# THE HOUSEHOLD FOOD SECURITY COPING STRATEGIES AMONG THE POOREST OF THE POOR IN MVOMERO DISTRICT, TANZANIA

BY

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# ABSTRACT

The key elements to determine food security include availability of enough food for active and healthy life, the access and stability of food supply. Many studies have been done on food security coping strategies. The studies say little (if any) about the poorest of the poor (POP). This implies many studies still report on poor people coping strategies towards food security with little information on the strategies for the poorest. This study determines the household food security coping strategies among the POP in Mvomero district. Specifically the study sought to define the POP, determine amount of food produced and establish household socio-economic status. Other objectives of the study included, identifying types of food storage and determining level of utilization of improved agricultural technology. The study adopted multi-stage sampling technique. Before quantitative survey the POP were identified by using Participatory Rural Appraisal methods. The sample size included 180 respondents. Data from these respondents were analyzed by using quantitative and qualitative methods, using Statistical Package for Social Science (SPSS) and structural function analysis respectively. The study revealed that farming was the main economic activity. However, the activity is not efficiently carried on due to lack of improved agricultural technology and lack of capital for buying agro-chemicals such as fertilizers. Inadequate education was also found to be constraints that affect the life of the poorest. To cope with food shortage the study came out with 10 strategies including purchasing food on credit and borrowing food from neighbour. The study concluded, the poorest live in miserable conditions, which are attributed to the low level of agricultural technology and inadequate education. Therefore, Government should provide subsides for agro-chemicals to the poorest of the poor.

Also the community members should pay attention to welfare of the poorest in the village by bringing them together with other social group in the development interventions

## DECLARATION

I, Nuru Rashid Nguya, 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 award at any other University.

**Signature**.....

**Date**.....5th June 2006.....

## COPYRIGHT

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## DEDICATION

To my beloved parents, Rashid S. Nguya and Sophia Nguya, who laid the foundation for my education.

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## ABBREVIATION

| | |
|---|---|
| FAO | Food and Agricultural Organization |
| FGD | Focus Group Discussion |
| FS | Food Security |
| HFS | Household Food Security |
| HFSCS | Household Food Security Coping Strategies |
| MAFS | Ministry of Agriculture and Food Security |
| MKUKUTA | Mkakati wa Kukuza Uchumi na Kupunguza Umasikini Tanzania |
| NGOs | Non-Governmental Organizations |
| PCA | Principal Component Analysis |
| POP | Poorest of the Poor |
| PRA | Participatory Rural Appraisal |
| SNAL | Sokoine National Agriculture Library |
| SPSS | Statistical Package for Social Sciences |
| SSA | Sub- Saharan Africa |
| Tshs | Tanzanian Shillings |
| URT | United Republic of Tanzania |
| USAID | United State Agency for International Development |
| WB | World Bank |

# CHAPTER ONE

## 1.0 INTRODUCTION1.

### 1.1 Background

Food insecurity remains to be the most visible manifestation of poverty in developing countries (World Bank, 1986). It is concerned with health, diets, shelter, education, access to vital resources and other aspects of living standards (Clack, 1991). The determinants of food insecurity in these countries are many. These include long drought periods, inadequate rainfall and poor agricultural technology (WB, 1986). Different strategies are applied by different countries aiming at food security, which include improvement of agricultural extension services, participatory approach for rural development, and development of irrigation systems (Maxwell and Frankenberger, 1992).

Before 1970s, food insecurity in the study area was not a significant problem as the majority of the people in the area never experienced food shortage for decades. The problem of food insecurity in the study area started to be evident in early 1980s as a result majority being poorest and few of them poor (Festo, 2004). The World Bank (2001) summarizes that the poor, besides lacking basic needs like shelter, food, clothes, education, employment, water, sanitation and other needs, are people who have deprivations that keep them from leading the kind of life that every one values. Moreover, they are often exploited by institutions of the state and society and are powerless to influence key decisions affecting their life (World Bank, 2001).

In Tanzania, food insecurity is very evident in Mvomero district, Morogoro region (Revallion, 1996). In this study area, rain fed agriculture is the major economic

activity and subsistence farming is the dominant practice. The major staple food is maize while rice and tomatoes, though used for food, are grown mainly for sale. Since farming remains the source of food and the most important income generating activity in rural areas, the main causes for rural poverty are those related to food insecurity (WB, 2001).

In 1997, based on income per capita per year, Tanzania was the third poorest country in the world and basing on Human Development Index (HDI) in the same year, Tanzania was the 150$^{th}$ out of 174 countries (Kayunze, 2000). Based on deprivations in food security, income and production, education and health status in 1997, about 20 out of 26 regions of Tanzania are the poorest, including Morogoro region (Kayunze, 2000). Many incidences and deaths caused by poverty are found mainly in rural areas than in urban areas (Kayunze, 2000). For example the rural poor were about 60% while the urban poor were 39% of the total population (Kayunze, 2001). The following were suggested as reasons for such a situation; Social services like education, health, water and sanitation were poor in the rural areas. Others include poor infrastructure, and lack of capital for agriculture, which is their main economic activity (Blackwood and Lynch, 1994).

It is important to note that the incidence of poverty is normally described in general terms. This results into generalization of ideas about poverty without having a clear documentation of the often marginalized and under-represented people who are the poorest. The poorest people in this study are those who live in extreme conditions of poverty. They are landless, vulnerable to sickness, and live in dilapidated houses.

Others do not feel as party of villagers because of the poor communication systems. However, the poorest have always been surviving using some documented strategies for their food security. With respect to Mlali division as a case study, the study seeks to explore coping strategies towards food security used by the poorest individuals.

### 1.2 Problem statement

The food security coping strategies (FSCS) in the world tend to concentrate on analysis of the poor. There seems to be no strategies whatsoever to procure strategic analysis of the poorest. This is a problem since some people in the developing countries are poor and others are the poorest. Thus food security coping strategies that are pertinent to people in the low developing countries such as Tanzania should address FSCS in the context of the poorest and not merely the poor (Maxwell and Frankenberger, 1992). It is noted by the same author that, people who are landless and live by borrowing patches of land, dwelling in dilapidated houses, succumbing to food insecurity and with no substantial means of earning income are not just poor but the poorest. In addition, food security coping strategies and livelihood analyses that deal with such kind of people are either non- existent or insufficient (Maxwell and Frankenberger, 1992).

However, in most African countries the poorest people's cries are not listened due to various reasons and circumstances. First of all, these (the poorest) are not easily accessible, especially in areas with poor infrastructures. The poorest also do not attend village meetings as they are usually marginalized. Furthermore, the poorest

often survive using, unclear coping strategies for food security. Thus it is important to examine household food security coping strategies for the poorest.

### 1.3 Justification

This study is of paramount importance since it will generate empirical information on the significance of food security coping strategies for the poorest. Therefore, the study (in Mlali) is not only important but also timely in the sense that, it seeks to bring into light the knowledge gap that exists in many documents concerning food security. The study links with the Millennium Development Goals (WB, 2002), which aims at reducing poverty and hunger and a reduction of proportion of 50% of the people who live in extreme poverty by 2015 (URT-2000). Furthermore the study goes together with the national objectives to reduce poverty outlined in the Poverty Reduction Strategy Paper (PRSP) current known as (MKUKUTA) which aims at:

a) Reducing the proportion of food poor Tanzanians from 27% to 14% by 2010.
b) Reducing absolute poverty by half from 48% in 2000 to 24% in 2010.
c) Reducing income poverty by increasing economic growth among the poorest by 2010 and
d) Improve living standard of the poorest by 2010 (URT, 2000).

MKUKUTA however, goes together with the national objectives and Millennium Development Goals in fighting against poverty.

### 1.4 General objective

The general objective of this study is to determine the food security coping strategies among the poorest of the poor. This information will assist programmes and policy

makers to design relevant intervention programmes and policies concerning the poorest of the poor and food security coping strategies.

### 1.4.1 Specific objectives

With respect to the poorest of the poor the study aims to:

a) Define the poorest of the poor by using Participatory Rural Appraisal (PRA)
b) Determine amount of food produced per annum (in terms of bags) by using Participatory Rural Appraisal (PRA)
c) Establish household socio-economic status of the respondents
d) Determine the level of utilization of improved agricultural technology
e) Identify methods of food storage types

## 1.5 Conceptual framework

In order to meet the information of the above stated objectives and to identify the variables for data collection a conceptual framework was developed. The conceptual framework prevents fragmentation of knowledge into diverse segment of unconnected statement. Mbwambo (2000) argues that, that framework can bind facts together and hence provide guidance towards realistic collection of data and information. The conceptual framework proposed for this study is presented in Figure 1. The framework shows a set of independent variables, which influence food security in the households. In socio-economic factors, income, education, occupation, and knowledge of food storage methods were the indicators that were measured. The indicators for agriculture production in the household included, land, the use of agriculture technology, farm size and number of bags produced. Moreover,

among the indicators that was used to measure the coping strategies by household included: selling labour, reduction of the number of meals, selling livestock, selling charcoal, traditional mat-making and borrowing food from relatives, friends and neighbours. The dependent variables that were used to determine food security were: number of meals taken per day, number of days taking inferior food-stuff and those taking luxurious food-stuff. The variables used in this study are defined in Table 1.

### 1.6 Research hypotheses

With respect to the poorest of the poor, the following hypotheses were proposed for this study:

**Null hypothesis:**

a) Education level has no significant effect on food security

b) Occupation of the respondents has no significant effect on food security.

c) Income have no a significant effect on food security

**Alternative hypothesis:**

a) Education level has significant effect on food security

b) Occupation has significant effect on food security

c) Income has significant effect on food security

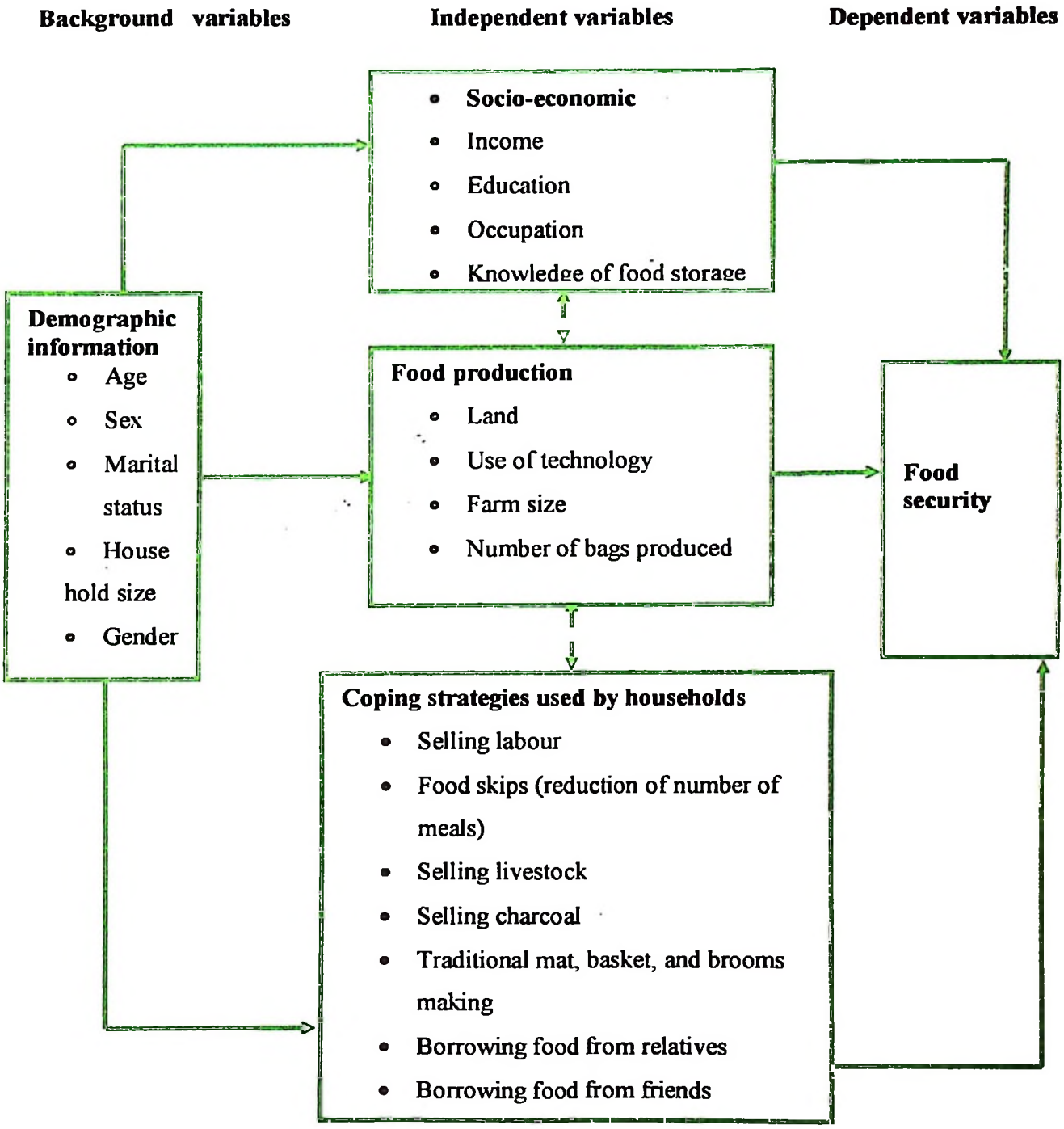


**Figure 1: The conceptual framework for the study of food security coping strategies among the poorest in Mvomero district.**

**Key**

Relation for primary analysis

Relation for secondary analysis

**Table 1: Definition of the key variables used in the study**

| Variables | Operational definition |
|---|---|
| Age | Number of years of the household head |
| Sex | Being a male or female in biological sense |
| Marital status | Married or single |
| Household size | Number of people in the household |
| Income | Money earned per month |
| Education | Highest level of formal education attained |
| Occupation | Major economic activities performed |
| Technology | Technology used in agriculture production by respondents |
| Knowledge of food storage | Methods of food storage type used by the poorest of the poor |
| Land | Acreage under cultivation |
| Food security | Number of meals taken per day (three meals –food secure less than three meals- food insecure<br>Inferior food-stuff: the normal food that is consumed by the poorest of the poor.<br>Luxurious food stuff: food stuffs of high quality |

# CHAPTER TWO

## 2.0 LITERATURE REVIEW

### 2.1 Overview

This chapter reviews some literature on the household food security coping strategies among the poorest of the poor. First of all, the definition of concepts; the poorest and the poor in section 2.2. The concept of houschold food security and its determinants is covered in section 2.3. While Section 2.4 describes different spatial levels of food security (i.e. global, national, household level), section 2.5 dwells on food security measures. The transitional Vs chronic food insecurity, problems of food in households and food security situation in Tanzania, are dealt within section 2.5. The concept of Poverty is described in section 2.6 while the linkage between poverty and food security is presented in section 2.7. In section 2.8, coping strategies used by households with regard to food security among the poorest of the poor have been presented. Finally, section 2.9 discusses the status of research on food security and poverty in Tanzania.

