ASSESSMENT OF THE EFFECTIVENES AND SUSTAINABILITY OF HOUSEHOLD FOOD INSECURITY COPING STRATEGIES IN CHAMWINO DISTRICT DODOMA REGION

BY

RUTH MAZENGO

A DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE IN AGRICULTURAL EDUCATION AND EXTENSION OF SOKOINE UNIVERSITY OF AGRICULTURE. MOROGORO, TANZANIA.

2011

ABSTRACT

Household food security is an important development issue. However, food insecurity still persists in many parts of Tanzania due to a number of factors. When people are faced with food shortage, they develop mechanisms to cope with this problem. These strategies, however, are neither effective nor sustainable. Therefore, this study was conducted to assess the effectiveness and sustainability of coping strategies towards food insecurity in Chamwino area in order to suggest possible ways that could be used to increase food production in the area as a way of reducing household food insecurity. Data was collected from 120 respondents by using questionnaires. Researcher's diary and checklist were used to collect information from key informants. Quantitative data were analyzed using Statistical Package for Social Science (SPSS) computer software and qualitative data were summarized and analyzed manually. Respondents were aware of the food insecurity problem and its causes. They identified some coping strategies which they considered to be effective; these included selling of livestock, selling of labour, utilization of wild foods and a reduction in the number and quantity of meals taken. However, despite the use of these coping strategies the problem of food insecurity is still persists. It is therefore recommended from this study that deliberate efforts to be taken by the government and other interested parties to promote and support off-farm income generating activities, train farmers on food processing and storage methods, empower women financially so that they can produce more food, identify wild food plants and conserve them, educate people not to sell their labour during peak farm activities and advise farmers to practice de-stocking of their animals so that they can sell them during period of good prices. Also, the growing of drought resistant crops should be encouraged.

DECLARATION

I, RUTH MAZENGO, do hereby declare to Senate of Sokoine University of Agriculture that this dissertation is my original work and that is has neither been submitted nor being concurrently submitted in any other institutions

_____ _____

RUTH MAZENGO Date

(MSc. Candidate)

The above declaration is confirmed

_____ _____

DR.F.T. MAGAYANE Date

(Supervisor)

COPYRIGHT

ACKNOWLEDGEMENT

I wish to thank all individuals who have been of great assistance in providing me with information and ideals during the dissertation, but it would be very difficult to mention them all by names. First, I thank God for His spiritual guidance and for keeping me in good health throughout my course of study. Without Him nothing could be possible.

I would like to gratefully thank my supervisor Dr. F.T. Magayane for his tireless guidance despite of his other heavy responsibilities and commitments He worked closely with me and devoted his time patiently. He also gave me useful suggestions and encouragement. It was upon him that the shape of this dissertation and completion on time depended.

I wish to express my appreciation to all members of the Department of Agricultural Education and Extension, Institute of Continuing Education and my fellow AEE studies for their useful encouragements and criticism during the early stages of proposal development. Special thanks are extended to Chamwino District Agriculture and Livestock Office for the provision of some of the secondary data for my study. I appreciate the contributions of all village leaders who in one-way or another assisted me during the survey work. The cooperation I received from my respondents enables me to gather data required for my study. Thus, I sincerely thank all the farmers in the study area.

My gratitude is also extended to Belgium Technical cooperation (BTC) and Volkswegen foundation initiative for sponsoring my studies and my employer DED Mvomero for granting me study leave. Deep gratitude and heartfelt thanks is extended to my husband Stockwell Mlyuka for best care of the family.

I express deep thanks to my son Erasto for his patience and love through out my study. Deep gratitude is also extended to Anjelina Nyenza for best care of my son. Special acknowledgement goes to my Brother Yohana Mazengo and his wife Erika for their constant encouragement and daily prayers. Lastly, but not least, acknowledgements are extended to all individuals who in one-way or another made this task a success.

DEDICATION

This work is dedicated to my parents late Mbega Mazengo and late Joyna Makolo who laid down the foundation of my education and my daughter late Aneth Stockwell who did not live to witness my struggle towards this achievement. May Almighty God rest them in internal peace, Amen.

TABLE OF CONTENTS

LIST OF TABLES

FIGURE

LIST OF ABBREVIATIONS AND SYMBOLS

DALDO	District Agricultural and Livestock Development Officer
DED	District Executive Director
FAO	Food and Agriculture Organization of the United nation
FGD	Focus Group Discussion
HIV/AIDS	Human Immune Virus /Acquired Immune Deficiency Syndrome
LCD	Least Development Countries
NGO	Non Governmental Organization
SACCOS	Savings and Credit Cooperative Society
SADC	Southern Africa Development Commission
SPSS	Statistical Package for Social Science
SSA	Sub-Saharan Africa
TFNC	Tanzania Food and Nutrition Centre
TFSP	Tanzania Food Security Programme
URT	United Republic of Tanzania
USDA	United States Department of Agriculture
VEO	Village Executive officer
WFS	World Food Summit
WHO	World Health Organization of the UN

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background

The right to food, which implies food security, is one of the most consistently mentioned aspect in international human rights documents but it is one of the most frequently violated in recent times (Clover, 2003). Concerns generated by the food crisis of the mid 1970s led to world leaders accepting the common responsibility of the international community to abolish hunger and malnutrition (Devereux, 2001).Targets set by the world food summit in 1996 for the reduction of hunger have largely failed (FAO, 2003). The goal of reducing the 798 million undernourished people by half in the year 2015 can now be reached only if the annual reductions can be accelerated to 26 million per year. The anticipated decline is more than 12 times the actual pace of reduction per year which at the moment stand at 2.1 million per year.

Between 1980 and 1988 per capita food consumption in the 48 Least Developed Countries (LCD) declined, while for developing countries as a whole it improved. Of about 800 million people who are malnourished, the highest numbers of these are in Africa and Southern Asia (Baldwin, 2006).

Worldwide, about 200 million people are food insecure a trend which is alarming as progress in reducing hunger in the developing world has slowed to a crawl and in most regions the number of undernourished people is actually growing despite the fact that world food production has grown faster in the past three decades (FAO, 2003).

Food security and insecurity are terms used to describe whether or not people have access to sufficient quality and quantity of food. McCalla (1999) defined food security as access to enough food for healthy and active life. The 1996 Rome Declaration on world food security defined food security as food that is available at all times, to which all persons have means to access; that is nutritionally adequate in terms of quantity and variety and acceptable within the given culture (Madeley, 2002).The concept of food security initially was analyzed at international and national levels; however, later it has also been examined at household and individual levels (McCalla, 1999). The household being the basic economic unit determines the level of consumption by the individual (FAO, 2003). At national level, food security entails adequate supplies through local production and imports (FAO, 1992). However, adequate availability of food at national level does not necessarily translate into even distribution across the country, or equal access among all households (McCalla, 1999). This implies that national food security is not directly linked to household food security much as adequate international, national and local food availability remains inevitable, but an insufficient condition for household food security. Food insecurity refers to people's risk of not having access to the required food over time (McCalla, 1999). It also implies for a situation whereby members of a house encounter inadequate diet for part or throughout the year or face the possibility of inadequate diet in the future (Mwagile, 2001).There are three forms of food insecurity: transitory, chronic and emergency food insecurity. Transitory food insecurity is a temporary decline in household access to needed food due to factors such as instability in food prices, product supply or incomes (FAO, 1992). Chronic food insecurity is rooted with poverty and results into a persistent inadequacy caused

by continued inability of a household to acquire needed food through market purchases or through production. Emergency food insecurity is a situation of actual and unpredictable food shortage, which arises suddenly due to factors such as hurricanes, wars, floods and other spontaneous calamities (Mwagile, 2001).Chronic food insecurity affects some 28% of the African population which is about 200 million people who are suffering from malnutrition (Mandeley, 2002). Famine is the most visible and extreme manifestation of chronic food insecurity. Of the 39 countries worldwide that faced food emergencies at the beginning of 2003, twenty five were found in Africa (Clover, 2003).Tanzania virtually depends on agriculture as a backbone of the economy. Also the majority of Tanzanians depends on agriculture as their main occupation and source of livelihood (URT 1990). More than 80% of the population live in the rural areas and depends largely on agriculture.

However, agricultural production of food and cash crop is not impressive despite several policy declarations to improve agricultural production such as the latest 2009/2010 “Kilimo Kwanza” which literally mean Agriculture First. There is a decline in production of food and cash crop, a situation which has resulted into food insecurity to a large portion of the population. Bennum *et., al*., (1997) observed in Ghana that while agricultural production is stagnant or declining, population is growing fast and the available natural resources are also diminishing rapidly. In Tanzania, the proportion of households in rural areas that suffer from food insufficiency is as high as 77 % (URT, 1990).

Also, in order to address the problem of rapid growing population, poor storage, and agronomic practices coupled with unreliable climatic conditions which greatly

contribute to food insecurity the government formulated an appropriate comprehensive food security programme through the Tanzania Food Security Programme (TFSP) (Makundi, 1996). This was to be used as a cohesive guide or blue print for government planners and donors alike to ensure that the goal of food security is achieved as quickly and efficiently as possible. However, this programme is yet to achieve its goal due to a number of constraints.

When faced with food insecurity, rural households have different responses to reduce risks associated with each type of food insecurity before receiving or seeking external assistance (Watts, 1983). These are known as food insecurity coping strategies. These strategies will vary by region, community, social class, ethnic groups, household, sex, season, severity and duration of the potentiality disruptive conditions (Corbett, 1988).

The common food insecurity coping strategies adopted in Africa communities includes dispersed grazing, change in cropping and planting practices, migration to towns in search for wage or employment, collection of wild foods, use of credit from merchant's money lenders and working in neighbours farms (Corbett, 1988, Watts, 1983). Other strategies includes adjustments of meals and food substitutions, alternative employment and distress migration; sale of household assets, local beer brewing and selling, livestock selling and lease of farm machine equipments (Makundi, 1986; Mngodo *et al.*,1996; Ishengoma,1998).

It is important to note that not all coping strategies are effective and sustainable. It is argued that an effective coping strategy is the one which will improve household food security and increase household income (Mascarenhas, 1983). Importantly, the main tool for developing an effective and sustainable coping strategy is by using the indigenous knowledge possessed by the key actors who are the household members (Katani, 1999).

1.2 Statement of the Problem and Justification

Chamwino district is among the 65 districts in Tanzania that are highly starved due to low food production, poor means of storage and limited alternatives for the food insecurity coping strategies. The reasons reported for the low food production are prolonged drought caused by climate change that significantly affects the rainfall pattern in the district in consecutive years (Kajumulo, 2009) and the limited coping strategies. Consequently, farmers in the area have developed strategies to cope with increasing low food production along with its consequences. However, it is argued that some coping strategies are effective but unsustainable because they can not be changed, meaning that they are detrimental to the livelihoods and future food security (WFS, 2002). A coping strategy is considered effective if it improves food security (Chambers, 1998). The coping strategies against food insecurity and their effectiveness and sustainability in the study area are not well documented. This study aims at investigating the existing food security coping strategies, their effectiveness and sustainability.

Findings from this study will assist in the development of long-term food security coping strategies for the enhanced and sustainable food availability at household level in Chamwino district. The information will also be used by policy makers, NGOs, religious groups and other stakeholders in dealing with food insecurity problem in the study area and other parts of Dodoma Region.

1.3 Objectives of the Study

1.3.1 Overall bjective

The study was aimed at assessing of the effectiveness and sustainability of household food insecurity coping strategies in Chamwino district, Dodoma region.

1.3.2 Specific objectives

(i) To explore household perceptions on food insecurity.

(ii) To investigate households existing coping strategies to food insecurity.

(iii) To examine the effectiveness of the coping strategies from the views of households.

(iv) To assess the sustainability of coping strategies employed by households.

1. 3.3 Research questions

(i) What are the households' perceptions on food insecurity?

(ii) What are the coping strategies employed during food insecurity in Chamwino district?

(iii) Are the coping strategies effective from household views?

(iv) Are the coping strategies to food insecurity sustainable?

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Concept of food insecurity

Food insecurity applies to a wide range of phenomena, from famine to periodic hunger to uncertain food supply (Baldwin, 2006). It addresses people's risk of not having access to food and that there is always a certain degree of food deficits in poor households during part of the year but it is not acute in the sense that no emergence action is required apart from disaster situations such as floods and droughts (Deveurex, 2002). Manifestations of food insecurity include famine which refers to situations into which excess mortality occurs as a result of starvation and diseases related to such circumstances (Corbert, 1998). The risks faced by rural households as a result of famine are severe and unpredictable (Rukuni and Eicher, 1987).

Hunger can be experienced temporarily by people who are food insecure as well as those who are food secure. Chronic hunger is a constant or recurrent lack of food and results in underweight and stunted children accompanied with high infant mortality (FAO, 1996). Acute hunger which amounts to 10% of the world hunger occurs when lack of food period is short term and is often caused when shocks such as drought or war affect vulnerable populations (Baldwin, 2006). Malnutrition is another form of food insecurity: this occurs when there is lack of essential micro-nutrients which fulfils body requirements in a given physiological and social context (FAO, 1980). A food insecure household is more likely to suffer from malnutrition but there is no guarantee for a food secure one to be free from malnutrition. According to FAO

(1996), about 40% of the total African population, largely children and women, face mounting problems of poverty and malnutrition. Food insecurity can be the concept with respect to time. In this regard, there are three forms of food insecurity; namely chronic, transitory and emergence food insecurity (Ishengoma, 1998). Chronic food insecurity occurs when a household on permanent or temporary basis lacks the resources to acquire enough food for a healthy and active life, but the household is not threatened by starvation (Kennes, 1990) and can also be attributed to drought (Liwenga, 1995). It is also linked with lack of access to sufficient land, capital, unemployment and political instability (Clover, 2003).

Transitory food insecurity occurs when a household suffers a temporary decline in food consumption. According to FAO (1996), this can result from instability in food production, food price and the household income or the health of children is affected in its worst form it results into famine. Seasonal food insecurity which occurs at pre-harvest of the cropping season falls under this category. Lastly, emergency food insecurity occurs in situations of acute and unpredictable food shortage which can arise suddenly as a result of factors such as wars, hurricanes, earthquakes, floods and other natural calamities (Rukuni and Eicher, 1987).

In Africa chronic food insecurity in 2001 was affecting 38 million people who were facing outright risk of famine with 24 000 dying from hunger daily (Devereux, 2002). Famines are the most visible and extreme manifestations of chronic food insecurity. In the last three decades, agricultural output in sub- Saharan Africa (SSA)

has hardly kept pace with population increases, this resulted into importation of 25 percent of the continents grain requirements (Baldwin, 2006).

