cases 120	Number of cases 120

Note: Values in the parentheses are Wald statistics.

* = Significant at 0.1 level

** = Significant at 0.05 level

*** = Significant at 0.01 level

ns = Not Significant

strategies for food insecurity. The three regression models give mixed results, however, gender and marital status are not significant in all the three models.

4.4.1 Education Level of the Household Head

The coefficient associated with education level is negative but significant at 5% level for doing off-farm activities. The results suggest that household heads who had formal education have lower probability of practising various off-farm activities as a coping strategy for food insecurity than those with informal education. Table 17 shows that there was quite a high rate of literacy in the study area. On aggregate about 63 percent of respondents had attained primary and secondary education.

Table 17: Distribution of respondents by education level within the study villages

Education Level	Village			Total (N=120)
	Mzula (n=25)	Mvumi Makulu (n=54)	Ndebwe (n=41)	
Adult education only	20.0	24.1	22.0	22.5
Primary education only	68.0	48.1	58.5	55.8
Secondary education	8.0	7.4	4.9	6.7
No formal education	4.0	20.4	14.6	15.0
Total	100.0	100.0	100.0	100.0

Source: Own survey data, 1999/2000

The World Food Summit (1996) reports that as a consequence of longstanding imbalance in participation in formal education, the literacy rate of the world's women (71.2 percent) is significantly lower than that of men (83.6 percent). This could mean that women are the ones who participate more in coping with food shortage than men. This among other reasons could be due the inferiority of the off-farm activities commonly practised in the study villages. For example, as mentioned in section 5.3.3 the majority of women were selling local brews and men were selling charcoal and firewood. Ishuza (1985) argued that local brewing (commonly carried out by women during weekends) forms the major off-farm activity which generates considerable income to the farmers.

4.4.2 Age of the Household Head

The coefficient associated with age of the household head is positive and significant at 0.1 level for casual labour and off-farm activities. This indicates that the odds of deciding to do off-farm activities were higher for people who had higher age than those who had lower ages. This is expected because the majority of young people were migrating to other areas whenever food shortages emerged. Table 18 indicates

that the majority of household heads, about 61 percent on aggregate, were above 40 years old.

Table 18: Distribution of respondents by their age group

Age	Mzula		Mvumi Makulu		Ndebwe		Total	
group(years)	No.	%	No.	%	No.	%	No.	%
< 40	16	13.3	18	15.0	13	10.8	47	39.2
41-55	6	5.0	13	10.8	7	5.8	26	21.7
>56	3	2.5	23	19.2	21	17.5	47	39.2
Total	25	20.8	54	45.0	41	34.2	120	100.0

Source: Own Data Survey, 1999/2000

4.4.3 Farm Size

The coefficient associated with farm size was negative but significant at 1% level for doing casual labour. This indicates that the odds of deciding to do casual labour as a food insecurity strategy were lower for farmers who had farms of above 5ha than was the case for those who had farms of below 5ha. Table 19 shows that the majority of farmers (about 80 percent) on aggregate had farms that were below 5ha.

Table 19: Distribution of farm size among three villages

Farm	Mzula		Ndebwe		Mvumi Makulu		Total	
size (ha)	No.	%	No.	%	No.	%	No.	%
< 1	1	4.0	14	35.8	7	13.0	22	18.3
1 – 2	4	16.0	4	9.8	25	46.3	33	27.5
3 – 5	13	52.0	9	22.0	19	35.2	41	34.2
> 5	7	28.0	14	34.1	3	12.5	24	20.0
Total	25		41		54		120	100.0

Source: Own Data Survey, 1999/2000

A plausible explanation for this is that farmers who had small farms did not have enough to store or fulfil their food requirements from farm output, therefore they had to engage themselves in off-farm activities. Adugna (1997) observed that farm household heads who involve themselves in off-farm activities tend to concentrate less in their own crop production.

4.4.4 Major Food Crops

The coefficient associated with the major food crops was negative but significant at 5% level for doing casual labour. This indicates that the odds of deciding to do casual labour were lower for farmers who had cultivated minor crops than those who had cultivated major crops. This is expected because the dependency of rains is higher for cereal crops like maize, sorghum and bulrush millet than minor crops like groundnuts, cowpeas, bambaranuts and sunflower. Harvesting of minor crops especially groundnuts in large amount make those households to be food secure as they do sell them to purchase food.

4.4.5 Amount of Food Stored

The coefficient associated with food stored in the households was negative but very significant at one percent level for collecting wild foods. This indicates that the odds of deciding to collect wild foods was lower for farmers who had stored more than 4 bags of grains than those who had stored less. Therefore, the possibility for a farmer to collect wild foods depended to a large extent on the amount of food stored. As table 20 shows the majority of people, about 83 percent, less than 4 bags of cereals.