### 2.2 Definition of concepts

#### 2.2.1 Poorest of the poor

The poorest of the poor are those people who are landless and live by borrowing patches of land, dwelling in dilapidated house structures, succumbing to food insecurity and with no substantial means of earning income (Kusnic and Davanzo, 1982). Thus they often rely on wage labour as their main source of income and pledge labour or accept low wages. The poorest households are often headed by abandoned widows or aged men- they usually do not have support of able bodied

income earners and have no time to participate in community activities since they experience social discrimination, isolation, physical weakness and seasonal deprivation (Kusnic and Davanzo, 1982).

### 2.2.2 Poor

Different authors have defined the term poor differently. For example, the World Bank (2001) defines poor people as those who live without fundamental freedom of action and choice that the better off take for granted. They often lack adequate food and shelter, education and health, deprivations that keep them from leading a fruitful and productive life. They are also vulnerable to diseases, economic dislocation, and natural disasters. And they are often exploited by the state and society and are powerless to influence key decisions affecting their lives. Moreover (Lwechungura, 1994) points out that, poor people in many societies tend to have larger families or larger number of economically dependent members, whereas Hammer (1987), defines poor people as those who have low living standards and get an inadequate supply of basic needs and have less income.

## 2.3 Food Security

### 2.3.1 The concept of food security

There exist several definitions of food security, which suggest the complexity of the concept. Conventionally, food security is defined as the balance of food supply (mainly cereal supply) and effective demand for food. The World Bank (1986) defines food security as the access by all people at all times to enough food for a healthy and active life. This definition is widely accepted and in this respect the

concept is taken to embrace three specific aims: ensuring production and adequate food supplies, maximizing stability in the growth of supplies, and securing food access (Ishengoma, 1998).

In the 1970s, food security was mostly concerned with food supply usually in the form of grain stocks- and was being applied at district level. In the 1980s, the focus shifted to beyond supply. It also included access to food at household level (Maxwell and Frankenbrger, 1992). Emphasis was also given on the food chain as a component of food security analysis to encompass production, marketing and consumption.

In general, food security exists when all people at all time have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life (USAID, 1992). In view of those observations, a country and its people become food secure when their food system operates efficiently to the extent of removing fears that there will not be enough to eat. In particular, food security will be achieved when the poor and vulnerable, particularly women and children and those living in marginal areas, have secured access to the food they need (Corbett, 1988) ·

### 2.3.2 Determinants of food security

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

### 2.3.2.1 Availability/ adequacy

Food availability is a measure of the food that is, and will be, physically available in the relevant vicinity of a population during a given period through a combination of domestic production, stocks, or net imports. This is the food in stock plus what can be picked directly from the fields and gardens as well as from foraging wild foods. According to FAO (1996), major components of food availability are domestic food production, food imports and food aids. In some households, food and other food crops can be sold and cash income obtained is used in purchasing food from the market (Mwakalobo, 2003). Food availability requires adequate products from agriculture, smooth market operations infrastructure and free flow of information (Mwakalobo, 2003). Food adequacy reflects both quantity and quality of the food that is enough to meet daily requirements by providing all essential nutrients for all members of the household or society (Lorri and Kavishe, 1990). According to Mwakalobo (2003), availability of food however, is not in itself a sufficient condition to food security. The issue of food availability at household level is closely linked to women who are providers of food to their families.

### 2.3.2.2 Food access

According to Mwakalobo (2003), food access is a measure of the population's ability to acquire available food for the given consumption period through a combination of its own production and stocks, market transactions, or transfer. Food access encompasses physical, economic and social aspects. Physical access of food relates to both adequacy of supply and the efficiency with which food is distributed, including storage, preservation, transportation, marketing and processing. The

economic access relates to resources for the procurement of food, the ability to generate income actually for consumption purposes. According to Mwakalobo (2003), economic access refers to the ability of people to establish entitlement over a requisite amount of food, the ability to generate income, whether in cash or in kind and the proportion of income that is actually available for consumption purposes. Social access refers to the social support network and equity within the social and economic organization of household and community as a whole. It is claimed by URT, (1992) that, among factors that determine food accessibility in the household is feeding frequency. The feeding frequency for Tanzanian population has been seen to be low, on average twice or three times a day. An inadequate food resource in the household has consequences in feeding frequency. The limited time, especially that of women for food preparation is the main reason that affects feeding frequency in the households. The time allocation study done in Rukwa Tanzania by Wandel and Holmboe-Ottesen (1992) cited Mwakalobo (2003) showed that competing demand for women's time due to increased economic work reduces time they spend on cooking thus undermining the feeding frequencies in the households. In Rukwa region households has reduced eating frequencies to two meals per day.

#### 2.3.2.3 Stability of food supply

It refers to a continuous flow and availability of food in the household or society either through the quantity stored or from external sources. This can be achieved through equitable income distribution, effective markets together with other public and informal supports and safety nets (FAO, 1996)

## 2.4 Different levels of food security

### 2.4.1 Food security situation globally

Food insecurity is expected to accelerate in Sub-Saharan Africa. SSA share of the world's food insecure population is projected to almost quadruple from 11% in 1969/71 to 39% in 2010 (FAO, 1996). According to FAO (1996), about 40% of the total African population, largely children and women, face mounting problems of poverty and malnutrition. This is inadequate nutrition due to a lack of access to adequate calories, proteins, vitamins and other essential micronutrients. Decreasing levels of mortality combined with persistently high (but gradually or marginally declining) fertility rates, have resulted in large increases in population, which is growing at an annual rate of 2.6% compared to a world average of 1.3%. Countries such as Angola, Botswana, Malawi, Namibia, Tanzania and Zimbabwe in southern Africa and Gambia, Mali and Niger in west Africa to name a few, had annual population growth rates exceeding 3% between 1990 and 1995 (FAO, 1996). Food demand is expected to increase tremendously in the coming decades. It is estimated that the Sub-Saharan Africa will account for 10.6% of the 690 million tones increase in the global demand for cereals and 5% of the 115 million tones increase in the global demand for meat products (FAO, 1996). While 42.8% of the 234 million tones will increase in the global demand for roots and tubers between 1995 and 2020. .These large increases in food demand will result not only from increase in population but also urbanization (FAO, 1996).

### 2.4.2 National level food security

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

### 2.4.3 Food security at household level

Benson, (1986), describe a food secured household as having assurance of sets of entitlements from food production, cash income, reserves of food or assets and / or assistance from government program, such that in times of need they will be able to maintain sufficient nutrients intake for their physical well- being. Others have defined household food security (HFS) as the ability of all members of the household to acquire sufficient amount of food continuously over time for an active and healthy life (Maxwell and Frankenberger, 1992). The above definitions have four core concepts. These are:

a) Sufficient food, which is defined as calories needed to active healthy life;

b) Access to food defined by entitlement to produce, purchase or exchange food or receive it as gift;

c) Security defined by balance between vulnerability, risk and insurance;

d) Time, where food insecurity can be chronic, transitory or cyclical

Therefore, HFS is an integral and highly complex multi-sectoral issue, composed of intersectional macro and micro relationships, and which requires an interdisciplinary approach and involvement of different actors (Liwenga, 1995). Ishengoma (1998) explained that HFS concerned with the microeconomics of a household. In particular it describes the use of food in the household, access to it by various members of the household, survival strategies, and the role of gender. Ishengoma (1998) further points out that decision concerning the use of resources output and cash income are some important critical variables in the overall household food security. Therefore, the household is said to be food insecure when it fails to meet its dietary food intake in terms of quantity and quality. There is evidence to suggest that household food insecurity is widespread and chronic in some areas of Tanzania since there seems to be a certain degree of food deficits at one time or another during the year. This is especially true prior to harvesting (Makundi, 1996).

### 2.4.4 Food security at individual level

According to Thomson and Metz (1997), an individual is said to be food secure if his or her food consumption is always greater than need, as defined by physiological requirement. Consumption is determined by the claim the individual has on

household food resources. This may be affected by individual earnings and assets, or by the individual's position in the household. It is certainly unusual for an individual's share of household food consumption to be determined solely by need. Usually, individuals' consumption can be influenced by other factors like, food preference, eating habits, cultural taboos and norms. It is therefore clear that food security at one level does not imply food security at a lower level of aggregation. A country which is food secure will almost have certainly contained groups of the population which are food secure, and many countries which are food secure at a national level will contain groups of population which suffer from severe food insecurity. FS at household level does not imply that all members of the household are food secure. A food insecure household may equally contain food secure members.

### 2.5 Food security measures

Food security at the country level can, to some extent, be monitored in terms of demand and supply indicators, that is, the quantities of available food versus needs. Food security at the household level is best measured by direct survey of dietary intake. However, it measures existing situations and not the downside risks that may occur. The level of, and changes in socio economic and demographic variables such as real wages rate, employment, price ratios and mitigation properly analyzed can serve as proxies to indicate the status of, and changes in food security. Anthropometrics information can be a useful compliment because measurements are taken at the individual level. Yet such information is the outcome of changes in the above indicators (Anania, 2003)

### 2.5.1 Chronic and transitory food insecurity

To date, no mention has been made of time, yet it is a very important factor in determining the nature of food insecurity problems. It is important to draw a distinction between chronic food insecurity and transitory food insecurity. When individuals or groups of people suffer from food insecurity all the time, they can be grouped as sufferers of chronic food insecurity. Transitory food insecurity can be further divided into temporary food insecurity and cyclical or seasonal food insecurity. Temporary food insecurity occurs when sudden and unpredictable shocks, such as drought or pests attack, affect a household's entitlements. For the urban households, sudden unemployment may also be a cause of transitory food insecurity. Seasonal food insecurity occurs when there is a regular pattern of inadequate access to food. This is often linked to agricultural seasons, particularly when it is difficult for households to borrow even out flows of food over time. (World Bank, 2001)

### 2.5.2 Problem of food in households

It is clear that rural household food consumption depend on -their own production (Kagosi, 2001). However, efforts to produce enough food are hindered by various factors, unpredictable rainfall being the major among others. The study done by Liwenga (1995) reveals that 92% of respondents had faced food shortage within the past years. The same study also reveals that severe problems occurred just before crop maturation. The major reason for the deficit was rain failure and excessive food-crops selling.

### 2.5.3 Food security situation in Tanzania

The policy goals with regard to food security are to achieve national self-sufficiency and raise the nutritional standard of living of Tanzanians (Biseko, 1989). In aggregate terms, Tanzania produces enough food to satisfy domestic requirements URT/UNICEF, 1990; Kavishe and Mosha, 1993). Food crisis however occurs, because some parts of the country experience food shortage due to prolonged drought, floods and transport constraints that hinder smooth transfer of food from one place to another. Thus, availability of food is not translated into household food security. A gross overall food supply situation does not mean all households will have access to food. In the analysis to show how total production was distributed among the regions, Liwenga (1995) pointed out that only 12 regions or 60% of all regions in Tanzania produced enough food above their respective population requirements.

## 2.6 Factors that can influence livelihood strategies

### 2.6.1 Poverty

Poverty is an extremely complex issue. However, in a mechanical conception, poverty is conceived as lack of income- as in the case of per capita income definitions often used by international organizations (Hyden, 1980). In subsistence economies or "an economy of affection"- based on kinship or lineage solidarity, income alone cannot be a valid measurement for poverty (Hyden, 1980). The reason is that apart from deprivation and inability to meet basic needs, poverty is also perceived mentally or culturally as isolation, loss of direction, hopelessness, apathy, and passive suffering. All these are facets of the same phenomenon referred to as

poverty, i.e. in terms of "not having enough to live in human dignity", or "having barely enough to survive".

Operationally, however, Mtatifikolo and Mabele (1999) consider this definition as being too narrow. In their view therefore, they argue that in practice it is common to specify the minimum requirements for both food and non-food items, and then calculate the needed income for current acquisition. This income becomes the poverty line. If the food share is generally known, then this will provide the benchmark expenditure. To obtain the poverty line-this minimum food expenditure is "grossed up" by an appropriate factor to accommodate non-food requirements (Mtatifikolo and Mabele, 1999).

Literature describes poverty as a situation that emanates from lack of necessary capabilities and entitlements to satisfy human basic needs. That, this situation limits a person from acquiring security and assets, or from having power for decision making (Chambers, 1983; Jazairy, 1993; IFAD, 1996; Kasimila, 1996). Poverty however, can always exist in a society where some (or all) of its members fail to attain certain level of well being considered by society as reasonable minimum standard of living (Bagachwa, 1994). Again it is argued that although this latter definition accommodates basic needs, norms and traditions, as well as some acceptable social thresholds, it is also operationally difficult to address poverty (Mtatifikolo and Mabele, 1999).

Poverty can further be conceptualized as a standard of living where by one lives below a minimum acceptance level (Mtatifikolo and Mabele, 1999). Things like food shelter, and clothes are used to draw minimum requirement levels. The incidence of poverty is twice as great in rural areas than in urban areas. The livelihood of the rural areas lag behind the livelihood of the urban areas in almost every physical indicator of living standard, housing type, electrification, access to clean water, and incidence of child malnutrition (World Bank, 2000).

However in Tanzania, as in other developing countries most of the people are poor, hence monetary measure of poverty becomes less meaningful (World Bank, 2000). The social factors influencing poverty include food intake, housing characteristics, education, household income, occupation and land ownership.

### 2.6.2 Food intake

Food is the most basic need for all people. Consequently, of the various manifestation of poverty (URT, 1998). The Household with food insecurity can be identified by, among others; inquiring the number of meals taken per day (URT, 1998). Food insecurity is regarded as one of the main causes of malnutrition, especially in children, as revealed by poor anthropometrics measures (World Bank, 1996).