Inherent differences in agricultural systems in India prevented the large increases in food production as seen in Asia. The increases in Asia were due to wide introduction in the 1960-70s of high yielding–varieties of rice and wheat, expanded fertilizer use and more irrigation. The African continent is one receiving most food aid with more than 300 million people requiring emergency food aid in any one year (Madeley, 2002).

2.2 Causes of Food Insecurity

2.2.1 Environmental factors

2.2.1.1 Weather conditions

Exceptionally high variations in rainfall and temperatures have resulted into frequent floods and droughts respectively (FAO, 2002). Floods and droughts resulting for variable weather patterns are one of the main variables influencing the current food crisis in Africa. It is predicted that climate change will cause severe drought in Africa and that by 2050 additional 30 million Africans could be affected by famine (FAO, 2002).

Environmental factors, weather inclusive impact heavily on agriculture, and in turn agriculture has a substantial impact on the environment. Variation (seasonality) in weather conditions in a given location affects agricultural production. One of the causes of seasonal food insecurity is production seasonality as it is dictated by rainfall regime and biological nature of agriculture products (Hubbard, 1995).

In most countries of Africa, agricultural production is rain-fed and therefore, highly susceptible to drought (Makundi, 1996). Food production is normally subjected to weather fluctuations. Yields are expected to be high during good rainy condition; and vice- versa when there are poor rains. In Tanzania, Mngodo *et al.* (1994) reported that climatic factors contribute greatly to household's food insecurity in the communities however; during the good climatic conditions harvests are better. Furthermore, studies carried in Morogoro region (Mtebe *et al.,* 1988); Shinyanga region (CARE International, 1995) and Kilimanjaro region (Makundi, 1996) attributed food shortages due to drought caused by poor and unreliable rainfall.

In parts with one cropping season per year, the season is divided into four periods namely harvest, post- harvest, rainy and pre- harvest seasons. It has been established that in these areas, households experience food shortages during the pre- harvest period (Lorghuist, 1983). It was argued by Ashimogo (1995) that, food shortages during the pre- harvest season was due to the fact that farmers sold their maize in excess during and after the harvesting period, and that post- harvest losses caused by biological and physical factors also caused the food shortage. In order to address the problem of seasonal food insecurity, rural households have been working hard to produce enough food; however, dependency on rainfall has been a major setback. In many developing countries, Tanzania inclusive, agriculture is rain-fed and there is very little irrigation.

Keenja (2001) indicated that in Tanzania, only 16% (156 000ha) of land that is suitable for irrigation (I0 000ha) is irrigated. This makes households and the nation

as a whole to be food insecure. Irrigation is very important when pursuing increased agricultural production. It is a key ingredient to food security; lack of it can cause famine and undernourishment especially in the food insecurity areas.

FAO (2003) reported that, irrigation increases yields of crops by 100 to 400 percent. Along with higher yields irrigation increase income of the households, reduces hunger and poverty. People who do not directly own irrigated land benefits from employment in irrigated field, pay less for the available food and they get more varieties of food. All these results into improved household income and savings accrued from irrigated land. Investing in agriculture, for example through irrigation might be one way of improving the lives of the rural poor through increased agricultural production. This will consequently increase employment opportunities in the rural areas helping to slow down migration to urban centers (Rukuni and Eicher, 1987).

2.2.1.2 Pests and diseases

Insect pests, diseases and vertebrate pests cause considerable food losses both in the field and in storage. These seriously damage the crop right from planting until harvest and in storage structures thereby causing food insecurity. Pests like armyworms, locusts and quelea quelea birds on outbreak may cause a 100% crop loss in the field (Makundi and Magoma, 2003). In order to avert crop loss, individuals and sometimes the government has to take control measures. It is reported that due to the low capital owned by the rural poor, most of them do not invest in the control of pests. Therefore, losses of between 15 -35% have been reported, this leads to food insecurity at household level.

2.2.2 Socio-economic factors

2.2.2.1 Poverty

Widespread abject poverty and hunger are getting worse in Africa. Nearly half the population of SSA lives below the international poverty line of 1.25 USD per day (World Bank, 2008). SSA has the highest prevalence of undernourishment which is a central manifestation of poverty. This is because as poverty worsens, food becomes more important than ever. Undernourishment deepens other aspects of poverty by reducing the capacity for work and resistance to diseases, and by affecting children's mental development and educational achievements.

Food insecurity and hunger are closely related to poverty and an inability to purchase food. Tackling hunger cannot be solved by simply producing more food because famine has occurred even with plenty of food (OXFAM, 2002). It was reported by FAO (1996), that food supplies have increased substantially but constraints on access to food and continuing inadequacy of household and national income to purchase food, instability of supply and demand, as well as natural and man made disasters prevent basic food needs from being fulfilled.

Due to poverty, farmers at household level find themselves under pressure for cash to fulfill other family obligations. This forces them to sell their crop immediately after the harvesting (Makundi, 1996). In many situations, farmers sell food crop produce during harvesting period, at low prices. Also, it has been reported that farmers tend to

sell much of their produces leaving the household with inadequate stocks to last until next harvest; this leads into food insecurity. In areas where food crops are also cash crop like Iringa region, farmers fail to make correct estimates of the amount of the harvest to be sold for cash. Most of them tend to over-sell the harvest resulting into food insecurity (Mngodo *et al.,* 1996). Mosha (1990) observed that the non-involvement of rural households in off- farm income generating activities result into poverty. It was argued that one way of improving household income so as to enable them purchase food in periods of shortage is by the households not to entirely depend on agriculture. Dependence of food cropping on a single growing season, together with lack of income generating projects creates a long waiting period between the sowing and harvesting of the main crop. Economically, this slack period is burden of unemployment, which increases the farmer's dependence on sales of his/ her small food reserves in order to obtain cash for other pressing needs. In order to reduce the over-dependence on selling of food crops, households engage themselves in the growing of cash crops and other off-farm income generating activities for example masonry, weaving, tailoring and the like will probably give solutions to sale of staple foods for cash (Nguya, 2006).

2.2.2.2 Land tenure

Access and rights to land is not only a determinant of food production, but an essential resource for many people if they are to escape poverty and consequently food insecurity (Baldwin, 2006). The distribution of land in eastern and southern Africa is so unequal that land reform and re-distribution is essential if there is to be a major reduction in food insecurity (Lipton, 2001). Land reform programmes have

enormous potential to increase agricultural production. However, they have to be accompanied by comprehensive programmmes of agrarian reform including access to credit, savings and markets in rural areas if they are to fundamentally redress the inefficiencies of inequality. Food production in Tanzania is done by the smallholder rural poor farmers who either own small pieces of land of less than one hectare or do not own land themselves (Ashimogo, 1995). This limits their food production capacity thus leading into food insecurity.

FAO (1985) pointed out that in order for a true solution to the food shortage to be obtained, efforts must start at the household level. Emphasis must be put on tackling the existing food crisis by utilizing all the available resources more effectively in order to achieve the immediate objective of eliminating hunger and ensure food security.

In African countries, women who are the main food crop producers have been deprived of their rights to acquire, hold and own land. Traditional and customary laws often create barriers for women to equal rights of access to land, property ownership and inheritance (Tesha, 2000). However the Land Act No. 4 of 1999 and the Village Act No.5 of 1999 of Tanzania emphasize the right of every woman to acquire, hold, use and deal with land to the same extent as men. This is one of the most fundamental principles that form the basis of secure land tenure for all people irrespective of sex. By giving women land ownership rights, this could improve food security and household income through agricultural production.

2.2.2.3 High population growth

Findings from studies which were carried out in thirteen survey areas in Africa, Asia and Latin America reported that food insecure households tended to be larger and had high number of dependants and younger age and the elderly who cannot do farm activities (Corbett, 1988). An increase in population has rendered some rural families to have less land to cultivate, while urban families have faced difficulties in securing income to support large families (Mosha, 1990). Although household size influences food security by having many people to feed, it is however not easy to establish a specific level of household size at which food insecurity starts (Francois, *et. al.*, 1982). However, at the same level of income or food production, large families are more likely to experience food shortage than small families. National development depends largely on its human capital (the population) whose quality and level of productivity determines the pace of development (WHO, 1982). Quality of productivity of the population is in turn determined by food security. The population must have adequate and nutritionally balanced diets to survive and be able to carry out individual activities in the community and national development activities. However, it has been noted that food shortage is the result of inability of most countries to produce, to purchase or even stock enough food to satisfy demand due to rapid population growth (FAO, 1980).

It is an unfortunate situation that in most developing countries while agricultural production is stagnant or declining, population is growing fast and the available resources are also diminishing rapidly (Bennum, *et al., 1992*). For example in the

SADC countries, food production either declined or remained stagnant while the population grew at a rate of three percent in the years between 1990 and 1995 (FAO, 1996). This has led to food insecurity situation.

2.2.2.4 HIV/ AIDS pandemic

HIV/AIDS is not simply a health issue, but also of vital importance across a spectrum of issues including development, security, food production and life expectancy. In SSA, which is the epicenter of the pandemic, infection levels average around 25 percent of the population, 58% of the affected being women (OXFAM, 2002). The food crisis that threatened more than 14 million people in Southern Africa in 2002/2003 brought into sharp turns on the interactions between HIV/AIDS and food security (Clover, 2003). Where women participate in agricultural production as it is the case in SSA, food security at household and community level is being seriously threatened. All dimensions of food security for example the availability, stability, access are affected in places where prevalence of HIV/AIDS is high. Households in these places do not only loose income and food production which could have been produced by the sick individuals but they also miss the economic contribution of family members who spend time to take care for the sick.

Farming skills are being lost, agricultural development efforts are failing, rural livelihoods are disintegrating, productive capacity to work to the land is declining and household earnings are shrinking (Tibaijuka, 2003). As HIV infection rate continues to rise and spread in several regions of Africa, it poses grave dangers to food security in the continent. Presently, food shortages are now exacerbating the downward spiral of health, both of those suffering from HIV/AIDS and children

suffering malnutrition (OXFAM, 2002). Traditional safety nets are breaking down for example, resources and technical know-how to grow staple crops and commercial crops has forced many households to shift to cultivating survival foods and others has abandoned their fields (FAO, 2003). It has been reported by URT, (2005), that lower labour availability in some areas due to HIV/AIDS has decreased production and productivity which consequently results into food insecurity. This leads into substantial productivity losses in both short and long term due to reduced work performance, lower cognitive ability.

2.2.2.5 Cultural habits on food growing and consumption

Seenapa (1982) reiterated that food insecurity especially in SSA is due to little priority given to highly potential and drought resistant crops for example sorghum, cassava, yams and sweet potatoes. Previously, people used to consume many alternative foods but through domestication and specialization only few species have remained for human consumption. This is called ``food erosion`` which is the removal or disappearance of some food species from the world of consumption (Mosha, 1990).

Food erosion determines to some extent the degree of access to food at the household level. Many families now rely on too few food types with certain food types eaten only during period of food shortage and which are actually considered as inferior type of food (FAO, 1996). Consumption of the less popular foods to cope with seasonal food deficit has been reported in various parts of Africa.

In some Africa culture, consumption of certain foods is mainly determined by consumer preferences, some of which are embedded in cultural norms and taboos (Missano, 1993). Restrictions of consumption of certain kinds of food like eggs and chicken meat to young children and women are known in Tanzania (Mosha, 1990). Improper use of little food available through immediate selling of the harvest after harvesting in order to meet other family obligations and the use in lavish activities may lead into food insecurity. Lavish uses may include the use of the harvest in traditional parties, funerals, marriages and in the making of local brew (Ishengoma, 1998).

2.2.2.6 Labour constraint

The size of the holdings and the area planted increases with the number of the people in the household (Wagao, 1991). It is argued that with low levels of technology in use, it is the labour constraint which is critical at selected points of the agricultural season. Labour profile per year and over years do provide an explanation for the pattern of decline yields per hectare as the size of the holding increases.

2.2.2.7 Marketing system and price fluctuations

Market prices and markets reliability can influence household food security when the household does not have the ability to store food or save cash (Ashimogo, 1995). The household will consequently experience seasonal food shortage not only from inadequate own production but also from seasonally fluctuating market prices that affects their incomes. The typical pattern is for price to drop steeply after harvest due to high supply and then rise slowly until it reaches a maximum and finally to scarcity as food deficit approaches (Maxwell, 2000). Most farmers tend to sell their produces

immediately after harvest where they fetch low price; however, they are compelled to sell in order to obtain cash to meet other obligations.

2.2.2.8 Literacy rates

The level of education of a population in an area has a great influence of adoption of new agricultural technologies (Lorghuist, 1983). Low level of education among members of the household was identified to lead to increased prevalence of malnutrition (Seenapa, 1987). Ignorance and malnutrition are complimentary and it is argued that any successful effort to reduce one is likely to diminish the other (Maxwell and Frakenberger, 1992). A widespread campaign on educating people on issues of food security and the household indigenous knowledge on food storage and budgeting is the common strategy for control of seasonal insecurity (TFNC, 1992)

2.2.2.9 Economic capability

Due to the poor economic capability of farmers in Chamwino district most of the farmers are not able to use better agricultural inputs. Cultivation of large areas requires the use of ox-plough or tractors which most farmers do not possess and have to therefore be hired. Also, buying of agricultural inputs for example improved seeds, fertilizers, agrochemicals for controlling pests needs good capital investment which many farmers in the area do not have. Lack of using improved agricultural technologies limits food production thereby leading to food insecurity in the area.

2.3 Coping Strategies to Food Insecurity

2.3.1 Overview

Coping strategies are measures for dealing with food insecurity situation. These are measures that individuals adopt when faced with food shortages before receiving or seeking external assistance (Kajumulo, 1993). It refers to the whole range of a typical behavior exhibited by individuals or households whose aim is to enable the individuals to endure the effects of adverse situations such as drought which bring about food shortage (Njiro, 1994). These strategies will vary by region, community, social class, ethnic group, household, sex, age, season, and severity of potentially disruptive conditions (Campbell, 1990; Maxwell and Frankenberger, 1992).

People facing food shortage make strategic decisions about how to meet their needs. Options range from informal safety nets in which people draw on their social network, to eating less and cheaper meals and even scrounging for fruit and seeds, or more desperate measure shifting in intensity from the selling off the land (FAO, 2002). At the household level where food insecurity is essentially a problem, a number of coping strategies has been adopted. Risks to food insecurity are frequently anticipated at household level therefore, coping strategies are carefully planned to handle them.