Table 20: Distribution of respondents by food storage (N=120)

Food Stored	Respondents (%)			
	Mzula (n=25)	Mvumi Makulu (n=54)	Ndebwe (n=41)	Total (N=120)
Below 1 bag	24.0	11.1	7.3	12.5
1–4 bags	76.0	51.9	90.2	70.0
5–7 bags	0	35.2	2.4	16.7
Above 10 bags	0	1.9	0	0.8
Total	100.0	100.0	100.0	100.0

Source: Own survey data, 1999/2000

4.4.6 Dependency Ratio

The coefficient associated with dependency ratio was negative but significant at 5% level for collecting wild foods as a strategy for food shortages in the study area. This indicates that the odds of deciding to collect wild foods are lower for people with high dependency ratio than for people with low dependency ratio. Table 21 indicates that the majority of the farmers had low dependency ratio (65%) and the remaining 35% had high dependency ratio. As it was reported by FAO (1992) food insecure households tended to be larger and have higher number of dependants and younger age composition.

Table 21: Distribution of respondents on their dependant ratio

Dependant ratio	Number	Percentage
Below 1	78	65.0
Above 1	42	35.0
Total	120	100.0

Source: Own Data Survey, 1999/2000

CHAPTER 5

5.0 CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

The study concludes by pointing out the fact that local people use various coping strategies to ensure food security in their households. This is clearly demonstrated by the fact that local people in Dodoma Rural District have been faced with recurrent famines and consequently have developed various gender-based coping strategies. As local people recognise their problems and identify their causes, they tend to formulate solutions according to their social, environmental and economical situations.

Participation of women in coping with food shortage and their role in ensuring food security as discussed in this study provides the evidence that many differences between women and men are socially constructed and can be changed. Gender division of labour normally brings differentiation of men and women on their knowledgebility about wild foods. Due to the women daily occupation as food gatherers they develop a thorough knowledge about the wild plant species than men do. Opportunities to training on food processing especially on how to preserve food to be used in time of food shortages can be a powerful incentive for women to ensure food security in their households.

The study also revealed that majority of women in the study area were engaged in some income generating activities like selling of cooked foods to passer-by people and local brews. The money earned by women was used mostly to purchase food for the family.

Dependency of wild foods during food shortages suggests that the limited forests and woodlands in semi-arid areas such as Dodoma Rural District need to be conserved so as to act as food reserves during famine periods.

As women have to sell their labour so as to ensure families are food secured then their workload tend to increase. There is little rationale for doing casual labour to ensure household food security because the periods of labour selling and food shortage tend to coincide with the times of critical farm operations.

5.3 Recommendations

The study recommends that there should be deliberate efforts to assist households that are dependent on rain fed production to diversify their source of livelihood. Diversification of sources of livelihood can be achieved through promotion of other sources of income generation. Promotion of off-farm activities coupled with policies designed to provide good rural markets for households that depend on food purchases are crucial.

It is further recommended that training schemes targeting the rural poor households especially women on food processing be given due consideration in policy

formulation. It is emphasised that those training should focus more on processing of wild foods.

Furthermore, it is recommended that indigenous wild foods be documented and characterised for the future generations. Policies should be designed that focuses on promoting wild foods. More research is called upon to identify important wild foods.

The study also recommends that policy makers should design policy interventions that focus on increasing the capacity of the rural poor to save their labour especially by reducing women workload, and ensure continued capacity to produce their own food. For instance, labour that is saved through such techniques can then be sold without affecting agricultural production. Government, institutions and NGOs should focus on the capacity building of the households and how to sustain them rather than provision of free relief food during food shortages when planning for rural food security.

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APPENDICES

Appendix 1:

CHECKLISTS FOR KEY INFORMANTS

1. Village executive officers:
    - Village population
    - Frequency of famine
    - Food aids information
2. Village elders (women & men):
    - History of famines
    - The way famines occur
    - How do they used to prevent famine
    - The coping strategies for food shortage
    - Their knowledge on indigenous food products
    - Comparison between past 20 years and today
3. Village Environmental Committee members
    - Environmental strategies
    - Conservation actions done
    - Important trees for the society

Appendix 2

HOUSEHOLD QUESTIONNAIRE FORM

Name of Enumerator ---------- Date ----------

Village ---------- Division----------

Household Identification No. ---------

Section A: Background information

1. Name of head of household----------

2. Respondent sex

   01 Male

   02 Female

3. Age --------Years

4. Marital status

   01. Single

   02. Married

   03. Divorced

   04. Widowed

5. Religion

   01. Christian

   02. Moslem

   03. Traditional

   04. Others (specify)----------

6. Tribe (ethnicity)

   01. Gogo

   02. Others

7. Household data: Fill in the Table (Start with Head of household)

Name	Sex	Age	Education level

Code: Sex:

01. Male

02. Female

Age:

01. Below 18 years

02.18 – 55 year

03. Above 55 years

Education:

01. Adult education

02. Primary

03. Secondary

04. Other (specify)

8. Total number of people in the household.....

9. What is the major economic activity of this household? .....

10. Who is responsible for the economic activity?.....

Section B: Agricultural production and Food security

1. Since when have you been residing at this village?.....

2. Do you own land?

01. Yes

02. No

3. How did you get this land?

01. Inheritance

02. Purchase

03. Given by the village government

04. Others (specify)

4. a) What was the total area cultivated during the last crop season?