### 2.6.3 Housing characteristics

Some research workers seeking simple indicators of poverty and wealth in developing countries have found that the quality of housing is a good indicator of

poverty (Voelkner, 1981 cited by Tyler, 1983; URT, 1997b). It is argued that the poor are identified not only by lower expenditure level but also by distinct differences in amenities (World Bank, 1996). These include electricity, sources of drinking water, type of toilet, floor and roofing materials, and the number of rooms used for sleeping (URT, 1997b).

Information on household amenities is said to be more useful than direct questions on income in evaluating the welfare status of households (Ayad, (1997). Moreover, such data are easier to collect than data on household income. Additionally, information on housing characteristics is useful from a public health point of view, being an indicator of the economic and environmental condition in which families live. It also provides an indirect indicator of household's socio-economic status (URT, 1997b). Some of these amenities may be a product of household's own efforts and/ or may be provided by the government or community (Tyler, 1983).

Studies indicate that possession of these amenities varies according to the place of residence and its social economic status. For example, a World Bank (1996) study done in Tanzania found that about 68% of the poor lived in houses without a metal roof and, about 80% in houses with mud walls. Furthermore, the study found that only 26.6% of the poor had taps as their main water source. Higher proportions of these were found in the rural areas. In a study conducted in Sudan, Ayad, (1977) observed a tendency for various indicators of housing quality to correlate very well with the household's deciles of income per adult equivalent. Ayad, (1997) found that in most SSA availability of electricity is concentrated in urban areas and those urban

vhouseholds are more likely to have safe drinking water and more decent dwellings than rural households.

### 2.6.4 Education

Education is one of the strongest determinants of poverty, being a means of access to economic resources as manifested in household income and welfare (Rodger, 1989; URT, 1998b). Lack of such input is considered to be a manifestation of poverty (Rodger, 1989; URT, 1998b). The education level of the household head is important because he/she is the one who takes major decisions concerning the household, especially production decisions (World Bank, 1996). It is documented that rural people are more likely to be illiterate than the urban people (World Bank, 1996). Since poverty is more widespread in rural areas, strategies must be made to improve education in rural areas, since high level of education may have a positive effect on household income (World Bank, 1996) and hence its ability to have durable and improved housing structures. Education is also related to nutrition. It is argued that the pathway from education to improved health may work directly through improved allocation of resources to health (for example care giving), as well as indirectly through changes in income (Sahn and Alderman, 1997).

### 2.6.5 Household income

Household income can affect poverty through its influence on other manifestations of poverty such as health, nutrition, illiteracy and mortality (URT, 1998b). It is argued that, a household income sets limits on the capacity to provide adequate nutrition and health care to all members (Casterline, 1989). Low income is likely to bring the

effect of poor health and housing (URT, 1994, Revallion, 1996). It has been observed that a higher level of income is expected to be associated with a higher expenditure on food, shelter, and sanitation, which have positive influences on the survival of household members (Casterline, 1989).

### 2.6.6 Occupation

The primary occupation of the household head is also related to poverty, being an indicator of the socio-economic status (Casterline, 1989). The occupation status influences poverty in the same ways as household income and education do. This is due to the fact that both are indicators of access to economic resources as well as social services. The occupation status of the household head may affect or reflect social factors, by a tendency for better education of the household heads to be more receptive to a more distribution of resources as well as more attentive to the social needs of their families. This can be reflected in improved social indicators like child nutrition and mortality rates, as well as household possession and the quality of housing.

### 2.6.7 Land ownership

In many developing countries, poverty is related to ownership of land (World Bank, 1996). Ownership of land is a potential factor in determining whether a household is only poor or is among the poorest. Those who are landless, lives in borrowed land may be regarded as the poorest people and those who have at least an ability to own land may be regarded as poor.

## 2.7 Poverty and food security linkage

The linkage between poverty and food security is a clear –cut with poverty considered the most widespread causes of food insecurity (World Bank, 2001). That being the case in rural Africa, poverty is characterized and explained largely by food insecurity. For instance, in Mali, it was found that between 50 and 90 percent of the heads of the households equate poverty with food security (World Bank, 2001). The poor health (old age) comes second in identifying poverty (7 to 31 percent) and the lack of clothing (9 to 36 percent) is third (World Bank, 2001). Other causes of poverty include lack of job opportunities or shortcomings in the functioning of safety nets (African solidarity) in case of crop failure or losses in livestock following a prolonged drought.

Since farming remains the source of food and the most important income generating activity in rural Africa, the main causes for rural poverty are those related to food insecurity. Recurrent crop failures are the main sources of food insecurity and poverty. The generalized and recurrent crop failures are due to drought and attacks of crops by pests and diseases and post harvest losses, limited use of land and labour augmenting capital. The drought also affects the productivity of livestock and human life. In Africa however, "the rural poor are to a larger extent dependent on rain-fed agriculture and other natural resources for their livelihood. Hence, fighting rural poverty with lasting results is inevitably linked with increased agricultural productivity, enhanced management of natural resources and environmental protection. For Africa, this implies a policy framework designed for and with rural

poor for improved dry land farming practices, improved management of pastoral resources and forest, as well as biodiversity conservation" (World Bank, 2001).

## 2.8 Food Security coping Strategies

### 2.8.1 Meaning of coping strategies

Coping strategies include activities which may appear insignificant and not identifiable from the overall rural food production system in years of sufficient food but which assume increasingly greater importance in times of food deficits (Mwagile, 2001). According to the author of this study, coping strategies can simply be defined as immediate solutions or alternatives solutions opted by people to overcome a problem at a specific period of time. Rural households have different measures to reduce risks associated with each type of food insecurity (Watts, 1993). The sequence in which households respond to services differs from one location to another; however they all have common features. 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 vary with respect to economic status, gender and age (Mhinte, 2000). However the types of strategies employed by the households also vary depending upon severity and duration of the potentially disruptive condition (Maxwell and Frankenberger, 1992).

### 2.8.2 The Coping strategies at household level and among the POP

Households adopt a variety of coping strategies, which are not always efficient or effective due to lack of resources, inadequate institutional support, and other factors

to offset the impact of production shortfalls and market uncertainties. Rugalema (1998) cited by Mutangadura *et al.*, (1999) found that household cut back the number of meals when faced with food shortages. However, it has been found that households were buying less expensive food as an alternative or substituting purchased relish (a side dish served with staple carbohydrate food stuff e.g. maize or cassava) with indigenous or wild vegetables as reported by Mutangadura *et al.*, (1999).

Furthermore, Mutangadura *et al.*, (1999) reported that in Zambia and Uganda the poorest rural households could not meet their food requirements or obtain cash through agricultural production. Therefore takes a range of income generating activities such as selling of fire wood, brewing millet beer, selling livestock, building fences, handcrafts, tailoring and petty trade to supplement their income. In Malawi, households do the casual labour (Mutangadura *et al.*, 1999). In Zambia some households were reported to have migrated to urban areas in search of employment so that they can remit some income to their rural areas, while some work in neighbours' fields as causal labourers to earn some income. There are documented cases of children as young as 10 years old going out to work in an effort to cope with illness of their parents (Mwakalobo, 2003). Households that do not have the ability to diversify sources of income are particularly vulnerable to the pandemic. Prevailing poverty drives women into sex work as a source of income. In Malawi 12 years old girls were driven to have sex to fulfill short term income needs (Mutangadura *et al.*, 1999).

Wagao (1991) pointed out that in Tanzania residents in rural areas have diversified strategies to lessen the adverse effects of the crisis. Household members cope with food shortage by reducing the frequency and changing the content of meals consumed daily, undertaking more income earning activities and buying or borrowing from either relatives or friends.

According to Mgondo *et al.*, (1996), poorest households have difficulties in meeting their food requirements from own production. To bridge the gap especially in the pre harvest period, they rely on off- farm enterprises, reduce their food consumption as well as frequency of meals per day. They also sell some assets, borrow food or cash from relatives and friends and migrate. A study done by CARE (1995), in Shinyanga cited by Ishengoma (1998) indicated that the coping strategies taken by households include the following:

(a) Adjustment of meals and food substitutions: a downward adjustment in the number of meals per day and the quantity prepared per meal was the most commonly adopted coping strategy utilized by most households. Then the other common strategy is that of food substitution (Ishengoma, 1998).

(b) Alternative employment and distress migration: wage labour constitutes one of the most important coping strategy available to chronically food insecure households

(c) Sales of household assets: many households have reported selling important productive and non-productive assets to meet food requirements in times of food scarcity. For example selling of household furniture like chairs tables

and radios. Another coping strategy was borrowing from relatives or friends or neighbours.

(d) Out migration in search of employment is a much common phenomenon (Ishengoma, 1998)

Other food coping strategies mentioned include gathering of wild foods, redistribution of children whereby the poorest households send their children to relatives over a period of time when the households are experiencing difficulties in meeting livelihood needs. Tibaijuka (1997) pointed out that in Kagera Tanzania, the poorest households sold bananas (their staple food) in desperation to raise money to meet medical costs.

**2.9 The status for research on food security and poverty in Tanzania.**

Food insecurity remains to be the most visible manifestation of poverty for many rural families in semi arid areas of Tanzania (Anania, 2003). In 2004, Festo conducted a research in Mlali division-Mvomero district. The focus was on livelihood and livelihood strategies of the poorest of the poor. This study revealed that, majority of the POP was aged above 50 years. This is an indication that, the higher percentage of the POP is that of the aged people. Most of these people were unable to work and lacked farming inputs. It was however observed that, these POP had land, live in grass-thatched huts, often suffer from food insecurity, and usually do not have support of able-bodied income earners (Festo, 2004).

Likewise in Tanzania, Tabusia (2003) did a study on non- market household food security coping mechanism to food security in Same district. It was reported that food insecurity leads to reduce food consumption in quantity and quality as some crops rich in nutrients are replaced by those of lower nutritional quality because they are easier to grow. At the individual level this may have consequences for the nutritional status. In addition Tabusia (2003) reported that other households use the methods of labour selling to help them during food scarcity periods. However, it was further observed that, a food deficit household, which coped with food shortage by selling labour, was likely to face another deficit in the following year. This is because; labour selling was done in critical period of farm operations and therefore making such households to have lesser time to work in their own farms. This therefore, causes a vicious cycle of food insecurity, as less food will be produced for consumption in the coming year. In Mvomero district, specifically Mlali division, information on how the POP cope with food security is not known and hence a need to determine a household food security coping strategies among the poorest of the poor to fill the gap.

# CHAPTER THREE

## 3.0 METHODOLOGY

### 3.1 Overview

This chapter outlines the methodology that was used in the study. Whereas in section 3.2, the study area and its justification are described, in section 3.3 the research design and its relevance to the study are presented. While the sampling procedure is shown in section 3.4, in section 3.5 an outline of data collection process has also been presented. Data processing and analysis have been presented in section 3.6 and finally, limitations of the data collection are outlined in section 3.7.

### 3.2 Description of the study area and its justification

The study was conducted in Mlali division, Mvomero District, in Morogoro Region. Mlali is one of the five divisions of Mvomero District, which lies within 37°-38° longitudes East of Greenwich, and 5°-7° latitudes south of the equator (Festo, 2004). The study area is in the southern part of the district, bordering Morogoro district in the north east. Kilosa district borders the area to the west (Fig. 2) and it has a population of 55,794 (Population census 2002). The area lies between 500 and 600 above sea level. The region has bimodal rainfall distribution pattern with short rains starting in November and ending in December while the long rains starts in March and end in May (Festo, 2004). Average rainfall ranges from 600 to 800mm with mean rainfall of 750mm per annum. The average temperature ranges from 14°c to 36°c with mean average of 20°c. Soils are mainly sandy loam and they are red in colour (Festo, 2004).

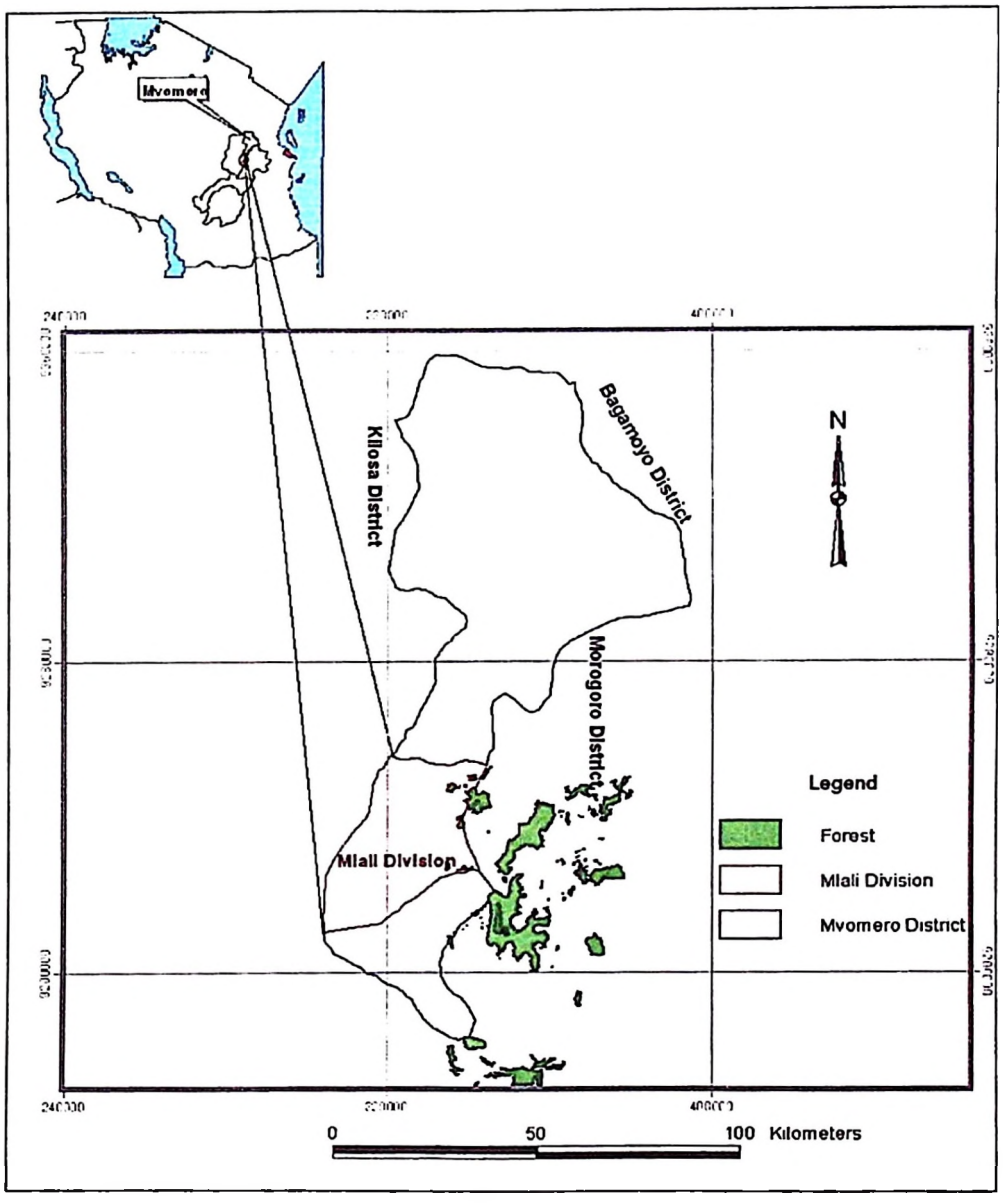


**Figure 2: A map of Mvomero district with reference to Tanzania and Morogoro region.**

The farming system in the study area is broadly of subsistence type and includes crops and livestock production. Subsistence crops include maize, rice, sorghum, and

bananas while for cash farmers depend mainly on fruits and vegetables especially tomatoes (Festo, 2004).