The types of strategies employed by households tend to vary in their emphasis on the choice of coping responses. The tendency is to avoid measures that endanger their future survival (Ishengoma, 1998). The success in coping, however, is unequal across households because of unequal access to community risk-sharing networks and public support. In general, the burden of coping fall heavily on low income

households with a very small protective income source or asset base (Teokul *et al.* 1986). Several workers found that frequency in which households responds to famine differs from one location to another, although, they all follow a simple three-stage model of coping (de Waal and al-Amin, 1986; Cutler, 1985; Watts, 1985). Strategies which are used to cope with famine at its earliest stage may also be used in coping with seasonal food shortages.

2.3.2 Seasonal food insecurity coping strategies

In order to cope with food insecurity in the Sahelian and Eastern Africa, Corbett (1988), identified the following strategies: dispersed grazing, change in cropping and planting practices, migration to town in search of urban employment, collection of wild food, use of credit from merchants and money lenders, migration to other rural areas in search for employment (in other people's fields), rationing of current food consumption. Other strategies included sale of productive household assets (livestock, land) consumption of food distributed in relief programme, sale of possessions (for example jewelry, radio), break-up of the household, increased petty commodity production and trading and distress migration. Some of these strategies were also identified by Campbell (1996). However, the contemporary pattern is different from that in the past as many traditional coping strategies have been undermined or modified by the impact of colonialism and including land alienation by Europeans.

2.3.2.1 Food purchases

Mhinte (2001) reported that food purchase is an important means of obtaining food during food shortage period. Despite an impressive increase in food production by many countries since late 1960`s, food insecurity is still looming, proving that increased production alone is not sufficient for food security (Zithn and Von Brown, 1992).

Majority of households in rural areas are poor thus making it difficult to purchase food in case of shortages. However, rural households design different ways to raise income for purchasing food to overcome the deficit. Labour selling is the most common strategy in many African countries. Either some of the members in food shortage households migrate to urban areas seeking for wage employments and remit cash to those who remained behind (Mngodo *et al.*, 1996; Mwagile, 2001) or they work as casual labourers in other people's fields and receive payment in form of cash (Liwenga, 1995; Beerlandit and Huysman, 1999; Ishengoma, 1998; Makundi, 1996). Other strategies of increasing household income for purchasing food include; sale of cash crops, sale of local brew, doing small business, oxen lease, sale of domestic assets, lease of farm machines and equipments (Mwagile, 2001; Ashimogo, 1995). Mutangadula *et al.,* (1999) reported that in Zambia and Uganda, rural households engage in small income generating activities such as selling firewood, brewing millet beer, tailoring, handcrafts and masonry. Studies have shown that household food security can be improved by buying food during peak season and store it. Also, selling less food at harvest, spending less on local brewing, women being given more power to decide on matters related to food and through provision of credits to help farmers improve crop and animal husbandry (Makundi, 1996). Kaiser and Dewey

(1989) argued that income controlled by women particularly in Africa is more likely to be spent on food. It has been reported that at similar levels of income, households with more women controlled income are more likely to be food secure.

2.3.2.2 Proper utilization of available food

During periods of food shortage, people have to shift from eating their preferred foods to eating alternative foods including wild foods. Consumption of less popular foods to cope with seasonal food deficit was also reported in Malawi (Mhinte, 2001); Kenya (Njiro, 1997); Nigeria (Ogbu, 1993) and Tanzania (Kavishe and Mushi, 1993; Mngodo *et al.,* 1996; Mwagile, 2001). Most wild foods which include green vegetables and fruits can contribute vitamins, other micronutrients and roughages to the diet and studies have shown that women were key informants regarding the use of wild foods (CARE International, 1995; Mwagile, 2001; Watts, 1983; Mngodo, *et. al.,* 1996). In Dodoma Rural district for example, 57 percent of women against 41 percent of were involved collecting and preparing such foods (Mwagile, 2001). However, due to knowledge gaps about famine foods people died on consumption of poisonous roots and mushrooms in Dodoma (Mwagile, 2001).

A downward adjustment in the number of meals eaten per day and the quantity prepared per meal was the most commonly adopted strategy utilized by most households in Zambia and Uganda (Mutangadula *et al.,* 1999) and Tanzania (Mngodo, *et al.,* 1996; Mwagile, 2001; Nguya, 2002). Nutritionally, the household members are forced to take inadequate foods both qualitatively and quantitatively which may be manifested in malnutrition especially for the young ones.

2.3.2.3 Reciprocal arrangements

Institutions in communities like family, clan and age set have fundamental roles in the organization of societies in developing in-kind coping strategies among themselves against food insecurity (Zinyama, *et al.*, 1987). The strategies include labour sharing for example in tending crop fields; gift or loaning food, livestock or cash; and in some cases sending members of a distressed family to live with more fortunate relatives or friends. These kind of arrangement are reciprocal in that assistance given at any time may represent repayment of past kindness or commitment on the part of those being helped to assist the help-givers should they experience problems at a future time (Zinyama, *et al.*, 1987). For example, food borrowing is a common practice in Tanzania (Mwagile, 2001); also reported in Ethiopia (Cultler, 1985); Sudan (de Waal and el-Amin, 1986) and other countries as a food insecurity coping strategy.

Redistribution of children from a distressed family to well off relatives over a period of time is another form of social coping strategy (CARE International in Tanzania, 1995). Loiske (1991) reported that in Babati and Manyara people practice redistribution of livestock where by a cattle owner in need of food entrust a cow to a neighbour or friend against food loan such that when the calf grows, the cow is returned to the original owner and deal is finalized.

A similar kind of arrangement is found in Dodoma where they have a cattle trusteeship system. In this case, the stock owner gives temporary disposition of one or more animal to stock trustee (Kajembe, 1994). The stock trustee will keep the

cattle until after crop harvest when the stock owner will bring a certain agreed amount of food and have his or her cattle back.

2.3.2.4 Environmental manipulation strategies

While the issue of food security is directly linked to climate change and variability, weather is not the single determinant of yield, nor is the physical environment the only decisive factor in shaping food security. Communities which are prone to food shortage situation use their physical resources base to reduce the likelihood of food shortage. In order to ensure food sufficiency all year round, rural households may use manipulated technology of using improved germplasm to increase their output per unit area (Gill, 1991). Also, selection of varieties that mature in short period reduce the severity of seasonal food insecurity. However, Teokul *et al.,* (1986), argued that this approach has a problem of requiring extra labour while the food produced may not be enough.

The use of different localities, valleys and hills which provide different potential, permits farmers to diversify crop production and allow livestock keepers to move their animals from one area to another in search of pasture and water (Gill, 1991). The author also identified mixed cropping as a means of reducing severity of seasonal food shortage. In some parts of developing countries which are food insecure, rural people have established farming systems that will minimize their risk of food insecurity. Corbett (1988) observed that in Sudan, families which practice mixed farming by integrating livestock with crop production appear to be food secure than families that depend solely on crop production. Also, relay cropping

reduces length of food shortage period. According to the Tanzania Ministry of Agriculture (1996) one of the strategies used by the government to make food more available to households was promoting simple models of household requirements through cultivation of resistant crops, home gardens and simple technologies for food preservation.

Different crops have different water requirements; for each agro-ecological zone there are specific crop which can be growing in order to get reasonable yields for food sustainability. In the semi-arid areas of Tanzania like Dodoma and Singida regions, farmers are advised to grow drought resistant crops for example cassava, sorghum, millets and sweet potatoes (TFNC, 1992). However, since these are not the favored food by many people, farmers have been growing maize which does not perform well in the areas. Consequently, these areas have been facing recurring famines (Liwenga, 1995).

2.4 Effectiveness and Sustainability of Coping Strategies

Sustainability of livelihood strategies was defined as those strategies which provide adequate stock and flows of food to meet basic demands (Alexandratos, 1995). Also, a coping strategy is said to be sustainable if it continues to be practiced even if the financial support has ended (USAID, 1987). An effective coping strategy is a mechanism which shows success to overcome food insecurity in the household (URT, 2003). A coping strategy can be effective if it will improve food security and increase household income. Any strategy to address food insecurity for the majority of the rural population in Tanzania, must involve actions to improve agriculture and

farm income. It has been observed that the same coping strategies being applied in different communities or households may produce different effectiveness. This will differ depending on the location, economic status, social and cultural aspects of the specific household. For example, even though use of wild food as a coping strategy have shown effectiveness in some parts of Tanzania, the case is different in Mufindi district where this strategy was not effective in supporting adequate food needs to the family members (Msola, 2007).

According to Mascarenhas (1983), for a coping strategy to be effective at the household level, it should have the following indicators: it increases food availability, increases household income, improves household feeding patterns, increases the number of months of household grain provision, increases the number of built and used storage facilities, and increase household assets.

Some studies have shown that some of the food insecurity coping strategies in fact lead to increased food insecurity (Mwagile, 2001). For example selling of labour to neighbours where mainly youth and men go to work in well- off neighbours farms in order to be paid in cash or kind has been reported to be ineffective and unsustainable (Mwagile, 2001). This is because while these people are working in other people's fields they fail to work on their fields at appropriate time. This leads to low production hence food insecurity. Also, migration by youths and men to urban areas for wage employment leaves farm workload to women, the children and old people. These are not able to work efficiently on farm activities so as to produce enough food and cash crops for family sustenance (Mngodo et *al*., 1996).

Collection and consumption of wild foods where people eat wild fruits, roots and vegetables helps people to at least cope with food insecurity (Ishengoma, 1998). However, the task of collecting, preparing and storing them is considered to be women's activity (Mwagile, 2001). In households where the number of women is limited, this strategy may not be effective. Also, due to a knowledge gap in the botany of wild plants; consumption of toxic plant materials may lead to health hazards or even death as it happened in Dodoma region, in 1998 where people died due to eating poisonous plants.

Selling or exchanging of livestock during shortage for cash or food is not effective and sustainable. For example selling of draught animals including oxen or donkey during food shortages was found to have a repercussion on the following cropping season as these animals were in shortage when it came to land preparation (Kajumulo, 2009). Another problem is that livestock sold or exchanged with merchants for cash or food are given at a take away price because of the desperate need for cash by the poor person to buy food.

According to Mascarenhas (1983) making and selling of local brew is not an effective strategy because it utilizes cereal grain such as sorghum and maize there by reducing household food stock. A downward adjustment in the number of meals eaten per day and the quantity prepared per meal, though the most commonly adopted coping strategy utilized by most households is neither sustainable nor efficient.

A reduction in the quantity and number of meals to the already under-fed population may lead to malnutrition. According to FAO (1996), about 46% of the total Africa population, largely children and women face mounting problems of poverty and malnutrition due to the lack of adequate calories, proteins, vitamins and other essential micronutrients.

The problem of rural food insecurity is essentially a problem of rural households. The overall strategy to reduce food insecurity must be to increase the opportunities available to low income households. Katani (1999) stressed that in developing a coping strategy the key actors should be the household members who possess indigenous knowledge. Since the majority of the rural poor depend mainly on agriculture for their livelihood, that will mean to assist them to produce more, of both cash and food crops, so that they can both provide cash for household needs and feed their families (Mngodo *et al.* , 1996).

In their report, FAO (1987) pointed out that more efforts should be put on households facing food shortages and must be given the opportunities to earn adequate income and attain sufficient domestic food production. Amartya (1981) emphasized that major solutions to household food insecurity must involve combined efforts and coping strategies. These may include mobilizing and assisting the farmers to be enable them produce and store enough food for their families. Food insecurity and poverty are two faces of the same coin. Poverty alleviation programmes through improved agricultural food production have to themselves be sustainable. IFPRI (2001) cited in USAID (2003) estimated that for each one percent

rise in agricultural productivity, poverty would be reduced by 0.6%. Sustainability of poverty alleviation efforts has a number of aspects. One is that the emphasis should be on interventions designed to enhance the income generation capacity of the poor (Dearden and Cassidy, 1990).

Important elements of these interventions are ensuring provision of essential infrastructure services and creation of policy environment enabling private small enterprises (for example off- farm income generating activities) to flourish and for the long term human resource development investment through effective health and education service expenditure. A second aspect of sustainability is an emphasis in food production conservation oriented technologies, and the third aspect is that services helping the poor must be designed to be highly cost effective.

CHAPTER THREE

3.0 RESEARCH METHODOLGY

3.1 Description of the Study Area

3.1.1 Location

The study was conducted in rural areas of Chamwino district which is one of the five districts of Dodoma Region. It lies on the central plateau of Tanzania in the western bearing along Dar es Salaam-Dodoma road. The district has a total area of 8 056 km square. The District borders Dodoma Municipal on the western front, Kondoa District on the North Kongwa and Kiteto Districts on the East and Mpwapwa District and Iringa rural on the Southwest. Also, Bahi district on the South East front.

Administratively, the district council is divided into 5 divisions 32 wards, 78 villages and 687 hamlets.There are two parliamentary electoral constituencies namely Chilonwa, and Mtera (Figure 1). It lies between Longitude 35 and 39 E and Latitudes 4 and 8 South. Altitude is about 910m above sea level.

3.1.2 Population size and growth

National population census of 2002 showed that Chamwino District had a population of 260 841 people; among them 136 869 were females and 123 972 males (URT, 2003). However, the year 2004 projections show that Chamwino district has a population of 289 959 whereby females are estimated to be 151 091 and 138 868 are males (DED 2011, personal communication). The population density is 33 people per square kilometers.

3.1.3 Climate

According to DALDO (2004) Chamwino district is composed of two agro-ecological zones, the features of Zone I includes undulating plains and hilly areas. This zone receives low rainfall of about 400mm per year which are unreliable and spatially unevenly distributed. Zone II receives between 500-600mm of rainfall per year. The climatic conditions in Zone I allow the growing of soghum, millet, groundnuts cassava and bambaranuts. In Zone II sorghum, millet, cassava, sweet potatoes, groundnuts, bambaranuts, sunflower, simsim, grapevines, pigeon peas, vegetables and maize are grown.

3.1.4 Occupation

The majority (80%) of the residents in Chamwino district are smallholder farmers (DALDO, 2004). They are growing different types of cash and food crops; also they are keeping livestock mainly cattle, goat and sheep. Suitable land area for agriculture in Chamwino district is 572 115 ha out of which only 79 380 ha are being cultivated.