Plot no.	Area (Hactres)

Total area----------Hactres

b) On average what was your farm size about 10 years ago?

5. a) Does the available land satisfy your household needs?

01. Yes

02. No

b) If the available land is not enough how do you fill the deficit?

6. Who own the land?

01. Husband

02. Wife

03. Both

04. Clan members

7. Who in the household has control over land-use decisions?

01. Husband

02. Wife

03. Both

04. Clan members

8. Agricultural production in the last crop season:

Crop type	Area (Hactres)	Yield (bags)

9. a) What type of cropping pattern do you follow?

01. Single stand

02. Mixed cropping

03. Intercropping

04. Others (specify)

b) Have you changed your cropping pattern for the time period of 10 years?

01. Yes

02. No

c) If yes, does it increase your food produces? .....

10. Who is involved with farm work?

01. Husband alone

02. Wife alone

03. Children alone

04. Husband and wife

05. Husband and children

06. Wife and children

07. All

11. a) Is the labour you have enough?

01. Yes

02. No

b) If no, how do you solve the problem?

Section C: Coping strategies against food insecurity

1. What is the most preferred staple food in the area among the following?

01. Maize

02. Sorghum

03. Finger millet

04. Others

2. What are the most important foods you prefer for the family? ----------

3. a) Are you able to eat your preference foods frequently?

01. Yes

02. No

b) If no, what do you eat instead? ----------

4. What are the important relishes (*mboga*) for the family?----------

5. Who is deciding what food to cook in the household?

01. Father

02. Mother

03. Both

04. Others (specify)

6. Who prepare the food for the family?

01. Father

02. Mother

03. Grand-mother

04. Other (specify)

7. a) Have you ever been faced with food shortages, say for the past 10 years?

01. Yes

02. No

b) If yes, in which months did it happen?----------

8. How does food shortages occur?

01. Often

02. Sometimes

9. What is the major cause of food shortages? ----------

a) When food is not enough to the whole family who gets it first?----------

b) Why? ----------

10. What do you do if there is food shortage in your household?

01. Collect wild foods

02. Doing casual labour

03. Food borrowing

04. Crop diversification

05. Migrate

06. Doing off-farm activities

07. Relying on remittance from children staying at urban areas

08. Beg on the street/ Do prostitution/ Stealing

09. Do nothing

11. How do you prevent food shortages in your household? ----------

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12. How do you store your farm produce after harvest?

01. Local storage structures

02. Bags

03. On the roof

04. Others (specify)

13. a) What do you consider to be the major storage problem?

01. Insect pests

02. Fungus/Mould

03. Rodents

04. Others (specify)

b) What do you do to overcome this? ----------

14. In which months did you harvest your crops?----------

15. Can you estimate the amount of food (grains) you store after harvest last season?

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16. (a) Was it enough to keep the family going until next harvest?

01. Yes

02. No

(b) If no, when did you exhaust your stock? ---------- months after harvest.

17. When stock is not enough how else do you get your food? ----------

18. a) Are there any members of the family who have out-migrated?

01. Yes

02. No

(b) If yes, what was the reason? ----------

19. a) Besides working in the farm do you undertake any off-farm activities?

01. Yes

02. No

(b) If yes, what are those activities?

Activity	When it is carried out	Where	Income per year

20. a) Are any members of the household employed?

01. Yes

02. No

(b) If yes, specify where they work.

Name (sex/age)	Type of job	Place of work	Income per year (Tshs)

Section D: Food accessibility and Food Consumption Patterns

1. What are the major sources of food for household consumption?

   01. Own crops

   02. Market

   03. From relatives

   04. Others (specify)

2. a) Is there a change of what you eat nowadays compared to what you used to eat say in 10 years ago?

   01. Yes

   02. No

b) If yes, what are the changes? ----------

3. a) Do you, or one of the household members sometimes collect fruits, leaves, roots or anything from the bush for eating?

   01. Yes

   02. No

b) When is that usually done? ----------months

4. Can you mention them?

   Fruits ----------

   Leaves ----------

   Roots ----------

   Others ----------

5. Who is responsible for their collection? ----------

6. What can you say about their preparation compared to the farm crops? ----------

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7. a) What is the present situation in relation to the availability of edible products from the bush compared to the past 20 years?

01. Increased

02. Reduced

03. Same

04. Fluctuates

b) Explain----------

8. What do you consider to be important means of improving food availability and accessibility in general?

9. Mention the drought resistant crops you know. ----------

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10. Edible plants can sometimes be poisonous, how can you differentiate the two? -------

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11. How do you preserve vegetables that appear in rain season only? ----------

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12. How long do they last? ----------

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13. Can you mention wild fruits you are familiar with? ----------

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14. At what time of the year are they available? ----------

15. Who is responsible for collecting them? ----------

16. Who normally consume them? ----------