The division was chosen for the study because of the financial problem since this research was done on private sponsorship. Other reasons are such as, the study area is located in rural area where it is known that three quarters of the poorest do work and live and significantly more than a half are expected to do so in 2025 (World Bank, 2001). Furthermore, in 1982 'more than 90% of the absolutely poor people of the world lived in rural areas, and the main reason is that the majority of the population in developing countries lives in rural areas (Hammer, 1987). In the case of Tanzania, by 1988 nearly 12 million people were living below the poverty line in rural community (Bagachwa, 1994). Based on upper (relative) and lower (absolute) poverty line of Tshs 46,173/= and Tshs 31,000/= per adult equivalent per year in 1991 prices, the relative and absolute poverty incidence in rural Tanzania were 59.1% and 44.1% in 1991(World bank, 1993, cited by Kayunze, 2000). In urban areas, excluding the city of Dar-es-Salaam, the incidence was 39.3%, while in Dar-es -Salaam; it was 9.3% (World Bank cited by Kayunze, 2000). These show that poverty in Tanzania is mainly a rural phenomenon.

### 3.3 Research design

A cross-sectional research design was used in this study. According to Bailey (1998), this design allows data to be collected at a single point in time and can be used for a descriptive study as well as for determination of relationship between variables. This design was considered to be favourable because of time limit and resources available

for data collection (Casley and Kumar, 1988). Not only that, but also this design is relevant for producing good results.

### 3.4 The Sampling Procedures

#### 3.4.1 Sampling technique

The study employed a multistage sampling technique, which is convenient for studying large and diverse population, as well as population whose actual indicators to be studied are not available (Casley and Kumar, 1988). Additionally, the technique reduces incidences of traveling for interview and hence the corresponding cost (Casley and Kumar, 1988). Two wards in the division were purposely selected on the basis of numbers of the POP. From each of the two wards, two villages were selected randomly making a total of four villages.

#### 3.4.2. Identification of the poorest of the poor

The POP in this study was identified after conducting the PRA methods. The methods employed include; well being, FGD and direct observation. The details of these methods are provided in section 3.5.1.2 to 3.5.1.4

#### 3.4.3 Sample and its size

The sample in this study was obtained in Mlali and Melela wards due to the high number of the POP. The sample comprised of 180 POP households, of which 45 households were from Mlali, Kipera, Melela and Mangae villages within Mlali division. In this study, the POP households were defined as those having dilapidated house structures within the village, with a mud floor, mud walls and grass-thatched.

This definition was adapted in the field before data collection. It is worth noting that time constraints, resources and the concern for meaningful data analysis and accuracy interpretation dictated the choice of this sample size.

### 3.5 Data collection methods

#### 3.5.1 Primary data

The primary data collection in this study was carried out in two phases. Phase one constituted a preliminary survey, in which (PRA) techniques were employed in Mlali, and Melela wards. The purpose was to help the researcher obtain the target group, that is, the POP as well as their coping strategies towards food security. The second phase was mainly based on survey questionnaires.

##### 3.5.1.1 Participatory Rural Appraisal ( PRA)

The PRA approach is essentially a process of learning about rural conditions in an intensive, interactive and expeditious manner (Mearns, 1994). This method was designed so as to get quick information about the POP and their livelihood. The methods that were used include, well being, FGD and direct observation. These were preferred because they assist respondents to evaluate their own situation (Mearns, 1994).

##### 3.5.1.2 Well-being

This method was used in identifying groups or ranking of households according to their well-being or wealth: including those considered the poorest. The PRA members were asked different questions. Among the questions asked were, to

mention the major economic activities in the village, indicators of well being in the village, groups into which villagers can be grouped (assuming the groups to be rich, poor& very poor.) Also the PRA participants were asked to mention the attributes of a rich, poor, and very poor household/ person based on the above indicators. The causes and effects of poverty was the last to be asked

### 3.5.1.3 Focus group discussion

This involved participation in casual talks with local people on issues focusing food security and the coping strategies opted. Such conversations were held in places where the researcher and villagers found appropriate. After the identification of the POP by a well-being method, the PRA went further to asses other details of the POP. The PRA participants were asked to mention the assets owned by a rich, poor, and very poor household/ person as well as the storage facilities. Also the participants were asked to mention different coping strategies that are opted by the rich, poor and very poor to cope with food security. The information collected was documented immediately after the conversation.

### 3.5.1.4 Direct observation

This method involves physically observing on what goes on within the area of study. In this study, the researcher was very close to the villagers so as to study them on all issues concerning the POP such as identifying the POP together with the strategies that are normally used to cope with FS. In this method POP were physically distinguished from the poor and rich individuals by using housing quality indicators. The POP were those with dilapidated houses within the village with a mud floor,

mud with pieces of tree walls and with thatched grasses roof. Also through direct observation the researcher was able to see some of their coping strategies including traditional mat making, assets present in their households and storage facilities/structures. This method however, was primarily used to tie together discrete elements of the data collected through other methods.

### 3.5.1.5 Survey questionnaires

The PRA findings in phase one of the data collection were the main guide used in formulating questionnaires for phase two. In this phase of data collection, a structured questionnaire was used as a tool for interviewing heads of households although other members of the household were allowed to participate so as to supplement information. The questionnaires were designed to permit acquisition of both quantitative and qualitative information. Both open and close- ended questions were used. In the open- ended questions, respondents were supposed to give their own views while in close-ended question they were supposed to choose among the given alternatives. The questionnaires were formulated in English and translated into Swahili to facilitate easy communication during data collection. The focus was to determine the food security coping strategies among the POP in relation to the study's objectives. To ensure validity and reliability, the first draft of the questionnaire was pre-tested in ten poorest households in each study village. Necessary changes were made on the basis of the pre-test results before the final administration. This included restructuring and omission of some questions.

### 3.5.2 Secondary data.

Secondary data were obtained from Sokoine National Agriculture Library (SNAL) as well as from electronic database such as CD-ROMs and websites. These were used to supplement information obtained from the field.

## 3.6 Data analysis

### 3.6.1 Qualitative data analysis

Qualitative data obtained through the PRA technique were used to enrich the quantitative data information and were analyzed by the use of the Content and Structural-Functional Analysis. In this way, the verbal discussions from respondents were broken down into smallest meaningful units of information or themes. This helped the researcher in ascertaining values and attitudes of respondents. The Structural- Functional Analysis method was used to explain the way social facts related to each other within a social system and the manner they relate to the physical surroundings. This type of analysis helped the researcher to distinguish between manifest and latent functions. Manifest functions are those consequences that are intended and recognized by the actors in the system (Katani, 1999). Latent functions are those consequences that are neither intended nor recognized (Kajembe, 1994)

### 3.6.2 Quantitative data analysis

The collected data were edited, coded and summarized prior to analysis using the Statistical Package for Social Sciences (SPSS) computer software in conformity with the objective of the study. Descriptive statistics particularly frequencies, percentages, and means were used in the analysis. Cross tabulation involving chi-square test was

used to test the hypothesis as well as associations and relationships between different pairs of variables. A, t -test at five percent level of significance was used to test the hypothesis. Some variables (socio-economic status) in this study were analyzed by the use of Principal Component Analysis method (PCA).

### 3.7 Limitation of the study

During the survey the following problems were encountered:

a) Funds were a big problem since this research was done on private sponsorship basis. So the researcher and one assistant spent a lot of time walking on foot from one household to another during data collection instead of using reliable transport such as motorcycle.

b) In some cases, country, community events interrupted the survey exercise, such as freedom torch races (*mbio za mwenge wa uhuru*), funerals and public meetings. More time was thus used to cover the interruptions

c) All respondents failed to estimate yield per area, because of different storage facilities used by the POP such as plastic bag, rack, warehouse, and big sized pot.

d) Finally, some respondents refused to give information because they did not see any outcome as far as previous research conducted. They argue, "they benefit nothing in answering questions"

However it should be known that, the average monthly income earned by POP in this study was obtained after converting the income from the household food expenditure per week into monthly income. This was reported due to the reason that all respondents from all villages do not keep records of their income, they live on hand to mouth economy and their income was very low.

### 4.3 Definition of the poorest of the poor

One of the objectives of this study was to define the POP. Three PRA methods: well being, FGD, and direct observation were used to address this objective.

#### 4.3.1 Well-being/ wealth ranking

The results from the well-being criteria with regards to the definition of the POP revealed that, POP are the people who live in extreme conditions of poverty. They live in dilapidated house structures, mainly made up of mud floor, mud walls and generally grass- thatched roof. They also have temporary toilets, which are grass - thatched or with no roofs at all. Further more the results revealed that the POP lack basic needs like food, shelter and clothes.

#### 4.3.2 Focus group discussion

The POP was also defined as those who have minimum possession of household assets. The assets owned include hand hoes, local kerosene lamp, loop beds, bicycles and livestock. The results further revealed that majority of the POP have no effective/ strong strategies to cope with FS during food shortage. They often sell labour to well off people in the villages and receive low wages. Most of them do

consume local vegetables that grow naturally in the bushes such as *Sesamum* (*mgunda*), *Solanum nigram* (*mnavu*) and *Sonchus oleraceus* (*mchunga*). Charcoal making and selling, brewing local beer, traditional mat and brooms making, were also among the coping strategies used by the POP. When the situation is very serious, the POP tend to skip some meals, such as eating once or twice per day while the recommended dietary practice for an adult person is thrice per day.

### 4.3.3 Direct observation

This PRA method was used to tie together the information obtained through other methods. With physical observation within the villages, it was revealed that the POP are people with inadequate basic needs and they often live in dilapidated houses. The majority were found idle outside their houses and a few were busy doing handcraft activities such as mat making. Furthermore, through direct observation it was found that the POP are people who still use traditional food storage methods. Some of the food storage methods that were observed include, rack *(chanja)* and warehouse (*ghala*). The fact that the POP live in dilapidated houses coupled with miserable conditions was found evident as some of their household assets were physically observed as local kerosene lamp, loop beds and malnourished livestock

## 4 .4 Definition of the non-poor.

According to the PRA results, the non-poor were defined by all three methods as follows here under:

### 4.4.1 Well-being criteria

In this PRA method, the non-poor were defined as people with adequate basic needs such as food, shelter and clothes. They often live in good housing conditions. Their houses are made of cement floor, walls of burnt bricks/cement blocks and corrugated iron sheet roofs. They have permanent toilets (Improved pit latrine toilets- either flash or pit latrines)

### 4.4.2 Focus group discussion

In FGD, the non-poor was defined as those who possess assets of high quality in the village. The mentioned assets owned by the non- poor were such as tractors, spongy mattresses, radios, motorcycles, cars, television sets and refrigerators. The results from FGD further revealed that majority of the non- poor have effective and strong strategies to cope with food shortage. They either purchase food on credit, borrow money from friends, neighbours, relatives and or selling crops.

### 4.4.3 Direct observation

This PRA method was used to sum up the information obtained through other methods. With direct observation the non-poor are people with good housing conditions. They have their houses with electricity and water. They have also assets of high quality, which could be seen outside their houses during study. Assets that were easily seen outside during survey include, tractors, motorcycles, and cars.

### 4.5 Amount of food produced per annum.

The aim of this study was to determine the household food security coping strategies among the POP, amount of food produced per annum by a household was one of the objectives. First of all, this objective was addressed in the pre-testing of questionnaires where majority of the POP failed to answer questions as a result of having different storage facilities such as rack, and warehouse. Therefore the amount of food produced by the POP per annum was obtained after conducting the PRA within the study area. The results revealed that the POP have the ability to produce only about 1-4 bags of various food crops per annum as a result of poor agriculture technology used.

### 4.6 Socio-economic characteristics and food security

One of the hypotheses to be tested in this study states that "the socio-economic characteristics of the POP do not have a significant effect on the household food security". The indicators used to measure the socio-economic characteristics were the level of education, occupation and income of the respondents while the indicators used to measure food security were the numbers of meals taken per day and food quality. In this research report, some of the values, which were given in percentages concerning the level of education, occupation and the income of the respondents, have been modified so as to have a meaningful analysis. In order to get information about the household food status, a question on number of meals taken per day in the household was asked. In this study, taking one and two meals per day was considered to be food insecure and taking three meals per day and above was considered to be food secure situation. Findings indicate that nearly two thirds of the POP with no

formal education takes one meal per day as opposed to one third of the POP with formal education who take more than one meal. Results further revealed that most of the POP with no formal education take two meals or less per day while majority of the POP (75.4%) with formal education take three meals per day.