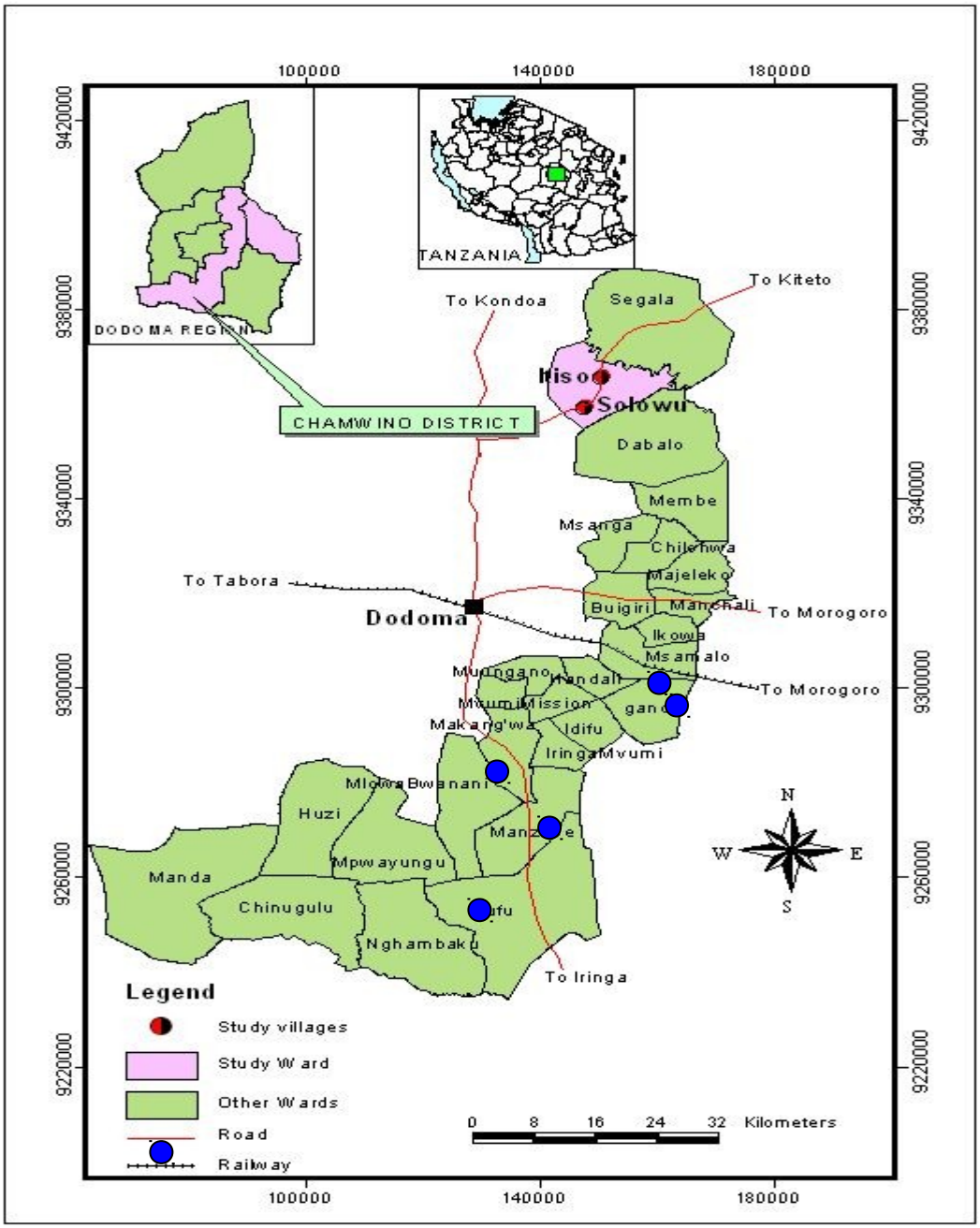

Figure 1: Chamwino District indicating the study area.

3.2 Research Design

A cross-sectional research design was used in this study. 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 (Babbie, 1993). Because of limited resources including time and finances available for data collection, this design was considered favourable.

3.3 Target Population

Households in Chamwino district who are practicing agricultural production were the target population for this study.

3.4 Sampling Procedures

The study employed a multistage – sampling technique in selecting 4 Wards out of 32 which make up Chamwino District. Selected Wards were Manchali, Ikowa, Makang'wa and Mvumi mission. Then, one village was selected from each ward to obtain a total of 4 villages. These were Manchali B, Makoja, Mlowa barabarani and Mvumi Makulu.

From each village 30 households were randomly selected from the existing village register which was used a sampling frame. Simple Random Sampling particularly lottery method was used because it allows each member in the population to have equal chance of being included in the sample (de Vans, 1993).

3.5 Sample Size

The sample size was consisted of 120 respondents who were randomly selected as described above (3.4). This sample size was arrived at in consideration of cost and time limitations for conducting the study.

3.6 Data Collection

3.6.1 Data collection instruments

Structured questionnaire with open and close ended questions were used to collect data. Researchers diary and checklist were used to supplement the information obtain during the interview.

3.6.2 Data collection procedures

3.6.2.1 Pre-testing of the questionnaire

A pilot survey was done before the actual study to test the questionnaire for its accuracy, adequacy of time allocated and for the researcher to familiarize herself with the study area. Fifteen (15) randomly selected farmers from the study area participated in this exercise; they were however not included in the actual study.

3.6.2.2 Primary data collection

Primary data were collected by interviewing the respondents using questionnaires. Checklists were used to interview the key informants who were the people who are knowledgeable on the issue at stake. They included extension officers, village leaders, NGOs workers and farmers who were not used in the aforementioned interview. In each village a total of 8 key informants were interviewed. Also, Focus Group Discussions (FGDs) were also held to collect the information for supplementing the study findings. This involved 6-12 farmers in each village and the discussion was led by a checklist.

Direct researcher's observation through keen observation and hearing was made in order to verify some of the information given during the interview and FGDs. These formed the researcher's diary.

3.6.2.3 Secondary data collection

The researcher collected secondary data through documentary review. Sources of this information were from Sokoine University National Agricultural Library (SNAL), DALDO's offices, Ward and village offices and from electronic sources.

3.7 Data Processing and Analysis

Data from household questionnaire were summarized and coded for computer analysis using Statistical Package for Social Sciences (SPSS) computer software. Frequencies and percentages were mainly the descriptive statistics which were computed and are presented in this report.

CHAPTER FOUR

4.0 RESULTS AND DISCUSSION

4.1 Respondent Personal Characteristics

This section covers the aspect of personal characteristics which were studied and were considered to have an influence on household food security issues. Characteristics included sex, age, marital status, level of education, occupation and household size. Result in Table 1 shows that there was about equal numbers of males and females in the households with a slightly higher percentage of males (52.5%) compared to females (47.5%).

As far as household food security is concerned, studies have shown that female headed households are more food secure than male headed households (Makundi, 1996; Ishengoma, 1998). It was further argued by Kaiser and Dewey (1989) that, income controlled by women particularly in Africa, is more likely to be spent on food. They further postulated that at similar levels of income, households with more women controlled income are likely to be food secure than male headed households because men are more likely to spend their income on other expenditures than on food. Also, Makundi (1996) observed that giving women more power to decide on matters related to food can improve the household food security. Table 1 further show that the predominant age group in the study area is between 36-45 years which comprised 33.3% of the respondents. This is within the productive age which lies between 30 and 50 years; people in this age group are expected to indulge themselves in on farm and off-farm activities. Age, has an important bearing on decision- making in food production, utilization and storage. Considering the age

composition of respondents in the study area, being within the productive age, this area is expected to be food secure other factors being constant.

Table 1: Distribution of Respondents by personal characteristics (n=120)

Characteristic	Number of respondents	Percent
Sex (n=120)		
Male	63	52.5
Female	57	47.5
Total	**120**	**100**
Age(n=120)		
<25	9	7.5
25-35	18	15.0
36-45	40	33.3
45-55	29	24.2
>55	24	20
Total	**120**	**100**
Marital status (n=120)		
Single	12	10.0
Married	77	64.2
Divorced	18	15.0
Widowed	13	10.8
Total	**120**	**100**
Level of education (n=120)		
None	43	35.8
Primary education	62	51.7
Secondary education	12	10.0
Post secondary education	3	2.5
Total	**120**	**100**
Occupation (n=120)		
Farmer only	74	61.7
Petty trader	6	5.0
Farmer and petty trader	34	28.3
Household keeper	1	0.8
Formal employment	5	4.2
Total	**120**	**100**
Household size (n=120)		
1-3	17	14.2
4-5	51	42.5
6-7	52	43.3
Total	**120**	**100**

Findings in Table1 also show that 64.2% of the respondents are married whereas 10% were unmarried. It is expected that married couples are likely to be more productive compared to single individuals due to labour supply in farm activities and access to productive resources in agriculture which will lead to food security (Mngodo *et al.,* 1996).

It is further depicted from Table1 that more than half of the respondents (51.7%) had attained primary school level of education whereas 35.8% had not obtained formal education. Primary education has been identified to be the dominant education level among people who are employed in the informal sector in Tanzania (URT, 2003).The level of education of a population in an area has a great influence on the adoption of new agricultural technologies (Lorghuist, 1983). It is argued that a wider spread campaign on educating people on issues of food insecurity and the household indigenous knowledge on food storage and budgeting is an important strategy for controlling food seasonal insecurity (TFNC, 1992).

With the majority the people in the study area being primary school leavers there is a need to organize such campaigns in order to improve the food security situation. Respondents were asked the type of occupation they were engaged in and most of the respondents (61.7%) were engaged in on-farm activities as smallholder farmers. This was followed by a category of respondents who were practicing both farming and doing petty business such as selling of charcoal, running kiosks and selling bites. These contributed 28.3% of the respondents. It is anticipated that because majority of the population in the study area are full-time engaged in farming activities, farmers could be able to produce enough food to feed their households.

Household size, which is an important indicator of labour supply and food requirements, was also assessed. Households comprised of 4-5 members (42.5%) and above 5 members (43.3%). The average household size was 5.4 members. This size is on a higher side compared to that of 4.2 reported in the 2002 census for Dodoma Rural district where Chamwino district used to belong (URT, 2003). In Tanzania, rural household size is 5.1 (URT, 1997). Although household size affects food security, it is not easy to establish a specific level of household at which food insecurity occurs. However, at the same level of income or food production, large families are more likely to experience food shortage than small families as is the case in the study area. Findings from studies conducted in thirteen survey areas in Africa, Asia and Latin America reported that food insecure households tended to be larger and have higher number of dependants and younger age composition (FAO, 1992).

4.2 Agricultural Production Activities

4.2.1 Land preparation and utilization

Table 2 shows that 95.8 percent of respondents in the area do own land. Access and rights to land do not only determine food production but also it is an essential resource for many people if they are to escape poverty and consequently food insecurity. Land ownership is a very important factor in determining how land is going to be utilized in agricultural production. For example, it is most likely that the land owner will not allow a person who has hired his land to grow perennial or permanent crops. Therefore, in the study area, land ownership if properly utilized is a factor which could positively contribute towards food security.

The size of land owned and cultivated by the majority of the respondents was less than one hectare as indicated by 61.7% and 62.5% of respondents respectively. About 21% of the respondents owned and cultivated more than 2ha.

Table 2: Distribution of Respondents by land ownership and utilization (n=120)

Aspects on land	Number of respondents	Percent
Ownership of land (n=120)		
Do own land	115	95.8
Do not own land	5	4.2
Total	**120**	**100**
Size of land owned (ha) (n= 115)		
<1ha	71	61.74
1-2ha	25	21.74
>2ha	19	16.52
Total	**115**	**100**
Size of land cultivated (n=120)		
<1ha	75	62.5
1-2ha	25	20.8
>2ha	20	16.7
Total	**120**	**100**
Means of land acquisition (n=120)		
Bought	43	35.8
Inherited	39	31.7
Given by village government	9	7.5
Cleared new land	15	12.5
Hired	14	11.5
Total	**120**	**100**
Land control (n=115)		
Men	68	59.1
Women	40	34.8
Family members	7	6.1
Total	**115**	**100**

The size of land cultivated has a significant bearing on food security. Ashimogo (1995) observed that food production in Tanzania is done by the smallholder rural poor farmers who either own small pieces of land of less than one hectare or do not own land

themselves this limits their food production capacity, thus leading into food insecurity. URT (1999) reported that more than 85 percent of smallholder farmer in Tanzania cultivate between 0.9 to 5 hectares of land.

Table 2 further presents findings on the means of land acquisition respondents who bought land were the majority (35.8%) followed by those who inherited it (31.7%). Those who were given land by the village government are 7.5% and through clearing of new land accounted for 12.5% of the respondents. It was observed by Mwagile (2001) that in the study area land was not a constraint in agricultural expansion but low income and lack of capital to expand more land and buy inputs as well as farm implements were the limiting factors. Emphasis should therefore be put on tackling the existing food crisis by utilizing all the available resources land inclusive more effectively in order to achieve the immediate objective of eliminating hunger and ensure food security. Findings from this study shows that men dominantly control and own land (59.1%) whereas 34.8% of women do control and own land. In the study area, like in many other parts of Tanzania, traditional and customary laws often created barriers for women to equal rights to access land, property ownership and inheritance. Efforts to make sure that women have equal rights of access to acquire, hold, use and deal with land to the same extent as men could improve food security and household income through agricultural production.

4.2.2 The use of improved technologies in agricultural production

Use of improved agricultural technologies including improved crop varieties, crop protection measures, recommended spacing and proper food storage are pre-requisites in ensuring food security of households in a given area.

Table 3 presents responses on the use of improved crop production technologies. More than half of the respondents (57.5%) were not planting their crops by using the recommended spacing. This results into either having fewer plants per unit area or having more plants per unit area which results into plants competition for resources. All these results into low crop yields which leads into food insecurity.

Table 3: Distribution of Respondent by use of improved crop production technologies in their farm (n=120)

Type of improved technology used	Number of respondent	Percent
Proper spacing		
Use of proper spacing	51	42.5
Do not use spacing	69	57.5
Total	**120**	**100**
Improved varieties		
Do use of improved varieties	55	45.8
Do not use improved varieties	65	54.2
Total	**120**	**100**
Pesticides		
Use of pesticides	30	25.0
Do not use pesticides	90	75.0
Total	**120**	**100**
Fertilizer/manure		
Do apply fertilizer/manure	44	36.6
Do not apply fertilizer/manure	76	63.4
Total	**120**	**100**
Agriculture equipments		
Do use oxen/tractor plough	37	30.8
Do not use oxen/tractor plough	83	69.2
Total	**120**	**100**

Results in Table 3 further shows that many farmers do not use improved technologies. All these technologies lead into increased yields in terms of quantity and quality; thereby ensuring food security in a given area. Table 3 shows that many (54.2%) do not use improved varieties. Improved varieties may have different attributes for example resistance against certain diseases, pests and drought: thereby ensuring food security in a given area. A quarter of the respondents were applying pesticides to protect their crops against pests. The high percentage of farmers who are not taking crop protection measures are likely to have their crops being damaged by pests which will result into low crop yields; consequently resulting into food insecurity. Only 36.6% of respondents were applying manure or fertilizers in their crop fields. Application of manure and/or fertilizers to supply plants with basic nutrients and protecting crops against diseases and insect pests normally gives higher crops yields; thus food security. Farmers in the study area should be sensitized to apply farmyard manure which is abundant in their crop fields so as to increase yields. Findings in Table 3 also show that there is limited use of oxen or tractor drawn equipments as only 30.8% of respondents indicated to use them. The remaining percentages (69.2%) were using hand hoe and other traditional digging tools. Limited use of oxen or tractors was due to high prices of buying or hiring them. It was noted during FGD that small acreage was the factor which was limiting the use of oxen or tractor in plowing. Many of respondents said that "*even if we had money to hire a tractor, the land we own is too small to warrant use of a tractor*".

In the study area, there are two extension agents to disseminate new agricultural technologies. However, some farmers questioned the services and advices provided by extension agents during FGD. It is imperative for the extension agents to sensitize

farmers to use improved technologies so as to increase crop yields to make the households food secure.

4.2.3 Major food crops harvested and their utilization

Table 4 presents yields of major crops harvested in the area during the 2008/09 cropping season. About 55.8% percent of respondents harvested between 101-500kg of groundnuts, 41.7% harvested between 26-100kg of millet, 41.7% harvested between 101-500kg of sorghum whereas 50.8% of respondents harvested between 26-100kg of maize. Results, further revealed that yields of more than 500kg were obtained by the following percentages of respondents; groundnuts (19.5%), millet (13.3%), sorghum (13.3%) and maize (12.5%).

Table 4: Distribution of Respondent by amount of major crops harvested in 2008/09 cropping season (n=120)

Yield of major crops (kg)	Number of respondents	Percent
Groundnuts		
0-25	7	5.8
26-100	23	19.2
101-500	67	55.8
>500	23	19.2
Total	**120**	**100**
Millet		
0-25	20	16.7
26-100	50	41.7
101-500	34	28.3
>500	16	13.3
Total	**120**	**100**
Sorghum		
0-25	20	16.7
26-100	50	41.7
101-500	34	28.3
>500	16	13.3
Total	**120**	**100**
Maize		
0-25	21	17.5
26-100	61	50.8
101-500	23	19.2
>500	15	12.5
Total	**120**	**100**

From the findings, sorghum followed by groundnuts yielded well which were the followed by millet and maize. Given the semi-arid type climate of the study area which is usually accompanied by unreliable rainfall it is better for the farmers to grow crops which are drought resistant for example cassava, sweet potatoes and sorghum although they are not favoured foods in the area.

This was attested by the extension agent during FGD who said *"although farmers know that growing of maize is very risky because of unreliable rainfall, they still prefer to grow maize to other crops because they prefer it as their favourite staple*

food". Sorghum and millet are considered to be unpalatable. It was further revealed that households with better purchasing power were buying maize to be used as their staple food during period of poor maize harvests. There is a need to put more efforts to convince farmers to growing drought tolerant food crops which can tolerate the drought conditions. Continued growing of maize which does not perform well in the area will lead to prolonged food insecurity.

4.2.4 Uses of harvested crop

The various uses of harvested crops in the study area are presented in Table 5. A bigger amount of harvested food crop is used for food as it was attested by 40.7% of the responses. Selling foodstuffs for income was mentioned by 33.3%, whereas use of cereals for local brewing was also mentioned by 13.3%, using foodstuffs for ceremonies were 7.3% and for ritual sacrifices 5.3% of responses.

Table 5: Distribution of responses by various uses of harvested food crop

Uses of food crops	Number of responses	Percent
Consumption	61	40.7
Selling for income	50	33.3
Local brewing	20	13.3
Ceremonies	11	7.3
Rituals	8	5.3
Total	**150**	**100**

Selling of harvested produce immediately after harvesting in order to get cash so as to meet other family obligations is a common phenomenon in many parts of Tanzania. Due to poverty, farmers at household levels find themselves under pressure for cash, which compels them to sell their crops immediately after harvesting

(Makundi, 1996). Also, it has been reported that farmers tend to sell much of their produces leaving the household with inadequate stocks to last until next harvest; a situation which lead to food shortages. Mngodo *et al.,* (1996) observed that in areas where food crops are also cash crops, farmers fail to make correct estimates of the amount of the harvest to be sold for cash. Most of them tend to over-sell the harvest resulting into food insecurity this was also the case reported in the study area. Mwagile (2001), found that in Dodoma and Singida regions it was common for households especially the poorer ones, to run out of their own food stocks before the next harvest (April/May).

The use of cereal in local brewing as a strategy to obtain income has a negative impact on food security because it utilizes cereals which are otherwise meant to be used for food. To accentuate the problems of local brewing on food security, the Village Executive Officer (VEO) Manchali said that "*this business if not well planned, may utilize food produce meant for food, thereby living the family in famine. If famine is widespread among many families, it compels the government to intervene by providing food. This is a big problem.*"

It is also revealed from Table 5 that some harvested food is used for ceremonies like traditional parties and marriages. Also, some of it is used in funerals, making ritual sacrifices and the like; all these if not well planned may lead to food insecurity

4.2.5 Food storage

Proper post-harvest handling and storage of the harvested produce forms an important cornerstone of food security. Table 6 presents responses on food storage strategies practiced by household in the study area. About seventy four percent of the respondent reported that they were storing their harvests whereas the remaining (25.8%) were not storing food because there wasn't much to store. Food storage is important in ensuring that the household has got enough food in terms of quantity and quality from one harvest season to another.

Results in Table 6 further shows 56.2% mentioned a popular storage means were storage in sacks followed by wickerwork baskets "Vihenge" (32.6%). Other means of storage include storing in woven baskets 9.0% of the responses.

Table 6: Distribution of respondents by food storage and storage methods

Variable	Number of respondents	Percent
Practice food storage (n=120)		
Do practice	89	74.2
Do not practice	31	25.8
Total	**120**	**100**
Food storage method (n=89)	Number of responses	
Sacks	50	56.2
"Vihenge"	29	32.6
Baskets and tins	8	9.0
Silo	2	2.2
Total	**89**	**100**
Food stored lasts till next harvest (89)		
Do not last	76	85.4
Do last	13	14.6
Total	**89**	**100**
Problems faced during storage (n=89)		
Insect damage	45	50.6
Rodents damage	30	33.7
Theft	10	11.2
Rotting	4	4.5
Total	**89**	**100**
Means of solving pest problems (n=89)		
Sun drying	30	33.7
Apply traditional herbs	20	22.5
Apply ashes	17	19.1
Do nothing	12	13.5
Apply insecticide	10	11.2
Total	**89**	**100**
Having knowledge on food storage (n=89)		
Do not have	63	70.8
Do have	26	29.2
Total	**89**	**100**

From the results, it is evident that farmers in the study area are using traditional methods of food storage which is poor and which lead to biological and physical damage of stored food crops. A crop loss of between 25-40% and sometimes 100% has been reported in Tanzania under traditional storage methods (FAO, 1990; URT, 1992). Furthermore, majority (85.4%) of the respondent indicated that the food they stored did not last until the next harvesting season which means that majority of the

households were facing food shortages. These households were therefore forced to look for other sources of food. Respondents indicated that they were facing some problems in the process of storing grains. Insect pest problem was mentioned by 50.6% of the responses followed by 33.7% rodents, theft (11.2%) and rotting about (4.2%) of the responses. The loss caused by these biological agents significantly reduces the amount in quantity and quality of grains stored. This leads to food insecurity in the area. Normally theft occurs on wickerwork baskets which are normally situated outside the residential houses. Responses on how to protect food crop produces indicated that they were using sun drying of their produces which was 33.7% of the responses. Other measures included use of ash to protect their food crops (19.1%); however it was also indicate that some farmers were doing nothing to protect their produces. Kitchen ashes are known to be effective in controlling stored product insect pests provided their application is made timely before infestation had began and the correct amount has been applied (Bamaiyi *et al.,* 2006). Regular sun drying which reduces infestation by further removal of moisture content in the produce and also the developmental stages of the insect are killed by desiccation when exposed to sun heat (Gwinner *et al*., 1996). Application of insecticide to protect stored products against insect is not very popular in the area as it was mentioned by only11.2% of the responses. The reasons put forward were high costs, unavailability and lack of knowledge on insecticide application as it was evidenced during FGD. Findings from Table 6 further indicate (22.5%) of the responses has traditional knowledge on how to store food products. Most of them acknowledged that the knowledge they have is from experience either obtained from their parents, relatives or colleagues. During FGD it was apparent that nobody had received any

formal training on storage techniques. In order to avert food insecurity problem in the study area, there is a need to train farmers on good storage methods in order to minimize and prevent post-harvest crop losses.

4.2.6 Livestock ownership

Table 7 presents major types of livestock kept by respondents in the study area. Results show that chicken were the mostly kept whereas pig were the least kept. Only 1.7% of the respondents are not keeping chicken, followed by goat and sheep by 6.7% of respondents who are not, 26.6% cattle and the least livestock kept are pigs by 52.5% of the respondents are not keeping.

Table 7: Distribution of respondents by types of livestock owned (n=120)

Type of livestock	Number of livestock owned	Number of respondents	Percent
Chicken	0	2	1.7
	1-4	23	19.2
	5-9	35	29.9
	>10	60	50.0
Total		**120**	**100**
Sheep and goats	0	8	6.7
	1-4	24	55.8
	5-9	60	50.0
	>10	28	23.3
Total		**120**	**100**
Cattle	0	32	26.6
	1-4	67	55.8
	5-9	15	12.6
	>10	6	5.0
Total		**120**	**100**
Pigs	0	63	52.5
	1-4	21	17.5
	5-9	23	19.2
	>10	13	10.8
Total		**100**	**100**

The number of livestock especially cattle kept by individual were expected to indicate the economic base of the households. During food shortage, livestock especially cattle may be sold or exchanged for food (Kajembe, 1994). It was observed by Corbett (1998) that in Sudan, families which practice mixed farming by integrating livestock with crop

Production appear to be food secure than families that depend solely on crop production; a similar observation was made by Gill (1991).

As an insurance against food insecurity in the study area, people should be encouraged to keep a reasonable number of different types of livestock. These can be sold in times of food shortages to obtain cash in order to purchase food.

4.2.7 Engagement in off-farm income generating activities

Table 8 depicts household respondents' involvement in off-farm generating activities. Three quarters (75%) of the respondents indicates that they were involved in off-farm income generating activities in order to supplement for their income. Casual labourers and local brewing were ranked as the most popular off-farm activities with 20.2 % and 19.6% of responses respectively.

Table 8: Distribution of respondents by involvement and type of off-farm activities

Activity	Number of respondents	Percent
Off-farm activity (n=120)		
Involved	90	75.0
Not involved	30	25.0
Total	**120**	**100**
Types of off-farm activities	Number of responses	
Casual labour	34	20.2
Local brewing	33	19.6
Shanty hotels	26	15.5
Small business	25	14.8
Charcoal/firewood selling	21	12.5
Bites selling	18	10.7
Handcraft	11	6.5
Total	**168**	**100**

Running shanty hotels (“magenge”) (15.5%), doing small business for example running kiosks (14.8%), charcoal and firewood selling (12.5%), making and selling bites (10.7%) and handcraft (6.5%) were other off-farm activities undertaken by the respondents. Involvement in off-farm income generating activities is an integral component in ensuring food security. By diversifying the household’s activities, the risk of food insecurity is reduced, as a downturn in one activity can make up for another. McCarthy (2009) argued that off-farm activities complement on-farm productivity by increasing the household capacity to purchase farm inputs and/or on-farm investments leading to improved yields and labour productivity.

The income generated from off-farm income generating activities enables the household to purchase food in time of shortages. Also the income generated is used to buy other basic needs like school uniform which otherwise could have been

bought by selling crop produces after harvesting. This sometimes leads to food insecurity.

Therefore it is important that farmers in the study area encouraged and empowered financially and technically on how to undertake off-farm income generating activities. This will act as a buffer to the household food security in times of food shortage.

4.2.8 Perception of the food insecurity concept

4.2.8.1 Respondents views on the indicators of food insecurity

Table 9 shows that respondents had different indicators of food insecurity. Highest percent of the responses (25.1%) indicated that food insecure households are those which do not have enough food to eat and in many cases they have to spend their time searching for food. Responses which defined food insecurity households as those who eat less number of meals than the normal ones (3 meals for persons above 6 years and 5 meals for the under-five children) constituted 16.4% of the responses. Harvesting less from their crop fields (15.7%); having little land to cultivate indicated by 12.1%.

Table 9: Response on the indicators of food insecurity situation at household level

Indicators of food insecurity	Number of responses	Percent
Do not have enough food	52	25.1
Eat less meals per day	38	16.4
Harvest less from their farm	31	15.7
Have little land to cultivate	25	12.1
Do not have any livestock	24	11.6
Have malnourished children	20	9.7
Migrate/ work in other peoples farms	17	8.2
Total	**207**	**100**

Other responses on the indicators of food insecurity include; not having livestock was mentioned by 11.7 %, children malnourishment (9.7%); and through some household members migrating to urban areas to seek for wage employment or going to work in other people's farm for cash or food which contributed 8.2% of the responses. All these definitions gives an implication of factors leading to household food insecurity or those which are a result of having less to eat in terms of quality and quantity. These definitions are well encompassed in Madeley (2002)'s definition of food security which is the opposite of food insecurity as food that is available all times, to which all persons have means to access; that is nutritionally adequate in terms of quantity and variety and acceptable within the given culture. In order to properly address the problem of food insecurity, people have to first understand the proper definition of food security.

4.2.8.2 Respondents experience of periods of food shortage

Households were asked if they had experienced food shortage in the past four years. More than three quarters (79.2%) of respondents indicated to have been faced with food shortage in that period. Respondents were further asked to indicate months of the year in which they do normally experience food shortages. Months of January to March were mentioned by 71.6% of the responses as months of acute food shortage followed October- December which were ranked by 18.9% of the responses.