**Table 3: Socio-economic characteristics with meals eaten per day in the sampled households in % (n=180)**

| Characteristics | One meal | Two meals | Three meals | Total | $X^2$ |
|---|---|---|---|---|---|
| **Education level** | | | | | |
| Non- formal | 64.7 | 39.8 | 24.6 | 43.0 | 0.006* |
| Formal | 35.3 | 60.2 | 75.4 | 57.0 | |
| **Occupation** | | | | | |
| Farming | 100.0 | 83.6 | 84.6 | 89.4 | |
| Non-farm activities | - | 7.2 | 6.2 | 4.5 | 0.865ns |
| Farming/petty trade | - | 9.2 | 9.2 | 6.1 | |
| **Income** | | | | | |
| Below 1000 | 37.5 | 3.1 | 1.5 | 14.0 | |
| 1000-5000 | 62.5 | 96.9 | 80.0 | 79.8 | 0.000* |
| Above 5000 | - | - | 18.5 | 6.2 | |

*ns not statistically significant* **statistically significant at ($p<0.05$)*

The reason for the majority of the POP households taking two meals and below per day could be due to extreme poverty that exists in their households. Inadequate income to purchase food as a result of inadequate education could be a major reason among the POP who takes less meal. Taking three meals per day is common in Tanzania where food is adequate and activities do not limit this food-feeding pattern. Results of the chi-square showed that there is a significant relationship ($P< 0.05$) between the number of meals taken per day and education level of the respondents. Hence the null hypothesis is rejected and the alternative is accepted: that is, education level has a significant effect on the number of meals taken per day.

However, with regards to food security status and occupation of the POP, the results of the chi-square showed that there is no significant relationship ($p>0.05$) between the number of meals taken per day and occupation of the POP households. Hence the null hypothesis that occupations of the POP do not have a significant effect on the food security has been accepted. Nevertheless, the results of the chi-square showed that there is significant relationship ($p< 0.05$) between the number of meals taken per day and income of the POP household. Hence the null hypothesis is rejected and accepting the alternative; that is, income has a significant effect on the number of meals taken. As shown in Table 3, the POP with less than Tshs 1,000 were able to take one meal per day, compared to 80.0% of the POP earning income between1,000 and 5,000 who are able to take three meals per day. Therefore the data in the table, show that the higher the income the higher food security and vice-versa.

### 4.6.1 Inferior food-stuff

In this study inferior foods were defined as food that cannot provide the recommended daily intake of nutrients. The types of these foods that were reported by the respondents include stiff porridge, which was reported by all respondents, and boiled local vegetables (without cooking oil). In this study taking inferior types of food five times per week was considered to be food secure and taking inferior types of food more than five times per week was considered food insecure. The research results revealed that a high percentage of the POP households (97.2%) lived on inferior types of foods on a daily basis. It is possible that the POP households suffer more from food insecurity due to inadequate money to buy other food -stuff, spices and flavour that could improve food quality.

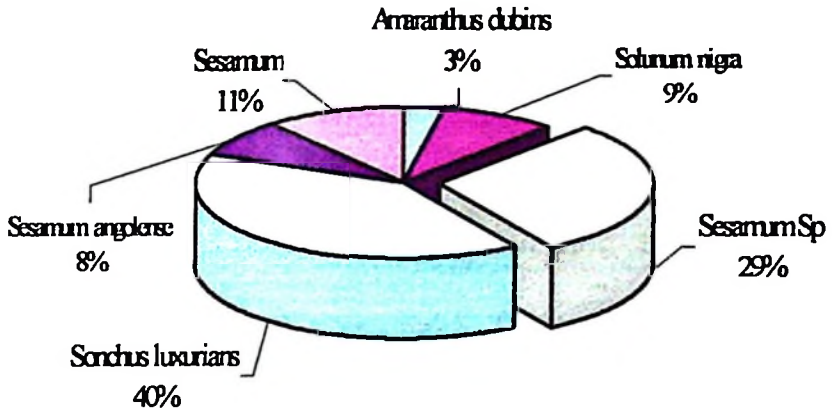


**Figure 3: Distribution of boiled vegetables among the poorest of the poor.**

### 4.6.2 Superior food

Foods like rice, sardines, beans and meat were considered to be superior foods because they are regarded as foods of high quality. The POP households were requested to state the frequency of taking superior foods per week. The results revealed that very few (2.8%) POP do consume superior food once per week. The majority (97.2%) takes superior foods during special occasion including religious ceremony. The higher percentage of households of the POP consuming superior foods during special occasions could be due to low purchasing power to buy the foods in other occasions. This explains the real situation of the POP in the study area: that is, taking foods of low quality. It should be noted that rice is not in the figure because all respondent (100%) reported to use it during special occasion.

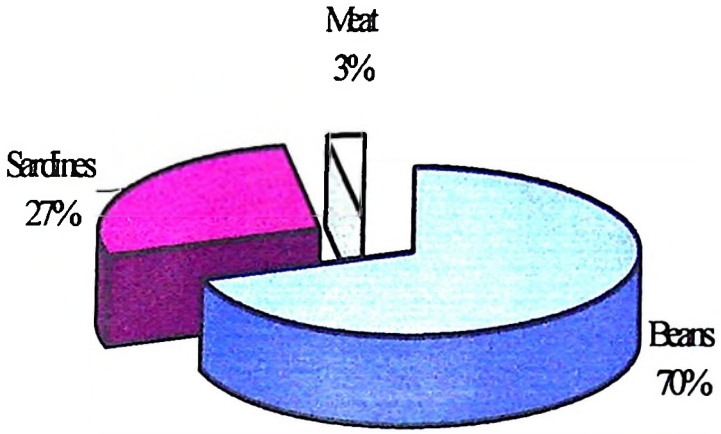


**Figure 4: Distribution of superior foods during special occasions among the poorest of the poor**

### 4.7 Socio-economic status of the poorest of the poor

The socio-economic status of the respondents is described in this section. A question on this aspect was asked because it is one of the measurements of poverty at household level. It includes variables such as assets within the households, housing conditions, sources of fuel for cooking, sources of water for household use and sanitation services. The purpose of this section is to provide information on respondent's socio-economic status and the way it was used to develop an index through Principal component Analysis (PCA). Finally the index obtained through PCA was cross-tabulated with other variables in this study. Assets refer to properties owned by a person or company, having value and being available to meet debts, commitments or legacies (Anania, 2003). In this study respondents were asked to state whether or not in their households they possessed assets such as hand hoes, bush knives, local kerosene lamp, axes, radios and wool- mattresses. The households with hand hoes and bush knives had access to agricultural activities. The significance

of owning axes among the POP could be due to its use in collecting firewood as a source of energy. While the use of wool- mattresses imply low level of income that the poor cannot afford to buy spongy mattresses. Owning radios show that even the POP recognizes the importance of mass media communication and it is an easiest way of getting information from all over the world. While a bicycle ensures cheapest transport among the POP, the households with livestock, big sized pot, ensure themselves of food supply.

As shown in Table 4 the most popular assets were hand hoe, bush knife, local kerosene lamp, axe and wool mattress. While the least popular assets were such as table/chair set, and big sized pot. These assets were limited to only few respondents because they were considered to be luxurious assets among the POP.

In order to get information about housing quality, questions focused on the kind of the material used to make floor, walls, and roofs were asked. Results in Table 4, indicate that majority of the respondents household floors were made up of mud, and the walls were made up of mud bricks while more than half of the respondents household roof were made up of trees, mud and thatched grasses. This is possible for the most of the rural areas where majorities are the poorest of the poor who lives in poor housing quality.

**Table 4: Socio- economic status among the poorest of the poor**

| Ownership of assets | Percentage |
|---|---|
| Hand hoe | 98.3 |
| Bush knives | 97.8 |
| Local kerosene lamp | 97.8 |
| Axe | 88.3 |
| Wool mattress | 71.7 |
| Radio | 57.8 |
| Charcoal stove | 46.7 |
| Bicycle | 41.1 |
| Livestock | 40.6 |
| Kerosene lamp | 37.2 |
| Big sized pot (*mtungi*) | 15.0 |
| Table/chair set | 1.7 |
| **Housing conditions** | |
| **Floor** | |
| Mud | 97.2 |
| Cement | 2.8 |
| **Walls** | |
| Burnt bricks | 6.7 |
| Mud bricks | 47.2 |
| Mud and trees | 37.2 |
| Thatched grass, cardboard | 1.7 |
| Mud | 6.7 |
| Trees only | 0.6 |
| **Roof** | |
| Rusted pieces of corrugated iron sheet | 41.7 |
| Trees, mud, thatched grasses | 55.6 |
| Rusted pieces of corrugated iron sheet, grasses | 2.8 |
| **Source of water** | |
| Tap water inside the house | 2.2 |
| Borehole inside the house | 6.7 |
| Borehole/tap water in the village | 69.4 |
| Buying water in the street | 11.1 |
| Lakes, dams, spring water | 10.6 |
| **Toilet facilities** | |
| Improved pit latrine pit latrine | 1.7 |
| Local pit latrine | 92.8 |
| Neighbour/bushes | 5.6 |
| **Sources of fuel for cooking** | |
| Firewood | 92.2 |
| Kerosene/charcoal stove | 7.8 |

Nevertheless, respondents were asked to mention their sources of water and toilet facilities in the household. The data revealed, majority of the POP uses water from Borehole/tap that is present in the village, which account for 69.4 percent of the available sources. Very few POP (2.2%) reported to have tap water within the household. Other sources of water include, buying in the street, lakes/dams, spring water and Borehole inside the house. The plausible reason for the majority of the POP using Borehole/tap water within village could be due to low income that causes not to purchase their own Borehole within the household. Results in Table 4 also shows, toilet facilities are not yet available among the POP, this is attributed by probably the low income among the POP household. Very small proportion of the sample reported to uses bushes/neighbours toilets. Majority of the POP uses local pit latrine and very few have improved pit latrine pit latrine as indicated in (Fig, 5).

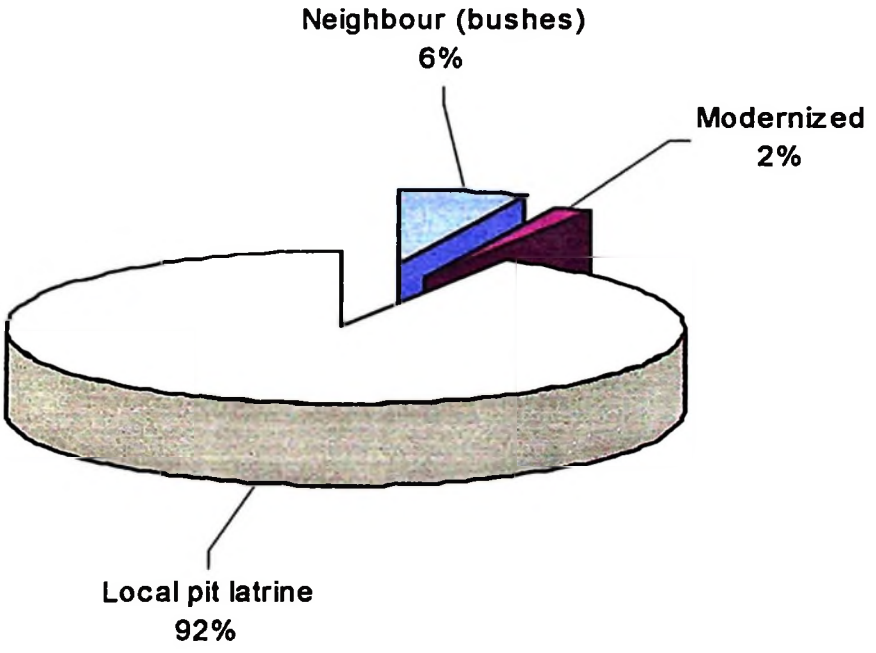


**Figure 5: Toilet facilities used among the poorest of the poor**

On the use of fuel for cooking, majority of the respondents reported to use firewood. Very few respondents use kerosene/charcoal as a source of fuel for cooking (see Fig 6 below). The use of firewood for the majority of the POP and charcoal implies high exploitation of forest and trees around villages. The reason for the majority of the POP using firewood could be attributed by low purchasing power to buy kerosene/ charcoal.

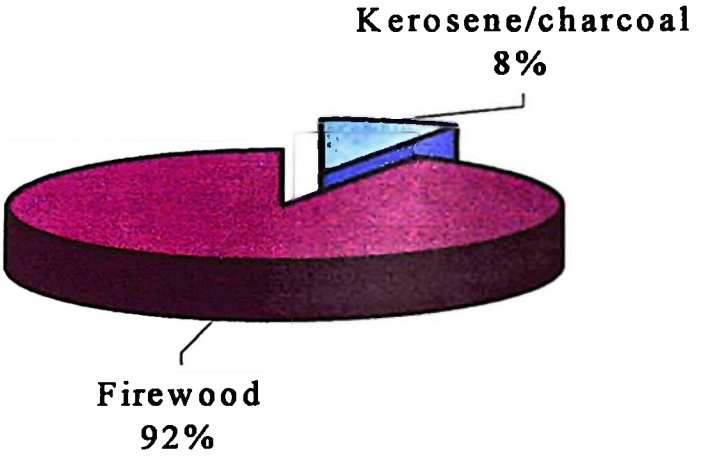


**Figure 6: Fuel used for cooking among the poorest of the poor.**

### 4.7.1 Socio-economic status index

Establishment of the socio economic characteristics of the respondents was one of the objectives in this study. In order to achieve this objective the study employed Principal Component Analysis (PCA) method to analyze the socio-economic status data. Initially, the socio-economic status data such as household asset, housing condition, sources of fuel for cooking, sources of water for household use and sanitation were used to develop an index based on the formula:

$Aj = f_1 x\ (aji - a_1) / (S_1) + \ldots\ldots f_N x\ (fajN - aN) / (sN)$ ( Filmer and Pritchett, 1998)

Where:

Aj = Index developed

$a_1$= mean

$f_1$= scoring factor

$a_j$=the value for the asset or services

$S_1$ =standard deviation.

Based on this formula, household indices were assigned to resident of households and the resulting population was divided into wealth quintiles that then represented proxies for socio-economic status. Wealth quintiles were thus expressed in terms of quintiles of individuals of the total population. The final index was based on household assets, housing quality, water and sanitation and the source of energy for cooking. This approach (asset index) has been used and recommended by many studies (Filmer and Pritchett, 1998).