Table 10: Distribution of respondents by months of food shortage (n=120)

Aspect	Number of respondents	Percent
Experienced food shortage in the past four years(n=120)		
Yes	95	79.2
No	25	20.8
Months of food shortage in the year(n=95)	Number of responses	
January-March	68	71.6
October-December	18	18.9
July-September	8	8.4
April-June	1	1.05
Total	**95**	

From the above findings, it is evident that months of January to March are of food shortage in the study area. Unfortunately, it is during this period when farm activities are at their peak including weeding where farmers need a lot of energy to undertake these activities. The months of January to March falls in the pre-harvest period of the study area. Lorghuist (1983) observed that in areas with one year cropping season, households experience food shortages during the pre-harvest period. A number of factors may be attributed to these shortages; for example Ashimogo (1995) argued that food shortages in Sumbawanga region during the pre-harvest season was due to the fact farmers sold their maize in excess during and after the harvesting period and that post-harvest losses caused by biological and physical factors also caused the food shortage.

In the present study, the cause of food shortage during the pre-harvest period was attributed to poor harvests of cereal crops mainly due to poor rains which implied that the amount which was stored could not last until the next harvesting season. Any interventions to provide households with supplemental food from different sources

should be done during the months of between December and March to rescue people from famine and also to enable farmers to get enough energy to work on their farms. This will at least ensure next harvesting season's food security.

4.2.8.3 Causes of food insecurity

Table 11 presents finding on causes of food insecurity in the study area. Finding indicates that labour shortage was the most mentioned (19.1%) as the major cause of food shortage in the study area. This was followed by low income and purchasing power by (14.7%) responses, drought with 13.5%, misuse of food by 12.3%, poor storage structures (11.2 %), poor crop production techniques with (9.9%), overselling the produce after harvest and pests was mentioned by 7.9% respectively and the least mentioned because was the large household sizes by responses (3.6%).

Table 11: Respondents on the opinions on the major causes of food shortage

Causes of food shortage	Number of responses	Percent
Labour shortage	48	19.1
Low income and purchasing power	37	14.7
Drought	34	13.5
Misuse of food	31	12.3
Poor food storage structures	28	11.1
Poor crop production technique	25	9.9
Overselling the produce after harvest	20	7.9
Pests	20	7.9
Large households	9	3.6
Total	**252**	**100**

Labour shortage was caused by selling of labour to other people's farm during the farming period, migration mainly by the youths to urban areas to fetch wage work,

and high costs of hiring labour. The migration of men and youths to town for wage work or them going to work in other people's farms for food or cash during the farming season, leaves their households with only women to work on their fields to produce food for the households. This has a negative impact on food crop production due to the fact that the food produced will not be enough to feed the whole family therefore the problem of food insecurity will be prolonged.

Agriculture in the study is rain-fed; given the semi-aridity type of climate in this area, rainfall amount and distribution is unreliable in most years. This usually leads to crop failure resulting into poor harvests. Some times, the area receives excessive rainfall which causes floods which sweep away crop plants resulting into food shortage. Various studies carried out in the country have attributed food shortages due to droughts caused by poor and unreliable rainfalls (Makundi, 1996; CARE International, 1995; Mtebe *et al.*, 1988).

The remedy to ensure food security in the study area is to plant drought tolerant crops such as sweet potatoes, cassava and sorghum. Low income and little purchasing power of people in the study area significantly contribute towards food insecurity. Lack of permanent cash crop(s) and involvement in non-profitable off-farm income generating activities for example selling of labour makes people in the study area not to have enough income to invest in agriculture and buy food in periods of food shortage.

Respondents also identified poverty in terms of low income and purchasing power as one of the factors contributing to food insecurity. Commenting on the effect of low income on investing in agriculture, one respondent had this to say during FGD "*in our area, land is not a limiting factor; but most of us do not have enough money for opening new land,* buy *improved seeds and fertilizers. This severely hampers our efforts to increase crop production ".*

Inappropriate use of food after harvest also leads into food insecurity. Food is used in ceremonies like wedding; making of local brews, exchange with other items for example khanga and other lavish uses; all these leads into food insecurity. The use of poor crop production techniques was also identified by the respondent as a cause of food insecurity. Respondents mentioned high cost of inputs, unavailability of inputs, and lack of technical know-how on their usage, poor extension services and small land area under cultivation as issues which leads to non-usage of modern production techniques. The subsequent result of using poor crop production methods is poor yield which leads into food insecurity.

Finding in Table 11 also shows that insect pest infestation and diseases infection on crop plants reduces crop yields which consequently lead into food insecurity. Smallholder farmers do not usually take crop protection measures to control insect pests and diseases although some farmers were aware of methods for example the planting of resistant crops. However, infestations for example of armyworms may wipe out the whole crop field; meaning a total loss. During FGD meetings the Extension Officer and the Village Executive Officer (VEO) had this to say about

invasion by armyworms “in *the year 2002 armyworms invaded Mvumi Mission and Makang’wa Wards; they wiped everything which was green. Farmers in that year did not harvest anything, so the government and NGOs had to give food aid.*

Large household size was also identified as a cause of food insecurity in Chamwino district. Many households were found to have above the national average household size of 5.1 people (URT, 1996). These were mainly from orphans, un-controlled birth and polygamy which are common practice in study area (Mwagile, 2001). Given the average area under cultivation per household, it is obvious that enough food to meet the household requirements can not be produced. It is argued that although large families in some cultures has been considered a blessing, a change in economic patterns and life style has created a lot of economic hardships to larger families, as children are no longer an economic asset. Population increase has made some rural families to have less land to cultivate and less to eat (Johnson, 1986). It is important to emphasize the importance of family planning policies in the study area to address the problem of large households. The use of poor traditional methods of food storage in the area leads to post-harvest crop losses which further worsen the food insecurity situation. Storage in sacks and wickerwork baskets leaves the food produce prone to insect, rodents and micro-organisms damage. This reduces the quantity and quality of the food available for consumption.

Another contributing factor to food insecurity was the selling of food crop after harvest to obtain cash in order to attend to other family obligations. This is a common phenomenon especially in areas like Chamwino district where there is no

specific cash crop available in the area; this forces the farmers to treat the major food crop as their major cash crop. The problem arises when farmers fail to estimate enough food stock to take the household through the year; there is a tendency of over–selling. Makundi (1996) observed that this was a common problem in Iringa, Mbeya , Ruvuma , Rukwa , Kilimanjaro and Arusha regions. Selling of up to 20% of the food produced in Iringa region was common and that 75% of the overall cash income was being derived from selling food crops (Mngodo *et al;* 1996). This practice in most cases led into food insecurity.

4.2.8.4 Measures to improve food security situation

According to results in Table 12 food processing was identified as the solution to improve food security (21.8%), while the least mentioned solution was engagement in off-farm income generating activities (6.9%) responses.

Table 12: Respondents on the opinions to minimize the problem of food shortage

Solution	Number of responses	Percent
Food processing	47	21.8
Planting drought resistant crops	41	19.1
Controlling pests and diseases	33	15.2
Proper drying of produce	30	13.9
Good storage of produce	28	13.0
Use recommended agronomic practices	21	9.7
Off-farm activities	15	6.9
Total	**215**	**100**

Other solution included growing drought- resistant crops for example cassava, sweet potatoes, millet and sorghum. People in the study area prefer to grow maize, but due to unreliable rainfall there is usually maize crop failure; thus leading to food

shortage. It is, however encouraging that farmers in the study area have started to realize the importance of planting drought resistant to crops as one of the Extension Officer had this to say "*poor performance of maize because of unreliable rainfalls, people have shifted to growing millet and sorghum and these few are now becoming their dependable staple foods."*

Post-harvest crop loss in storage was also mentioned as one of the factors causing food insecurity in the area that need to be addressed in order to reduce food shortages. Cereals grains which are stored for consumption and planting in the subsequent season have their quantity and quality reduced by different biological and physical agents due to poor storage techniques. There is a need to train farmers on better storage techniques in order to reduce losses. The traditional storage structures need to be improved to minimize wastage thereby ensuring food security.

Engagement in off-farm income generating activities to generate cash for buying food in periods of food shortage and to buy other essential items was also suggested as one of the solutions to overcome food shortages. This will form a better option rather than depending on selling food crops as source of income which later leads to food insecurity especially where there is over-selling and there is no dependable cash crop like in the study area. Farmers should be assisted in establishing sustainable off-farm income generating activities. Mosha (1990) argued that one way of improving household income so as to purchase food in periods of shortage is by the households not to entirely depend on agriculture. Also, farmers are advised to plant permanent crop like grape vines which are known to perform well in many parts of the district.

These will be sold to earn income which can be used to invest in food crop production and buying food during food shortages. Engagement of households in growing cash crops and other off-farm income generating activities for example masonry, weaving and the like gives solutions to sale of staple food for cash (Nguya, 2006).

Table 12 also shows that drying of food to attain the appropriate moisture content before storage was mentioned by the respondents as one of the solutions to food shortage. This included regular sun drying of the produce for storage to ensure that the product is kept at the right moisture content. Some of the respondents indicated that they were storing their cereals by the fireplace so that the heat and smoke produced further dries the cereals so that micro-organisms and insects do not infest them. The knowledge on the importance of drying the cereals to the right moisture content should be insisted during storage technique training to farmers. Respondents also identified the importance of the utilization of proper agronomic crop production techniques and the control of insect pests and diseases improving crop yields. However, little capital possessed by the majority of smallholder farmers makes most of them not being able to invest in those techniques which in most cases requires high investment. It was evident during FGD that factors which were limiting the use of appropriate crop production techniques included the high costs of inputs, unavailability of inputs, and lack of technical know-how, poor extension services system and small land area under cultivation. Apart from the need of improving extension services also farmers should be given access to credit and loan facilities

where they can borrow money in order to invest in production of food crops to ensure food security.

Another solution identified by respondents in addressing the problem of food shortage is the processing of the products before storage. Processing increases the storability and value of the stored product. For example harvesting of vegetables, drying and then grinding them make them to be stored for a long time and can be used in time of scarcity. Also, storing of sliced and dried sweet potato and cassava chips which are available in the study area makes them to be used for a long time of period. Training on food processing especially on how to preserve food to be used in time of food shortages can be a powerful incentive for women to ensure food security in their households.

4.3 Effectiveness and Sustainability of Household Food Insecurity Coping Strategies

4.3.1 Selling of livestock

Table13 presents findings on selling on livestock as a coping strategy and on its effectiveness and sustainability. About 57% of respondents indicated that they were not selling their livestock even when they faced with food shortages, the remaining percentage (43.3%) indicated that they sell some of their livestock mainly cattle and goat to earn cash for buying food. As regards the effectiveness of this strategy 44.2% of respondents indicated that it was effective whereas 15.4% reported and the strategy was very effective. On the sustainability aspect 63.5% mentioned this strategy as being not sustainable while 36.5% of the respondents considered it as being sustainable.

Table 13: Distribution of Respondent by effectiveness and sustainability livestock selling as a coping strategy.

Variable	Number of respondents	Percent
Selling of livestock(n=120)		
Do sell	52	43.3
Do not sell	68	56.7
Total	**120**	**100**
Effectiveness(n=52)		
Effective	23	44.2
Very effective	8	15.4
Not effective	21	40.4
Total	**52**	**100**
Sustainability (n=52)		
Sustainable	19	36.5
Not sustainable	33	63.5
Total	**52**	**100**

Farmers reported to sell their livestock including heifers, pregnant cows and draft animals including oxen and donkeys at low prices. Sometimes livestock are directly exchanged with food. There is also a cattle trusteeship system where cattle may be exchanged with certain amount of food on trust that after harvesting when the cattle owner will return the food and have his or her cattle back.

Livestock selling was said to be effective by some respondents because they get cash to enable them to buy food which they were badly in need of and probably remain with some cash which they can use to meet other family obligations. However, during FGD it was apparent that the prices offered to buy livestock during food shortage period are very low which could not be accepted during normal periods as many of the respondents said that in *last year in the month of February we had to sell our cows and their calves just after calving, only to get money which we only*

managed to get three sacks (about 250kg) of maize. Otherwise we could have obtained about 7 sacks for the same value in times of good harvests."

Selling of draught animals for example oxen or donkeys during food shortages have a repercussion on the following cropping season as these animals will be in shortage when it comes to land preparation. This leads into little land being cultivated, thus food insecurity. This strategy is not sustainable because once a person runs out of livestock to sell; the problem of food security will still be there. Also, selling of livestock is not sustainable because it is not reversible. Farmers should be advised to sell their livestock (de-stocking) during the period of good prices so that they can purchase and store enough food for future use.

4.3.2 Borrowing of food and/or cash

Table 14 depicts household respondents on borrowing of food and/or cash from friends or relatives as a coping strategy. Results show that 52.5% of respondents indicated that they were practicing this strategy whereas the remaining percent (47.5%) indicated that they were not practicing this strategy. Assessment of the effectiveness of the strategy showed that 81.1% of respondents found this strategy to be effective whereas15.9% found it to be ineffective. The strategy was indicated to be not sustainable by 71.4% of the respondents whereas 28.7% respondents found it to be sustainable.

Table 14: Distribution of Respondents by effectiveness and sustainability borrowing food and/or cash as a coping strategy

Variables	Number of respondents	Percent
Borrowing food and/or cash(n=120)		
Do borrow	63	52.2
Do not borrow	57	47.5
Total	**120**	**100**
Effectiveness (n=63)		
Very effective	10	15.9
Effective	43	81.1
Not effective	10	15.9
Total	**63**	**100**
Sustainability (n=63)		
Sustainable	18	28.7
Not sustainable	45	71.4
Total	**63**	**100**

Two types of borrowing were reported to be practiced in the area. One was borrowing and paying back without interest and the other one re-paying with interest. A strategy is effective in the sense that the household obtains food which it needs especially if the food and/or cash borrowed has to be repaid without interest. If the borrowed cash and/or food had to be repaid with interest it has the implication that the household has to produce more so that the surplus food can be returned to the friend or relative. Alternatively, the surplus has to be sold in order to pay back the loan with interest.

The strategy is not sustainable due to the fact that it creates an element of dependency. During food shortage periods when friends or relatives will not be having some food to offer, the household facing food shortage may starve. Also, the household will always be required to produce surplus food for re-paying back the

borrowed food or cash; this is not always the case given the unreliability nature of agriculture practiced in the area.

4.3.3 Skipping of some meals

Table 15 presents respondents on skipping some meals as a coping strategy for food insecurity. The highest percentage (60.8%) of respondents indicated that they were not skipping some meals as a coping strategy while 39.2% of the respondents showed that they were practicing this strategy. On the effectiveness of this practice 27.5% of the responses considered it to be effective, 31.9% very effective and 40.4% not effective. Majority of the responses of 87.2% found this coping strategy as being unsustainable whereas only 12.8% considered it to be sustainable.

Table 15: Distribution of Respondents by skipping some meals

Aspect	Number of respondents	Percent
Skipping of some meals(n=120)		
Do skip some meals	47	39.2
Do not skip some meals	73	60.8
Total	**120**	**100**
Effectiveness (n=47)		
Very effective	15	31.9
Effective	13	27.6
Not effective	19	40.4
Total	**47**	**100**
Sustainability (n=47)		
Sustainable	6	12.8
Not sustainable	41	87.2
Total	**47**	**100**

In the study area, normally the households take three meals which includes breakfast, lunch and dinner although five meals as recommended for the under-five children by the World Bank (1990). However, in periods of food shortage some of

the respondents indicated that they ate one meal (lunch or dinner) only, ate two meals, go without food the whole day or prepare light food for example porridge for children as lunch or dinner. Those who were reducing the quantity of food they were taking, were working on the assumption that by reducing the quantity they were cooking, the food stock they had could take them longer.

The coping strategy of skipping some meals is not effective because it disrupts the household feeding patterns (Mascarenhas, 1983). Although this is a commonly applied strategy in coping with food insecurity it is ineffective and sustainable (Katani, 1999). It leads to poor health status and general body weaknesses, hence, low farm production. This supports the present findings which show that 87.2% of responses found this strategy unsustainable.

4.3.4 Reduction the quantity of meals

Table 16 depicts the respondents on the reduction the quantity of meals taken as a coping strategy towards food insecurity. The highest percent 66.7% of the respondents showed that people in the study area were not reducing the quantity of meals taken while 33.3% they reduce food quantity. On the effectiveness of this strategy 50.0% of the responses perceived this strategy to be effective whereas 30.0% showed it to be very effective and 20.0% responses showed it not to be effective. On the sustainability point of view 75% of responses found this coping strategy being unsustainable where by 25.0% considered being sustainable. Reduction the quantities of meal taken by a household works on the principle that the

food stock available is going to last longer than if the normal ration was going to be cooked.

Table 16: Distribution of Respondents by effectiveness and sustainability reducing meals as a coping strategy

Variables	Number of respondents	Percent
Reduction quantity of meals(n=120)		
Do reduce the quantity	40	33.3
Do not reduce the quantity	80	66.7
Total	**120**	**100**
Effectiveness (n=40)		
Very effective	12	30.0
Effective	20	50.0
Not effective	8	20.0
Total	**40**	**100**
Sustainability (n=40)		
Sustainable	10	25.0
Not sustainable	30	75.0
Total	**40**	**100**

Explaining further on how this strategy is achieved, one of the extension agents had this to say *"some households reduce their meals by a half or change their meals composition for example drinking porridge or vegetable relish"*. Eighty percent of the respondents considered this strategy as being not sustainable. This is because finally the available food stock will be exhausted and if there are no any other sources of food; the household will face food shortage. In general, a downward adjustment in the number and quantity of meals taken by already undernourished individuals especially children and women may lead to malnutrition as a resulting of lack adequate calories, proteins, vitamins and other essential micro-nutrients. One of the VEO while commenting on this coping strategy had this to say: *"by reducing the number of meals taken per day and also by cutting down the ration many children fail to go to school and adults fail to attend to farming activities."* It is suggested

that, it is important for the authorities to provide food assistance to the household facing food shortages during the critical food shortage period of between January and March in order to avoid the problem of people failing to attend to their daily activities.

4.3.5 Eating of famine food

Eating of inferior or famine foods was also identified as a coping strategy and the results are presented in Table17. Findings in Table 17 show that 60.8% of the respondents indicated that consuming inferior foods was being used as a coping strategy whereas 39.2% of the respondents indicated that this strategy was not being practiced. It is further revealed that 66.0% of the respondent who eat famine food found the strategy to be effective whereas 25.5% considered it to be not effective while 8.5% respondents found it as being very effective. More than three quarters (87.2%) of the respondent who eat inferior food found this strategy not to be sustainable while (12.8%) found it to be sustainable.

Table 17: Distribution of Respondents by effectiveness and sustainability consumption of famine food as a coping strategy

Variables	Number of respondents	Percent
Eating famine foods (n=120)		
Do not eat them	47	39.2
Do eat them	73	60.8
Total	**120**	**100**
Effectiveness (n=47)		
Very effective	4	8.5
Effective	31	66.0
Not effective	12	25.5
Total	**47**	**100**
Sustainability (n=47)		
Sustainable	6	12.8
Not sustainable	41	87.2
Total	**47**	**100**

Famine foods are the ones which are not normally eaten during the time of plenty. Collection and consumption of wild foods which include fruits and vegetables is a common coping strategy in many African societies (Campbell, 1986; de Waal and el-Amin, 1986; Ishengoma, 1998). Also, Mwagile (2001) observed that collection of wild fruits in Dodoma rural district was being done by 57 percent of women and 41 percent of men. Wild vegetables and fruits contribute vitamins, other micronutrients and roughages to the diet (CARE International in Tanzania, 1995). In Shinyanga, women were found to be key informants regarding wild foods; it was their responsibility to gather and prepare such foods. Utilization of wild foods during periods of food shortage is an efficient strategy because it broadens the food base available to the households. Urio *et al.* (1996) reported that some of wild foods have characteristic features sustainable for drought and storage and also have good nutritional qualities. However, since collection of wild food is mainly done by women, households with shortage of women may not be able to collect wild foods.

Also, knowledge on the types of wild foods to be collected is important to avoid collection of poisonous species which may cause deleterious effects including deaths on human beings (Mwagile, 2001). Considering other household activities which are undertaken by women, going to collect prepare and store wild fruits denies them enough time to engage themselves in other on- and off-farm activities which may lead into reduced food production and household income. During FGD, the participants had this to say about the sustainability of this strategy *"given the rate of deforestation which is taking place in our area preferred wild fruit trees are being cut down during land clearing for agriculture activities, charcoal preparation and firewood. This forces women to travel long distances to collect wild vegetables and fruits."*

If this trend continues it will reach a point where there will no longer be enough wild fruits to carter for the needy.

4.3.6 Change in diet

Result in Table18 shows that 42.5% of the respondents changed diet whereas 59.5% stuck to their usual diet which is mainly hard porridge (ugali). A change in diet was rated to be effective by 58.8% of the responses while 25.5% of responses as not effective and 15.7% as very effective. On its sustainability, 54.9% of responses considered it as being unsustainable and the remaining percentage of 45.1% as sustainable.

Table 18: Distribution of Respondents by effectiveness and sustainability of change in diet as a coping strategy

Variables	Number of respondents	Percent
A change in diet eaten (n=120)		
Do change diet	51	42.5
Do not change diet	69	59.5
Total	**120**	**100**
Effectiveness (n=51)		
Very effective	8	15.7
Effective	30	58.8
Not effective	13	25.5
Total	**51**	**100**
Sustainability (n=51)		
Sustainable	23	45.1
Not sustainable	28	54.9
Total	**51**	**100**

It was indicated that some of the respondents in the study area drunk porridge only or wild vegetable instead of their preferred foods they eat during the times of plenty. One of the Extension agents had this to say about this strategy *"many households changed their meal composition by drinking porridge instead of the usual stiff porridge. Others were taking wild vegetable soups only as their main dishes.*"

Wagao (1991) reported that household members cope with food shortage by reducing the frequency and changing content of meals consumed daily. This strategy was not effective especially in poor and large sized households because some diets which were switched onto were of low quality and were not being taken in required amounts; consequently this lead into poor health of the individuals. Therefore, this strategy is not effective as it does not guarantee food security which exists when all people at all time have physical and economic access to sufficient, safe and nutritious

food to meet the dietary needs and food preference for an active and healthy life (World Bank, 1990).

The strategy was considered by the many respondents not to be sustainable because it gave a temporary solution to the food insecurity problem and it only functions as long as the household have cash to buy the new food. It is said that the households experiencing food shortages spend an average of 80% of the households' income on food (Eide *et al.*, 1986). Considering all other expenses that have to be met, such as shelter, clothing, fuel, schooling and medicine; this is an extremely high figure.

4.3.7 Migration to urban areas

Responses on migration to other places mainly in urban areas looking for wage work as a coping strategy are presented in Table 19. Less than half (40.0%) of the respondents indicated that they do migrate to other places to look for wage work in periods of food shortage. On the effectiveness of this coping strategy 56.3% of the respondents ranked it as being effective while 35.4% as ineffective and 8.3% as very effective. Assessing its sustainability, this coping strategy was rated by 55.3% of respondents as being sustainable whereas 45.8% perceived it as being unsustainable.

Table 19: Distribution of Respondents by effectiveness and sustainability of migrating for wage work as a coping strategy

Variables	Number of respondents	Percent
Migrating for wage work (n=120)		
Do migrate	48	40.0
Do not migrate	72	60.0
Total	**120**	
Effectiveness (n=48)		
Very effective	4	8.3
Effective	27	56.3
Not effective	17	35.4
Total	**48**	
Sustainability (n=48)		
Sustainable	26	55.3
Not sustainable	22	45.8
Total	**48**	

It became evident during the study that youths tended to migrate to other places especially in the urban areas for wage work and remit cash to their families so that can buy food. Wage employment constitutes one of the most important coping strategies to chronically food insecure households in Tanzania (Ishengoma, 1998; Nguya, 2002); this is because the household is able to purchase food at that particular period. This coping strategy is however not sustainable because, it does not address the issues which are the main causes of food insecurity in the household. If for one reason or cash is not remitted, the household again faces the problem of food shortage as one of women respondent had this to say *"my husband left for Dar es salaam during the 2009/10 food shortage period to look for wage labour. For the first two months he was sending money for us to buy food, however, he fell sick and could not go to work and therefore not paid. Our family food situation became so bad that I had to seek for help from church leaders"*. Another problem is that migration of men and youths for wage employment leaves farm workload to women,

the children and the elderly who are not able to work efficiently on farm activities so as to produce enough food and cash crops for sustenance.

4.3.8 Selling of labour in other people farms

Findings on responses on working in other people's farm for payment in form of cash and/or food as a coping strategy are presented in Table 20. Respondents (45.8%) are those who worked as casual labourers ; while those who did not work as casual labourers contributed 54.2%. The highest percent (61.8%) of respondents found it very effective while 29.1% said it as being effective and 9.1% not effective. On the sustainability of the strategy, 43.6% of respondents considered it sustainable while 56.4% considered it unsustainable.

Table 20: Distribution of Respondents by effectiveness and sustainability of selling labour power

Variables	Number of respondents	Percent
Selling of labour power (n=120)		
Do sell labour	55	45.8
Do not sell labour	65	54.2
Total	**120**	**100**
Effectiveness(n=55)		
Very effective	34	61.8
Effective	16	29.1
Not effective	5	9.1
Total	**55**	**100**
Sustainability(n=55)		
Sustainable	23	43.6
Not sustainable	32	56.4
Total	**55**	**100**

Labour selling is most common strategy in many African countries; in this case, men and women go and work in other people's fields and are paid in terms of cash and/or food (Liwenga, 1985; Beerlandit and Huysman, 1999; Mwagile, 2001). Studies in

other parts of Tanzania, have shown that selling of labour to well-off neighbours' farms has been reported to be ineffective and unsustainable (Mwagile, 2001). It is argued that, while working in other people's fields, they fail to work on their own fields at the appropriate time; this leads to low production, hence household food insecurity.

4.3.9 Getting food assistance

Results on getting food assistance from the government, NGOs and other religious groups as a coping strategy is presented in Table 21. Majority of the respondents 62.5% acknowledged to have received food support while the remaining percentage 37.5% did not receive the aid. About (66.6%) of the respondents considered it to be not effective and only 25.3% consider it being sustainable whereas 74.6% of respondent mention it unsustainable.

Table 21: Distribution of Respondents by effectiveness and sustainability of food aid as coping strategy

Variable	Number of respondents	Percent
Receiving food aid (n=120)		
Do receive food aid	75	62.5
Do not receive	45	37.5
Total	**120**	**100**
Effectiveness (n=75)		
Very effective	5	6.7
Effective	20	26.7
Not effective	50	66.6
Total	**75**	**100**
Sustainability (n=75)		
Sustainable	19	25.3
Not sustainable	56	74.6
Total	**75**	**100**

Provision of food assistance is important in addressing the problem of food shortage especially during the critical periods. In the study area, household mostly experienced food shortage between January to March, when also during this time, farm operations are at their peak. It is during this period food assistance should be provided so that people can get enough energy to enable them to work on their farms to produce enough food.

Food aid is effective in providing relief to the otherwise starving individuals. However, not all food insecure households are able to access food aid especially when of some conditions which attached the aid. For example, it was discovered during FGD that food aid from some religious group was usually meant for their followers. Also, food aid from the government sometimes had political alienations where the aid was given to members of a certain political party and not otherwise. Also, some households are so poor such that they cannot afford to buy even the subsidized food. Some of the respondents had this to say about this problem *"during the 2006/07 food shortage, the government provided subsidized maize which was being sold at 50Tshs per kg. However, some families were not able purchase them. This forced the government to provide them with maize free of charge."* Respondents found this strategy not to be sustainable as it does not guarantee a continued supply of food neither does it provided a long lasting solution to food insecurity problem in the study area.

4.3.10 Borrowing of food and/or cash from merchants

Table 22 presents findings borrowing food and/ or cash from merchants as a coping strategy. It is reported (50.0%) of the respondents did borrow cash and/or food from the merchants and an equal percentage did not borrow. Borrowing was considered to be effective by 41.7%% , very effective only 30.0% and ineffective by 28.3% of the respondents Also results shows (66.7%) of respondents considered the strategy being unsustainable whereas 33.3% found it to be sustainable.