The index later, is used to find the cut off-points and finally categorize the respondents into five groups. The first group denoted the poorest and as you go downward the poorest status decreases to better off which was the last group. The PCA results are summarizes in Appendix III. There are 36 principal components, the first component account for 10.5% of the total variance. The second largest component accounts for 7.8% of the total variance of all variables. The Eigeinvalue of the first component has been used to direct the scoring weight of the first column for each of the assets and other items. Complete PCA results of the variables related to socio-economic status of the respondents are presented in AppendixIV, while the cut off point are presented in Appendix V.

In this research report, only socio-economic status proxy for the poorest and better off households was used for clear analysis. Results in Table 5 show socio-economic status between types of household, where assets differ so insignificantly, in the fact that poorest have access to some of assets as like the better off household. However there are also some of the assets, which are owned by the better off household in high percentage. For example assets such as bicycle, radio, hurricane lamp and charcoal use are owned in high extent by the better off household. While the poorest have much access in assets such as hand hoe, local kerosene lamp, wool mattress, big sized pot, torch, and livestock. The significance of owning livestock among the poorest of the poor could be due to coping mechanism during food shortage. The poorest tends to have livestock for food security purpose as it shown 69.4% of the POP has access to livestock compared to 16.4% of the better off household. The results are similar to (Anania, 2003), who found that 21.1% of the respondents do keep livestock as an asset to cope with food security during food shortage.

The score is also noted for the housing conditions, such as floor, walls, roof, source of energy for cooking and sanitation conditions. Better off households are expected to have better housing condition and access to sanitations than the poorest. Thus, as expected, the better off are more likely to have cemented floor, tap water and Borehole inside the house as opposed to poorest who have mud floor, and uses tap/ Borehole that in the village as seen in Table 5. Nevertheless sources of energy for cooking and sanitation between types of household shows that better off household are more likely to have the Improved pit latrine pit latrine as opposed to the poorest who majority (94.4%) uses local pit latrine and few of them uses bush/neighbour

sources. On the sources of energy for cooking the data revealed that better off use much kerosene/charcoal than the poorest household. The plausible reason could be due to low income that they can't afford to buy charcoal/ kerosene. Poorest/better off ratio in this study refers to how many times better off exceed poorest in terms of asset and housing condition. For example in Table 5 households that own livestock has an asset index 4.1 higher unit than the one that does not own such a livestock. Likewise, a household with a mud floor has an asset index lower by 1.1 units than the one that does not own such a house.

Table 5: Socio-economic status by quintiles in (%)

| Variable | Poorest | Better off | Poorest/better off ratio | $X^2$ |
|---|---|---|---|---|
| **Assets ownership** | | | | |
| Hand hoe | 100.0 | 97.2 | 1.03 | 1.014ns |
| Bush knife | 97.2 | 97.2 | 1.00 | 2.057ns |
| Axe | 86.1 | 86.1 | 1.00 | 0.862 |
| Hurricane lamp | 33.3 | 41.7 | 0.79 | 0.533ns |
| Torch | 55.6 | 52.8 | 1.05 | 0.056ns |
| Charcoal use | 38.9 | 63.9 | 0.61 | 4.503* |
| Local kerosene lamp | 100.0 | 97.2 | 1.03 | 1.014ns |
| Chair/table set | 0.0 | 8.3 | 0.00 | 3.130ns |
| Wool mattress | 66.7 | 63.9 | 1.04 | 0.061ns |
| Radio | 44.4 | 58.3 | 0.76 | 1.390ns |
| Bicycle | 25.0 | 52.8 | 0.50 | 5.844* |
| Livestock | 69.4 | 16.7 | 4.15 | 20.450* |
| Television | 0.0 | 1.0 | 0.00 | 0.403ns |
| Big sized pot | 52.8 | 5.6 | 9.43 | 19.429* |
| House | 83.3 | 88.9 | 0.93 | 0.343ns |
| **Housing condition** | | | | |
| Mud floor | 100.0 | 86.1 | 1.16 | 5.373* |
| Cement floor | 0.0 | 13.9 | 0.00 | 5.373* |
| Burnt bricks wall | 8.3 | 8.3 | 1.00 | 0.000* |
| Mud bricks wall | 52.8 | 36.1 | 1.46 | 2.025ns |
| Tree and mud walls | 47.2 | 30.6 | 1.54 | 2.104ns |
| Tree walls | 2.8 | 0.0 | 0.00 | 1.014ns |
| Thatched grass and card board | 5.6 | 0.0 | 0.00 | 2.057ns |
| Mud with mud | 5.6 | 2.8 | 2.00 | 0.348ns |
| Rusted pieces of iron sheet | 66.7 | 30.6 | 2.18 | 9.396* |
| Tree, mud, thatched roof | 66.7 | 30.6 | 2.18 | 9.396* |
| Thatched grass and pieces of iron sheet | 2.8 | 2.8 | 1.00 | 0.000* |
| **Water source** | | | | |
| Tap water inside the house | 0.0 | 8.3 | 0.00 | 3.130ns |
| Borehole inside the house | 0.0 | 33.3 | 0.00 | 14.400* |
| Borehole and tap water within village | 75.0 | 38.9 | 1.93 | 9.574* |
| Buying water in the street | 11.1 | 8.3 | 1.34 | 0.158ns |
| Dams, lakes and spring water | 19.4 | 5.6 | 3.46 | 3.175ns |
| **Toilet facilities** | | | | |
| Improved pit latrine pit latrine | 2.8 | 5.6 | 0.50 | 0.000* |
| Local pit latrine | 94.4 | 77.8 | 1.21 | 4.181* |
| Bushes/neighbour | 19.4 | 2.8 | 6.93 | 5.063* |
| **Energy for cooking** | | | | |
| Fire wood | 94.4 | 44.5 | 2.12 | 0.000* |
| Kerosene/charcoal | 5.5 | 16.7 | 0.33 | 0.000* |

*ns not statistically significant* **statistically significant at ($p<0.05$)*

### 4.8 Level of utilization of improved agriculture technology

Determination of level of utilization of improved agriculture technology was one of the objectives of the study. Total land owned and the means of acquiring was used to address this objective.

#### 4.8.1 Total land owned and means of acquiring

Findings in Table 6 show majority of the POP (60.5%) owned 0.5-2.0 acres. Very few respondents reported to have 4.5 acres and above. It's however reported that the size of land is not a potential factor in determining whether a household is poor or better off. The results are also compatible with the study conducted by (Festo, 2004) who found that majority of the POP owned an average of 2.0 acre and observed that size of land is not a factor in determining whether a household is poorest or not. This is because majority of the respondents in study area own land as asset but their land is often unproductive, marginal and dry also they lack money of buying inputs such as seeds and hence suffer from year round food insecurity (Festo, 2004).

**Table 6: Land ownership and means of acquiring (n=180)**

| Category | Percent |
|---|---|
| **Total land owned** | |
| <0.5 | 6.1 |
| 0.5-2.0 | 60.5 |
| 2.5-3.0 | 16.1 |
| 3.5-4.0 | 9.4 |
| 4.5 and above | 7.8 |
| **Means of acquiring** | |
| Inherit | 52.3 |
| Hiring | 19.5 |
| Clearing bushes | 14.4 |
| Buying | 8.0 |
| Given by village government | 5.7 |

Findings in Table 6 also reveal different means of land acquisitions among the POP. More than half of the respondents inherited the land, less than a quarter tends to hire the land. Other means of land acquisition includes clearing bushes, buying, and given land by village government.

### 4.8.2 The use of agricultural technology

The aim of this section is to discuss the use of agricultural technology among the POP. In this case respondents were asked to state the technology used in agricultural activities. The findings in Table 7 show that all respondents (100%) still use hand hoe in agricultural activities. Only tenth (10.9%) of the respondents reported to use tractor in accomplishing farm activities. The high percent (39.3%) of the POP using improved seeds has been reported due to the effort of the village government after realizing the poorest situation that exist within individuals. The findings further reveal POP were given 1kg of maize seeds in the last cropping season through their Member of Parliament who emphases the importance of agriculture being a source of food. Nevertheless, the use of fertilizer in this study was very insignificant. Few 15.5% respondents reported to use fertilizer once per cropping season. This is because majority of the POP are not capable of buying fertilizer due to low level of income. Also inadequate knowledge on the importance of using fertilizer attribute for the lower percentage. Other agricultural technology reported to be used by the POP are such as herbicides (2.3%) and hiring labour which account for (31.6%). The high percent of hiring labour among the POP reported to be exchange mechanism. That is in the year were food is available POP tends to exchange food with farm activities rather than using money in hiring source of labour.

Table 7: Technology used in farming in % (n=180)

| Technology | Percent |
|---|---|
| Hand hoe | 100.0 |
| Tractor | 10.9 |
| Improved seeds | 39.3 |
| Fertilizer | 15.5 |
| Herbicides | 2.3 |

In order to have the meaningful analysis on the level of utilization of improved agriculture technology, an index was developed. The index was based on whether respondents used improved agricultural technology in agricultural activity. For each variable, every "Yes" response was given a value of 1, which indicate the use of technology, while "No" response was given a value of 0, meaning no use of technology see Table 8.

Table 8: Technology index used in farming

| Variable | Description |
|---|---|
| Hand hoe | 1 = The use hand hoe |
| | 0 = No use of hand hoe |
| Tractor | 1 = The use of tractor |
| | 0 = No use of tractor |
| Hiring labour | 1 = The use of hiring labour |
| | 0 = No use of hiring labour |
| Fertilizer | 1 = The use of fertilizer |
| | 0 = No use of fertilizer |
| Improved seeds | 1 = The use of improved seeds |
| | 0 = No use of improved seeds |
| Herbicides | 1 = The use of fertilizer |
| | 0 = No use of herbicides |

The frequency on the use of agricultural technology is presented in Table 9. In this case an index range from 0 to 6 was obtained as indicators on the use of agricultural technology in farming activity.

**Table 9: Frequency of the use agricultural technology in farming.**

| Index (n=180) | Percent (n=180) |
|---|---|
| 0 | 4.4 |
| 1 | 38.9 |
| 2 | 31.7 |
| 3 | 15.6 |
| 4 | 5.6 |
| 5 | 2.8 |
| 6 | 1.1 |

Moreover, the values of the index on the use of agricultural technology in Table 9 were categorized into low (0-2), medium (3-4) and high level of the use of improved agricultural technology (5-6) (see Figure 7).

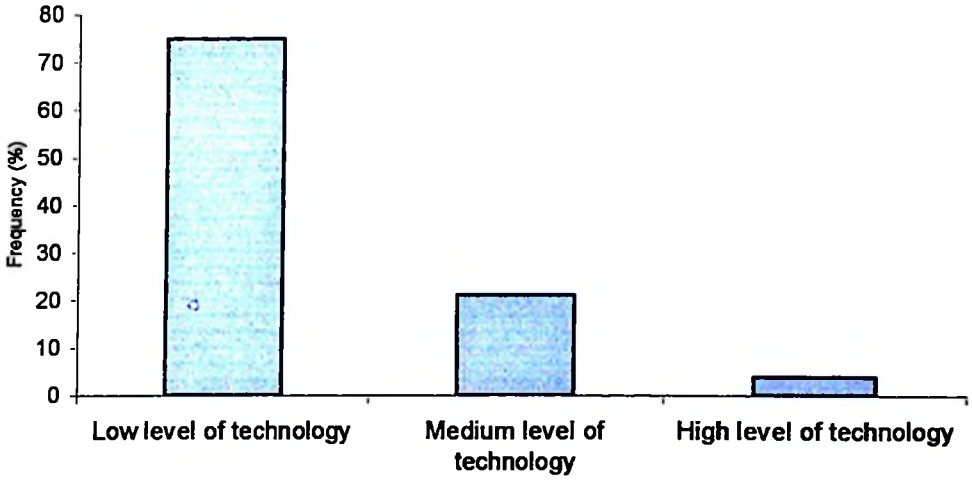


**Figure 7: Level of using improved agricultural technology**

The results in Figure 7 show majority of the POP still use low level of technology in agricultural activities. This causes low level of production and hence food insecurity among the poorest individual. The low use of agricultural technology could be

attributed by low level of income; hence failure to purchase farm inputs such as improved seeds and fertilizers.

**Table 10: Level of improved agricultural technology with socio economic quintiles in %.**

| Level of technology | Poorest | Better off | $X^2$ |
|---|---|---|---|
| Low level | 77.8 | 62.8 | 0.003* |
| Medium level | 16.7 | 19.4 | |
| High level | 2.8 | 5.6 | |

*ns not statistically significant* **Statistically significant at (P< 0.005)* 0.05

The chi-square test results in Table 10 show statistically significant (P<0.05) between the uses of technology with the socio-economic quintiles. That is the poorest household has access to low level of agricultural technology than the better off household.

### 4.9 Food storage methods used

The last objective of this study was to identify the food storage methods used in the study area. Types of crops grown in the study area were used to address this objective

#### 4.9.1 Types of food and cash crops grown

Research findings show that rice, maize, sorghum and tomatoes were the most popular food and cash crops in the study area. Other crops grown reported to be vegetable, cassava, sunflower, sesame, and cotton.

In Table 11, majority of the respondents (92.9%) grow maize as a food crops followed by sorghum, which account for the more than half (55.7%) respondents. Vegetable account for more than a quarter, while very few percent were for respondents growing cassava and sunflower. However, the main cash crop grown reported to be rice followed by sorghum and vegetable, which account for a quarter of the respondents. Very few respondents (1.9%) mentioned sesame and cotton to be cash crops.

**Table 11: Types of food and cash crops grown in % (=180)**

| Crop | Food (percent) | Cash (percent) |
|---|---|---|
| Rice | 21.4 | 42.6 |
| Maize | 92.9 | 9.3 |
| Sorghum | 55.7 | 25.9 |
| Tomato | 14.3 | 18.5 |
| Vegetable | 34.3 | 25.9 |
| Cassava | 2.9 | 0.0 |
| Sunflower | 2.9 | 0.0 |
| Sesame | 0.0 | 1.9 |
| Cotton | 0.0 | 1.9 |

### 4.9.2 The stored crops by the poorest of the poor

Research findings show that, the main stored crops in the study were, maize, rice, sorghum and vegetable. Maize accounts for the higher percentage (91.4%), followed by sorghum, which account for the more than half of the respondents see Table 12. Other stored crops by the POP reported to be rice and vegetable.

**Table 12: The main stored crops by respondents in (%)**

| Crops | Percent |
|---|---|
| Maize | 91.4 |
| Rice | 17.1 |
| Sorghum | 52.9 |
| Vegetable | 8.6 |

### 4.9.3 Food storage methods used

The aim of this section is to discuss the types of food storage methods used by respondents. Table 13 shows different types of food storage methods used by respondents.

**Table 13: Food storage methods used among the POP in % (n= 180)**

| Crop | Storage methods | Percent |
|---|---|---|
| Maize | Ash +safrets | 12.5 |
| | Pestcides+safrets | 10.9 |
| | Warehouse | 14.1 |
| | Rack | 17.2 |
| | Safrets | 45.3 |
| Rice | Ash+safrets | 10.0 |
| | Safrets | 90.0 |
| Sorghum | Ash+safrets | 21.6 |
| | Rack | 10.8 |
| | Safrets | 67.6 |
| Vegetable | Safrets | 57.1 |
| | Chungu/pots | 8.3 |

Findings in Table 13 show different crops with their storage facilities used by respondent in the study area. Results revealed that majority of respondents used safrets as the main food storage facilities. Safrets in the study area were defined as a

plastic bag formally used to store fertilizer, it usually contain 50kg. Other storage methods used reported to be ashes and safrets that means food crops are mixes at first with ashes before stored in the safrets. The significance of mixing food crops for example sorghum with ashes prior to storage has been reported due to inadequate income to purchase pesticides. Therefore ashes act as pesticide to prevent crops from infection. As presented in Table 13 nearly a quarter of respondents (21.6%) reported to use ashes with safrets to store sorghum crops. However a small proportion (8.3%) of respondents reported to store vegetables by using cooking pots.

Nevertheless, the other storage methods used in the study area were reported to be warehouse and racks. More than a quarter (28%) of the respondents use rack to store food crops while about tenth of the respondents (14.1%) were using warehouse in storing maize.

### 4.10 Coping strategies used by households with regards to food security

Food shortage is common in different societies in Sub Saharan Africa. This has made household to develop different coping strategies in order to cope with this scourge (Ishengoma,1998). This subsection examines different coping strategies that were used by POP households during food shortage periods.

**Table 14: Food security coping strategies among the poorest of the poor**

| Coping strategies | Percent |
|---|---|
| Selling labour | 44.0 |
| Traditional mat, basket, and brooms making | 22.2 |
| Reduced number of meals per day | 20.5 |
| Purchasing food on credit | 17.0 |
| Selling charcoal | 13.5 |
| Food offer | 4.2 |
| Borrowing food from neighbour | 5.6 |
| Selling livestock | 2.8 |
| Brewing local brew | 4.2 |
| Selling firewood | 2.8 |
| Food offer | 1.8 |
| Selling vegetable | 1.1 |

Results in Table 14 show strategies used in coping with food insecurity in the study area. The most popular coping strategies used by the POP were reported to be sales labour, traditional mat, basket and brooms making and reduction in the number of meals taken per day. Other strategies used were purchasing food on credit which account for (17.0%), followed by selling charcoal, which account for (13.5%) of the available strategies. While the least popular strategies were reported to be selling livestock and firewood.

**Table 15: Coping strategies of food security by socio-economic quintiles in %**

| Coping strategies | Poorest | Better off | Total | $X^2$ |
|---|---|---|---|---|
| Selling labour | 50.0 | 38.0 | 44.0 | 0.663ns |
| Traditional mat and basket making | 25.0 | 19.4 | 22.2 | 0.654ns |
| Reduced number of meals per day | 19.0 | 22.4 | 20.5 | 0.915ns |
| Purchasing food on credit | 7.2 | 26.0 | 17.0 | 0.005** |
| Selling charcoal | 25.0 | 11.1 | 13.5 | 0.1991ns |
| Food offer | 8.3 | 0.0 | 4.2 | 0.016** |
| Borrowing food from neighbour | 8.4 | 2.8 | 5.6 | 0.039** |
| Selling livestock | 5.6 | 0.0 | 2.8 | 0.120ns |
| Brewing local brew | 5.6 | 2.8 | 4.2 | 0.802ns |
| Selling firewood | 5.6 | 0.0 | 2.8 | 0.730ns |

*ns not statistically significant *statistically significant at (p<0.05)*

Results in Table 15 show the strategies used in coping with food insecurity in the study area. Nearly half (44.0%) of the respondents sell labour followed by (22.2%) who doing tradition mat making and less than a quarter reduced the number of meals per day.

Surprisingly, purchasing food on credit seems to be the most effective coping strategies use by both household categories and it is statistically significant at ($p<0.05$) although the large percentage of the better off households purchasing food on credit compared to the poorest household. However food offer was also stated to be the coping strategies among the POP households as majority can not afford to purchase food at the market. This was statistically significant at $p<0.05$ with all respondents being in poorest category as indicated in (Table 15).

Borrowing food from neighbour appeared to be high in the poorest household than in better off household. This show, even better off do borrow food from their neighbour during food shortage. The poorest category outweigh better off category by 5.6% and it is statistically significant at $p<0.05$.

Moreover, other coping strategies stated to be tradition mat, basket, and brooms making, selling charcoal, firewood, livestock, charcoal and brewing local brew.

# CHAPTER FIVE

## 5.0 SUMMARY, CONCLUSION AND RECOMMENDATIONS

### 5.1 Overview

The main objective of this study was to determine the household food security coping strategies among the poorest of the poor. This information will assist programme and policy makers to design relevant intervention programmes and policies concerning the poorest of the poor and food security coping strategies. In the previous chapter the presentation and discussion of this information have been adequately covered. This chapter presents the summary of the major findings in three parts; part one looks into general characteristics, part two describes the PRA findings and part three looks into structured questionnaire results. Not only that but also conclusion, recommendation for policy development, community, household, and suggestion for further research are given in this chapter.

### 5.2 Summary of the major findings

The summary of the major findings is presented in three parts. Part one involves general characteristics such as demographic and socio-economic, part two involves the definition of the poorest of the poor, non-poor, and amount of food produced per annum. While the last part involves household socio-economic status, food storage methods used and the level of utilization of improved agricultural technology.

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### 5.2.1 General characteristics

This study has shown that majority of the POP households were married and are in the age group of between 21 and 42. This group belongs to the group of economically productive people who are engaged in productive activities including food production. Education wise, the study revealed higher level of illiteracy in the study area, very few respondents had secondary education and the majority were completed the primary school education. The study revealed farming being the main economic activity for the majority of the POP, followed by both farming and petty trade which were reported by a small proportion. Very few respondents were employed as a security guide in the field.

Furthermore, in the case of income (average monthly income), majority of the POP households reported to receive an average monthly income of between Tshs 2,100 and Tshs 3,000. This was followed by households, which receive an average monthly income of between Tshs 3,100 and Tshs 4,000. A very few respondents reported to receive an average monthly income of below Tshs 1,000. It should be known that, the average monthly income earned by POP in this study was obtained after converting the income from the household food expenditure per week into monthly income. This was reported due to the reason that all respondents from all villages do not keep records of their income, they live on hand to mouth economy.

### 5.2.2 Definition of the poorest of the poor

The results from PRA methods revealed that, POP are the people who live in extreme conditions of poverty. They live in dilapidated house structures, mainly made up of

mud floor, mud walls and generally grass- thatched roof. They also have temporary toilets, which are grass -thatched or with no roofs at all. Further more the results revealed that the POP lack basic needs like food, shelter and clothes.

### 5.2.3 Definition of the non poor

Findings in the PRA result revealed that non-poor were the people with adequate basic needs such as food, shelter and clothes. They often live in good housing conditions. Their houses are made of cement floor, walls of burnt bricks/cement blocks and corrugated iron sheet roofs. They too have permanent toilets (Improved pit latrine toilets- either flashed or pit latrines).

### 5.2.4 Amount of food produced per annum

The PRA results revealed that, the majority of the POP has the ability to produce only about 1-4 bags of various food crops per annum as a result of poor agricultural technology used. It should be clear that, during the pre-testing of questionnaires all POP failed to estimate yield per area as a result of having different storage facilities such as racks and warehouse. Thus, the significant of using PRA method in addressing this objective.

### 5.2.5 Socio-economic status characteristics

Majority of the POP households owned hand hoe, bush knife, local kerosene lamp, radio and some own livestock. The higher proportions of respondent's house floor were made up of mud, walled by mud and trees and roofed by trees, mud and thatched grasses. The study further revealed that, the main source of water for the

majority of the POP households was Borehole and taps that are present in the village. The uses of local pit latrine were common and majority of the POP relied on firewood as a main source of energy for cooking. However one of the hypotheses to be tested in this study states that "socio-economic characteristic of the POP do not have a significant effect on household food security". The indicators to measure the socio-economic characteristics were education, occupation and income while the number of meals taken per day and food quality was used to measure food security.

The results show that there is a significant relationship between the number of meals taken per day and education level of the respondents. Occupation wise, the results of the chi-square show that there is no significant link between the number of meals taken per day and the occupation of the respondents. While in the case of income the chi-square result show significant relationship between the income and the number of meals taken per day. That is the higher the education level the higher the food security and vice versa.

### 5.2 Food storage methods

With regards to the food storage types used by the POP, the results indicate that the majority of the respondents used safrets as the main storage facilities. Safrets in the study area was defined as plastic bag formally used to store fertilizer, it usually contain 50kg. Other storage methods used by the POP were racks, warehouse and big sized pot. Of most important, other POP used ashes and safrets as food storage method that means food crops are mixed at first with ashes then stored in the safrets.

This has shown importance in preventing crops from infection (ashes acts as a pesticide for the majority of the POP in the study area).

### 5.2.7 Level of utilization of improved agricultural technology

The research results show that, majority of the POP still use low level of technology in agricultural activity example the use of hand hoe. This causes low level of production and hence food insecurity among the poorest individual. The low level of agricultural technology could be due to low level of income; hence failure to purchase farm inputs such as improved seeds and fertilizers.

### 5.2.8 Food security coping strategies used by the POP

Another notable observation in this study is that, the most popular coping strategies used by the POP was selling labour in farms to well-off individuals, tradition mat, brooms and basket making and the reduction in the number of meals taken per day. Other coping strategies were purchasing food on credit, selling charcoal and borrowing food from neighbour. Furthermore the results in this study show that, the least popular strategies were selling firewood and livestock.

## 5.3 Conclusion

The following conclusions are made from the findings of the study:

a) The results reveal that there are people who live in abject poverty, coupled with miserable living conditions, in Mlali division.

b) The inadequate provision of basic needs, poor housing conditions and high level of illiteracy among the people, contribute to such miserable conditions.

c) The study further revealed that, those who are the poorest in the study area have their lives full of uncertainties. They often encounter food shortages in their households. The frequent food shortage in the study area is attributed to subsistence farming, practiced by the peasants, which involves the cultivation of small households-owned plots. It was clearly learnt that the poorest households would continue experiencing food shortage if they entirely depended on rainfall for their food production.

d) Furthermore, the food shortage in the study area is also due to low level of technology used in the production process. The majority employs hand hoes during cultivation. The agro-chemicals such as fertilizers, herbicides and pesticides are generally not used. Petty trade, sales of crops and labour selling were reported to be the main sources of income to most households. The average monthly income was found to be ranging from Tshss. 1000 to 5000 for most of the households. The main reason for the low income was identified as being inadequate capital. The majority of the respondents (60.5%) from both households, produce food crops in their own farms and storage of the crops is done traditionally. While some of the respondents reported to use rack and warehouse to store their crops, others claimed that they use big-sized pots, which is a clear indication of food insecurity at the household level.

e) Selling labour, traditional mat and basket making, and a reduction in the number of meals taken per day were revealed to be the dominant coping strategies during the food shortage periods in both the poorest and better off households. Other coping measures include brewing and selling local beer, selling livestock and begging for food from relatives. These strategies were mainly reported to be used by those coming from the poorest households.

## 5.4 Recommendations

### 5.4.1 Programmes/Policy

The following were recommended from the study:

a) Good policies have to be formulated to assist the poorest households diversify their sources of livelihood; that is, promotion of other sources of income besides agricultural production. This will help to improve the life standards of the poorest in the study area.

b) The Government of Tanzania, Government Institutions and NGO's, in their planning for food security, should consider measures for capacity building of the households which are sustainable rather than opting for provision of free relief food to cover food shortage.

c) Despite the fact that the primary school fees have been eliminated, still the poorest have no access to education. This has been clearly shown in the study conducted. Therefore, the Tanzanian government through its Ministry of Education and Vocational Training has to educate the mass on the

significance of education, especially in rural areas where the poorest are found.

d) The Tanzanian government, through its extension agents within Mlali division ought to try to educate the poorest on the better farming practices. If this is done, the crop production is likely to improve and, hence food security.

e) Mlali division should adopt for small-scale irrigation projects and gardening. This can be the most important strategy curb food shortage especially to the poorest in the division.

f) The Tanzanian government through its MAFS via the village governments should also provide subsidies for agro-chemicals and improved seeds to the poorest individuals in the village.

g) Selling labour was revealed not to provide a sustainable capacity for households to obtain sufficient and reliable food as labour selling was coinciding with the seasons of critical farm operations. Such a practice thus ensures repeated food deficits to most of the households. It is therefore recommended that designing policy interventions, which will focus on increasing the capacity of the poorest in rural areas, will ensure sustainability in their capacity to produce food. The Government, Government Institutions and NGO's, when planning for rural food security, should therefore focus on the capacity building.

### 5.4.2 Community level

a) The Community Members should pay special attention to the welfare of the poorest in the villages by bringing them together with other social groups in the development interventions.

b) Civil societies should provide specific financial assistance to the poorest to enhance their financial capability and hence, productivity.

c) Training schemes on food storage mechanisms, targeting the rural individuals (which are the majority of the poorest), should be given priority and it is emphasized that those schemes should focus more on the storage of the food crops produced in the relevant areas.

### 5.4.3 Household level

In order for farmers to ensure themselves of food supply, they have to adopt the growing of food crops that are suitable to their environment instead of relying on some preferred crops that do not do well in their areas. Some of the recommended crops, apart from cassava, include sorghum and millet. These may, to a large extent, reduce the problem of crop failure due to insufficient rainfall.

## 5.5 Areas for future research

The study recommends the following for future research;

a) The presented findings in this case study were a result of a micro-survey done in two Wards of Mlali division in Mvomero district, Morogoro region. The major weakness of the micro studies is that, they cannot represent the

whole population of Tanzania. That being the case, there is a need for more research on food security and the welfare of the poorest in other part of the country to enable generalization of the highlighted information.

b) The study found that the poorest households have no regular sources of income, hence more researches on the assessment of income generating activities to curb food deficits among the poorest, is of paramount importance.

c) The assessment of welfare and the livelihood strategies of the poorest may be another worth investigation that can be done. However, equal sample sizes of the poorest and non-poor should be employed so as to make comparison.

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# APPENDICES

## Appendix I: Questionnaire for households

### A.HOUSEHOLD IDENTIFICATION

1. Date of interview.....
2. Name of the village.....
3. Name of the district.....
4. Name of the division.....
5. Household identification number.....

### B. BACKGROUND INFORMATION

6. Are you the head of the household?
    1. Yes
    2. No
7. What is your Sex ?
8. What is your age?.....yrs
9. What is your marital status
    1. Single
    2. Married
    3. Separated
    4. Others (specify)

10. What is your level of education?

1. None
2. Primary education
3. Secondary education
4. Above secondary education
5. Others (specify).....

11. What is your occupation

1. Farmer
2. Petty trader
3. Farmer and petty trader
4. Housework
5. Formal employee
6. Others (specify).....

12. What is the total number of people living in this household? .....

| Name | Age | Sex |
|---|---|---|
| | | |
| | | |

**C. LAND USE**

13. Do you own land for agricultural activities?

1. Yes
2. No

14. What is the means of acquiring land ownership?

1. Buy 3. Given by village government
2. Inherit 4. Hire 5. Others (specify)

15. If land was bought how much did you pay per acre? Plot?.....(indicate year bought).....

16. If land was hired how much did you pay in the last cropping season?.....

17. What is the size of the land owned?.....

18. What is the size of the land under crop cultivation?.....

19.Which food crops are used for food? (Tick whichever is applicable)

| Food crops | Yes | No |
|---|---|---|
| Rice | | |
| Maize | | |
| Sorghum | | |
| Tomatoes | | |
| Vegetables | | |
| Others (specify) | | |

20. Which types of crops are for sale?

| Crops | Yes | No |
|---|---|---|
| Tomatoes | | |
| Sorghum | | |
| Maize | | |
| Rice | | |
| Others (specify) | | |

21. Which technology do you use in your agricultural production? (Tick whichever is applicable to you). State any costs involved.

| Agriculture technology | Yes | No | Cost involved |
|---|---|---|---|
| The use of hand hoes | | | |
| The use of tractors in agricultural activities | | | |
| The use of hired labour | | | |
| The use of fertilizers | | | |
| The use of improved seeds | | | |
| The use of herbicides | | | |
| Harvesting costs | | | |
| Transportation costs | | | |

## D. SOURCES OF INCOME AND HOUSEHOLD FOOD EXPENDITURE

19. What is your sources of income in your household

| Sources of income | Yes | No | Average monthly income |
|---|---|---|---|
| Sales of crops | | | |
| Sales of livestock | | | |
| Petty trade | | | |
| Sales of labour | | | |
| Brewing local beer | | | |
| Remittances from relatives | | | |
| Rent of properties | | | |
| Wages of father | | | |
| Wages of mother | | | |
| Others (specify) | | | |

20. Is your income enough for your household daily expenditure?

1. Yes
2. No

21. If no, how do you meet your household food expenditure?

1. Sales labour
2. Receive remittances from closest relatives
3. Sales of livestock

4. Sales of crops
5. Doing petty trade activities.
6. Others (specify).....

22. What is your household food expenditure per week with respect to the following meals? State in terms of Tshss.

1. Breakfast----------
2. Lunch----------
3. Dinner----------

**E. HOUSEHOLD ASSETS**

23. Is this your house?

1. Yes
2. No

24. How many bed- rooms are herein?.....

25. The floor of this house is made of; (Tick one).

1. Mud
2. Wood
3. Tiles
4. Cement

25. The walls of this house are made of; (Tick one).

1. Stones, cement, burnt bricks
2. Mud blocks
3. Mud with trees
4. Thatched grass, card board

5. Others (specify).....

27. The roof of this house is made of which materials?

1. Cement tiles
2. Corrugated iron sheets
3. Trees, mud, thatching grass
4. Others (specify)

26. Which source of energy is used for cooking food?

1. Electricity
2. Firewood
3. Kerosene
4. Kerosene and charcoal
5. Others (specify).....

27. Indicate the assets you have in your household.

| Types of asset | Yes | No |
|---|---|---|
| Hand hoe | | |
| *Bush knife* | | |
| Axe | | |
| Kerosene lamp | | |
| Torch | | |
| Charcoal stove | | |
| Local kerosene lamp | | |
| Chair/table set | | |
| Foam mattress | | |
| Radio | | |
| Bicycle | | |
| Motorcycle | | |
| Tractor | | |
| Car | | |
| Refrigerator | | |
| Livestock | | |
| Television set | | |
| Others (specify) | | |

28. What is your main source of water for daily use?

1. Tap water within the house
2. Borehole in the house
3. Community Borehole/water tap
4. Buying in the street
5. River, canals, spring, dam
6. Others (specify)

29. What type of toilet is used in this household?

1. Flash toilet
2. Community flash toilet
3. Modern pit latrine
4. Local pit latrine
5. Nearby bush
6. Others (Specify)...

## F. HOUSEHOLD FOOD SECURITY

30. For the past 5/10 years, have you ever had food shortage in your household?

1. Yes
2. No

31. How can you describe the experience of your household with regard to its access to food?

    1. Very good
    2. Good
    3. Fair
    4. Bad
    5. Very bad

32. How many times per day do you take food?.....

33. Which of these cereal food-stuff do you prefer most in your household?

    1. Rice
    2. Stiff porridge

34. Among the vegetables below, tick the most preferred in your household.

    1. Sesumum angolense Sp
    2. *Sonchus luxurians*
    3. Sesumum angolense
    4. Sesumum
    5. Amaranth dubins
    6. Solanum nigra

35. State the frequency of eating inferior/superior food per week in your household

36. Which types of food are regarded as a food of high quality?

37. During the period of food deficit, which of the following ways has your household used to get food?

| Method used | Yes | No |
|---|---|---|
| Food offer | | |
| Food purchase on credit | | |
| Buying food | | |
| Begging from friends | | |
| Begging from closest relatives | | |
| Begging from neighbours | | |
| Borrowing food from friends | | |
| Borrowing food from closest relatives | | |
| Borrowing food from neighbours | | |
| Borrowing money from friends | | |
| Borrowing money from closest relatives | | |
| Borrowing money from neighbours | | |
| Exchanging livestock with food from other villages | | |
| Sending children to relative who have sufficient food | | |

38. In question 33 above, which methods/ways were very effective?
.....

39. Is there any other ways you know that people in this village/area do in order to suffice their food needs?

1. Yes
2. No

40. If yes (in question 39 above), mention the ways, which are commonly used in the village?.....

41. Has your household ever received food assistance from any organization?

1. Yes
2. No

42. If yes mention the organization(s).....

43. What was the nature of the assistance given from the organization?

| Organization | Type of assistance (use the key below) |
|---|---|
| | |
| | |

1. Food 2. Money 3. Credit 4. Advice 5. Others (specify)

44. Do you have the habits of storing crops after harvesting?

1. Yes
2. No

45. In the following crop table which crops do you store and in which methods?

| Types of crop | Yes | No | Method used |
|---|---|---|---|
| Cassava | | | |
| Maize | | | |
| Rice | | | |
| Wheat | | | |
| Others (specify) | | | |

46. In general, comment on the food security coping strategies among the poorest in this area.

.....

.....

**THANK YOU**

## Appendix II: Participatory Rural Appraisal (PRA) guide

### A.WELL-BEING CRITERIA

1. What are the major economic activities in your village?
2. What are the indicators of well being in this village?
3. In which group can you be grouped? (Assume the groups to be rich, poor, and very poor)
4. What are the attributes of a rich household/person based on the above indicators?
5. What are the attributes of the poor household/person based on the above indicators?
6. What are the attributes of a very poor household/person based on the above indicators?
7. What are the main assets owned by the very poor household?
8. What are the causes and effects of poverty?

### B. FOOD SECURITY

9. Does your village grow different crop varieties in the same piece of land?
10. What is the acreage per household? (Approximately)
11. What is the percentage of households using hand hoes, ox-driven implements and tractors?
12. What is the amount of grains bought per household?
13. What is the percentage of the households having grain storage facilities?
14. What are the meals taken per day among children aged 0-59 months?

15. What are the meals taken per day among household members who are over 5 years?
16. What is the frequency of taking meals of luxury food -stuff in the village?
17. What is the frequency of taking meals of inferior food -stuff in the village?
18. In which month of the year, is the food more abundant, little, and or none in your village?

**THANK YOU**

**Appendix III: Eigeinvalue accounted for 36 Component**

| | Initial Eigeinvalues | | |
|---|---|---|---|
| Component | Total | % of Variance | Cumulative % |
| 1 | 3.581 | 10.532 | 10.532 |
| 2 | 2.658 | 7.817 | 18.348 |
| 3 | 2.543 | 7.478 | 25.827 |
| 4 | 2.204 | 6.482 | 32.309 |
| 5 | 1.905 | 5.602 | 37.911 |
| 6 | 1.806 | 5.313 | 43.224 |
| 7 | 1.701 | 5.002 | 48.226 |
| 8 | 1.562 | 4.595 | 52.821 |
| 9 | 1.303 | 3.834 | 56.655 |
| 10 | 1.260 | 3.705 | 60.360 |
| 11 | 1.183 | 3.480 | 63.840 |
| 12 | 1.166 | 3.431 | 67.270 |
| 13 | 1.121 | 3.296 | 70.566 |
| 14 | .992 | 2.918 | 73.484 |
| 15 | .922 | 2.712 | 76.196 |
| 16 | .895 | 2.631 | 78.827 |
| 17 | .840 | 2.470 | 81.297 |
| 18 | .818 | 2.405 | 83.701 |
| 19 | .773 | 2.273 | 85.974 |
| 20 | .682 | 2.006 | 87.980 |
| 21 | .639 | 1.880 | 89.860 |
| 22 | .557 | 1.639 | 91.500 |
| 23 | .543 | 1.598 | 93.098 |
| 24 | .509 | 1.496 | 94.594 |
| 25 | .488 | 1.434 | 96.028 |
| 26 | .442 | 1.299 | 97.327 |
| 27 | .359 | 1.057 | 98.385 |
| 28 | .348 | 1.025 | 99.409 |
| 29 | .201 | .591 | 100.000 |
| 30 | 6.588E-16 | 1.938E-15 | 100.000 |
| 31 | 4.846E-16 | 1.425E-15 | 100.000 |
| 32 | 3.889E-16 | 1.144E-15 | 100.000 |
| 33 | 1.718E-16 | 5.053E-16 | 100.000 |
| 34 | 7.975E-19 | 2.346E-18 | 100.000 |
| 35 | 6.288E-14 | 1.527E-15 | 100.000 |
| 36 | 5.897E-18 | 2.053-17 | 100.000 |

Extraction Method: Principal Component Analysis.

Appendix IV: Component Score Coefficient Matrix

| Variable | Scoring weight | mean | Std.deviation |
|---|---|---|---|
| **Assets ownership** | | | |
| Hand hoe | -.012 | .9833 | .1284 |
| Bush knives | -.001 | .9722 | .1648 |
| Axe | .017 | .8833 | .3219 |
| Hurricane | .037 | .3722 | .4847 |
| Torch | .006 | .5056 | .5014 |
| Charcoal use | -.017 | .4667 | .5003 |
| Local kerosene lamp | -.002 | .9778 | .1478 |
| Chair/tables | .239 | 1.667E-02 | .1284 |
| Wool mattress | -.005 | .7167 | .4519 |
| Radio | .008 | .5778 | .4953 |
| Bicycle | .052 | .4111 | .4934 |
| Livestock | -.101 | .4056 | .4924 |
| Television | -.036 | 5.556E-03 | 7.454E-02 |
| Big sized pot | -.094 | .1500 | .3581 |
| House | .001 | .8889 | .3151 |
| **Housing condition** | | | |
| Mud floor | -.369 | .9722 | .1648 |
| Cement floor | .369 | 2.778E-02 | .1648 |
| Burnt bricks wall | .046 | 6.667E-02 | .2501 |
| Mud bricks wall | -.017 | .4722 | .5006 |
| Tree and mud wall | .002 | .3722 | .4847 |
| Cardboard wall | .020 | 1.667E-02 | .1284 |
| Mud with mud wall | -.017 | 6.667E-02 | .2501 |
| Tree walls | -.029 | 5.556E-03 | 7.454E-02 |
| Corrugated iron sheet roof | -.033 | .4167 | .4944 |
| Tree, mud roof | .030 | .5556 | .4983 |
| Thatched grass roof | .010 | 2.778E-02 | .1648 |
| **Water source** | | | |
| Tap water | -.035 | 2.222E-02 | .1478 |
| Borehole | .183 | 6.667E-02 | .2501 |
| Borehole, tap | -.057 | .6944 | .4619 |
| Buying | -.049 | .1111 | .3151 |
| Dams, lake | .004 | .1056 | .3081 |
| **Toilet facilities** | | | |
| Improved pit latrine | -.009 | 1.667E-02 | .1284 |
| Local | -.022 | .9278 | .2596 |
| Bushes | .029 | 5.556E-02 | .2297 |
| **Energy for cooking** | | | |
| Fire wood | -.342 | 0.9222 | .2686 |
| Kerosene/charcoal | .342 | 7.778e-2 | .2686 |

Extraction Method: Principal Component Analysis.

**Appendix V: Cut-off points for quintiles**

| Socio-economic quintile | Low boundary | High boundary |
|---|---|---|
| Poorest (0-20) | Below | -0.3221 |
| Second (21-40) | -0.3222 | -0.2067 |
| Third (41-60) | -0.2068 | -0.1171 |
| Fourth (61-80) | -0.1172 | 0.0322 |
| Better off (81-100) | 0.0323 | Above |