Table 22: Distribution of Respondent by effectiveness and sustainability borrowing of food or cash from merchants as a coping strategy

Variable	Number respondents	Percent
Borrowing food (n=120)		
Do borrowing	60	50.0
Do not borrow	60	50.0
Total	**120**	**100**
Effectiveness(n=60)		
Effective	25	41.7
Very effective	18	30.0
Not effective	17	28.3
Total	**60**	**100**
Sustainability (n=60)		
Not sustainable	40	66.7
Sustainable	20	33.3
Total	**60**	**100**

At the time food shortage, borrowing food or cash may be seen as an effective step in increasing the household's food purchasing power by using borrowed cash or by getting enough food. In the study area this system of borrowing is known as "songoleda" However, the high interest rates which are usually charged makes this coping strategy a burden to the household who are mainly smallholders depending on the selling of food crops (to obtain cash) or returning back a large proportion of

their harvests to the merchant. This further accentuates a continuing cycle of food insecurity.

Majority of the respondents said that the strategy was not sustainable as in most cases the amount of cash loaned to household facing food insecurity is in most cases just for enough buying food. It is too meager to be invested in agricultural production or other off-farm income generating activities. Also, the high interest rates charged on food or cash makes some of the households fail paying back. This forces some of them to sell their valuable assets to get money to pay the loans.

4.3.11 Selling of household assets

Results in Table 23 indicate 41.7% of the respondents sold their assets while 58.3% did not sell asset. On the effectiveness and sustainability of the strategy, it was considered to be very effective16.7% of respondents, 42.0% as effective and an equal percentage as being not effective. On the sustainability, 44.0% of respondents considered it to be sustainable whereas 56 % mentioned it not sustainable.

Table 23: Distribution of Respondents by selling household assets

Variables	Number of respondents	Percent
Selling of assets (n=120)		
Do sell assets	50	41.7
Do not sell asset	70	58.3
Total	**120**	**100**
Effectiveness (n=50)		
Very effective	8	16.0
Effective	21	42.0
Not effective	21	42.0
Total	**50**	**100**
Sustainability (n=50)		
Sustainable	22	44.0
Not sustainable	28	56.0
Total	**50**	**100**

It was reported that sold items included productive assets for example oxen ploughs and land and also the selling of non-productive assets like bicycles, radios and jewelry. This coping strategy is common in different parts of Africa (Wagao, 1991; del Waal and el-Amin, 1986; Ishengoma, 1998).

It is argued that as long as assets lasts and are tradable, food security is not adversely affected; however, depletion of assets is the onset of poverty and hunger. Selling of assets temporarily results into increased household income which enables them to buy food; however, it is ineffective from the fact that it is irreversible. Once an asset is sold it cannot be obtained back. Also, asset sold out of desperation to get money for buying food are sold at a give away prices. It was argued that once the assets to be sold are depleted, household food and economic situations become worse and more desperate than before.

CHAPTER FIVE

5.0 CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

Based on the findings of the study, the following conclusions can be deduced:

i) Farmers are aware of the problem of food insecurity and its causes.

ii) Causes of food insecurity were attributed to poor rainfall, misuse of food, poor storage facilities and small acreage of land under cultivation, use of poor farming tools, low incomes and large household sizes.

iii) There are several coping strategies which are practiced in the area; however, the popular ones were identified as selling of labour, selling of livestock, skipping some meals; reduction in the quantity of food consumed and utilization of wild foods. Others include selling of assets, migrating for wage work and engagement in off-farm activities. Despite of the use of these coping strategies, it has been found that most of them are ineffective and not sustainable; therefore the problem of food insecurity still persists in the area. There is a need, therefore to develop strategies which will ensure that food is available in a sustainable way and people in the area access and utilize it for better health.

5.2 Recommendations

Based on the study findings, the following recommendations are put forward: .Women who are the food crop producers in the area be financially empowered so

that they can increase food production through expanded cultivated land, buy agricultural inputs and construct better food storage structures. This will also entails the growing of drought- resistant crops.

- Trainings on processing and food storage techniques should be provided to farmers and concerned parties. Processing of both conventional and wild vegetables and fruit will increase the shelf-life of the products for future use. Storage structures to be built should be simple, less costly and durable.
- There should be deliberate efforts to promote and support off-farm income generating activities. Provision of soft loans for example through establishments of SACCOs will assist farmers in increasing their capital to invest in off-farm income generating activities.
- Wild food plants should be identified (inventory) and characterized. Ways of conserving them and promotion of their use should be made by the relevant organs.
- People should be educated on the irrationality of selling labour as a coping strategy during times of critical farm activities. This is because it denies them enough time to work in their farm which consequently results into poor food crop harvests; thus food insecurity.
- Farmers be advised to de-stock their animals and sell them during peak period of good prices and buy enough food to meet the household requirements. Also, not sell surplus of the harvested crops immediately after harvest because they will not be able to fetch good prices

5.3 Suggestions for Future Work

The aspects of food insecurity and their coping strategies vary with time and space because of various socio-economic factors. This study suggests that there is a need for a similar research to assess the effectiveness and sustainability of coping strategies in other parts of Tanzania towards food insecurity to ascertain if they can address the problem of insecurity.

REFERENCES

Alexandratos, N. (1995). World agriculture towards 2010: An FAO Study. FAO and Wiley and Sons Chichester. 76pp.

Amartya, S.(1981). *Poverty and Famines:* An Essay on Settlement and Deprivation. Oxford University Press, London.13-32pp.

Ashimogo, G.C. (1995). Peasant Grain Storage and Marketing in Tanzania: A Case Study of Maize in Sumbawanga District. PhD. Dissertation for the Award of PhD Degree at Verlag Koster, University, Germany.36pp.

Bamaiyi,L.J., Ndams, I.S., Toro,W.A. and Odekira, S. (2006). Effect of Mahogany *(Khaya senegalensis*) Seed oil in the Control of *Callosobruchus maculatus* on stored Cowpea. *Journal of Plant Protection* 42:120-134.

Beerlandit, H. and Huysman, S. (1999). *Food Security in Kagera Rregion: Baseline Description of Different Socio-Economic Systems Based on the Results of Participative Group Discussions, the First List of Indicators and Guidelines for Action*. KAFOSEC Research Project Report No l. 92pp.

Berck, W. and Bigman D. *(*Eds.)(1993*). Food Security and Food Inventories in Developing Countries.* Cab International, Wallingford, UK. 281pp.

Kaiser, L. L., and Dewey, K.G. (1989) Household Economic Strategies and Food Expenditure Patterns in Rural Mexico: Impact on Nutritional Status of Pre- School Children. *Ecology of Food and Nutrition*, 26: 147-168.

Culter, P. (1985). The Response to Drought of Beja: Famine and Refugees in Sudan. *Disasters* 10(4):1104pp.

Babbie, E. R. (1993). *Survey Research method.* Wordsworth Publishing Company. Belmount, Califonia. 335pp.

Baldwin, S. (2006). Food Security in Developing countries: The Parliament Office of Science and Technology, Milbank, London, [http://www.parliament. uk/post]. Site visited on 02/11/ 2010.

Bonnard, P., Haggerty, P., Swindale, A., Bergeron, G. and Dempsey, J. (2002). Report of the Food Aid and Food Security Assessment. In: *A Review of the Title II Development Food Aid Programme.* FANTA, Washington, DC. 34-41 pp.

Campbell, D. J. (1986). *Coping Strategies as Indicators of Food Shortage in African Villages.* Paper Presented at the Annual Meeting of the American Anthropological Association. Held at Philadelphia,USA, December 1968.. 67pp.

Campbell, C. (1990). *Food Insecurity: Definition and Measurement*. Cornell University, New York.45pp.

CARE International in Tanzania (1995). Rapid Food and Livelihood Security Assessment in Shinyanga, Mara and Mwanza Regions, [http://www.careintern.org.uk.resourcescenter/livelihood] Site visited on 17/10/ 2010.

Clover, J. (2003). Food Security in Sub-Saharan Africa. *African Security Review* 12(1): 5-15pp.

Corbett, J. (1988). Famine and Household Coping Strategies. World Development Report 9: 1099-1112pp.

DALDO. (2004). *Chamwino District Agriculture and Livestock Development Annual, Report.* Tanzania Publishing House, Dodoma, Tanzania. 88pp.

Devereux, S. (2000). Famine in Africa: Issues in Food Security. In: *Proceedings of theFoodSecurityinSubSaharanAfrica.*HeldinGaborone,Botswana,July10-15, 2000. (Edited by S. Devereux and S.Maxwell), 2000. 43pp.

Dearden, P.J. and Cassidy, E. M. (1990). Food Security- an ODA View. IDS *Bulletin. Institute of Development Studies*. Sussex, 21(1): 81-83.

De Vaus, D.A (1993). Surveys in Social Research. UCL Press London. 379pp.

Del Waal, A. and el-Amin, M. (1986). *Survival in Northern-Darfur 1985-1986 Report*. Save the Children Fund. 110pp.

Eide,W. B., Gerd, H.O., Wandel, M., Davy,P. and Sirisema, T. (19986*). Introducing Nutrition Consideration into Rural Development Programmes with Focus on Agriculture Report No.2.* Institute of Nutrition Research University of Oslo, Norway, 235pp.

Food and Agricultural Organization (FAO). (1992). Approaches to Monitoring Access to Food and Household Report.10pp.

FAO.(1992). Major Issues for Nutrition Strategies. *Theme Paper No.1*. Improving Household Food Security.12pp.

FAO.(2006).*The State of Food Insecurity in the World 2006*. FAO, Press, Rome, Italy. 13pp.

FAO. (1980). *The State of Food and Agriculture*. Food and Agriculture of the United Nations Rome. 205pp.

FAO. (1996). Technical Background Documents 1-5. World Food Summit, November 13-17, Rome, Italy, (1) 1-47pp.

FAO/WHO/UNU. (1985). *Energy and Protein Requirements, Report of Joint Expert Consultation.* WHO Technical Report Series No724. Geneva. 206pp.

FAO. (2001). The Special Programme for Food Security: Rationale, Objective and Approach. [**http://www.fao.org/spfs/objec-e.html**]. Site Visited on 21/10/2010.

FAO. (2002). The State of Food Insecurity in the World. [http://www/fao.org]. Site visit on 02/11/2010.

Food and Agricultural Organization (FAO). (2003*).Compendium of Agricultural=-Environmental Indicators (1989-91 to 2000)*. Statistics Analysis Service, Statistics Division, Food and Agriculture Organization oF United Nations, Rome. 20pp.

Francois, P., Perise, J., Kamoum, A. (1982). The Effects of Household Size and Income on the Probability of Energy Inadequacy: Tunisian Case Study. *Food and Nutrition Bulletin* 8(1):32-39.

Gill, G. J. (1991). *Seasonality and Agriculture in the Developing World*: A *Problem of the Poor and Powerless.* Cambridge University Press, Great Britain. 131pp.

Gwinner, J. Harmish, R. and Muck, O. (1996). *Manual on the Prevention of Post-harvest Grain Loss.* GTZ. Eschborn. 101pp.

Hubbard, M. (1995). *Improving Food Security. A Guide for Rural Development Managers.* Intermediate Technology Publications. London. 151pp.

Ishengoma, C. G. (1998). The Role of Women in Household Food Security in Morogoro Rural and Kilosa Districts. Dissertation for the Award of PhD

Degree of. Sokoine University of Agriculture, Morogoro, Tanzania. 371pp.

Kajumulo, A. (2009). *Drought Exposes Tthousands to Hunger in Central Tanzania. Jambo Tanzania:* Conversations from Action Aid International Tanzania.

Katani, P. (1999). Coping Strategies Against Deforestation: Impact of Socio-Economic Factors with Special Attention to Gender-based Indigenous Knowledge: A Case of Mwanza District. Dissertation for Award of MSc Degree at Sokoine University of Agriculture, Morogoro,Tanzania. 110pp.

Kajembe, G. (1994). Indigenous Management Systems as a Basis for Community Basis for Forestry in Tanzania: A Case Study of Dodoma Urban and Lushoto Districts. Tropical Resource Management Paper No 6. Wagenigen Agricultural University. The Netherlands. 194pp.

Keenja, M. P. (2001). *Food Security in Tanzania: The Way Forward.* Paper Presented in the Eighth Sokoine Memorial Lecture Series. 11 April 2001. Morogoro, Tanzania. 75pp.

Kennes, W. (1990). *The European Community and Food Security*. IDS Bulletin 21 (3): 67-70pp.

Lipton, M. (2001). *What Production Resources Do the Poor Really Need Escape Poverty?* Conference Paper on Sustainable Food Security in Sub-Saharan Africa. A Food Security Workshop Held in Gaborone Botswana, 20-22 September, 2001.143pp.

Liwenga, E. T. (1995). The Impact of Land Conservation Measures on Household Hood Security in Kondoa Eroded Areas, Tanzania. Dissertation for Award of MSc Degree at Agricultural University of Norway.109pp.

Lorghuist, R. (1983). Agricultural Production and Food Consumption: Some Neglected Linkages Food and Nutrition. *World Developments in Food Policy and Nutrition Journal 9*(2): 22-44.

Madeley, J. (2002). *Food for all*: The Need for New Agriculture. Oxford Press London 34pp.

Makundi, F. L. K. (1996). Household Food Security in Rural Tanzania: A Case Study of Moshi Rural District Kilimanjaro Region, Tanzania. Dissertation for Award of MSc Degree at Agricultural University of Norway, 138pp.

Makundi, R. H. and Magoma, R. (2003). The Impact of Pests and Diseases on Food Security in Tanzania. In: *Proceedings of the Second Collaborative Research Workshop on Food Security.* TARP II SUA Project, 28-30 May, 2003, Morogoro, Tanzania.31-33pp.

Mascarenhas, O. (1983). Implication of Constraints in Womens' Control and Utilization of Resources for Food and Nutritional Status of their Families. In: *Paper Presented at the TFNC/UNICEF Workshop on Hunger and Society Dar es salaam, Tanzania*. 45-67pp

Maxwell, S. and Frankenbeger, T. R. (1992). *Household Food Security Concepts, Indicators and Measurements.* Technical Review, UNICEF and IFAD, 274pp.

Maxwell, S. (2000). *The Evolution of Thinking About Food Security.* In: S. Devereux and S. Maxwell (Eds.). Food Security in Sub-Saharan Africa. 17pp.

Missano, H. M. (1993). Household Food Security, Malnutrition and Training. A Paper Presented at the Workshop on *"African Women Farmers in Food Security"*. Dar es Salaam, Tanzania. October 11-16. 45-50pp.

Mosha, A. C. (1990). *Decision Making in Resource Allocation in Rural Households for Food Security in Shinyanga Rural District*. TFNC Report. No33.

Mngodo, J. T. J., Hinge, P .M., Kwayu, A. R. I., Lemweli, O. O. N., Magai, G. K., Nkinga, F., Banda, T. and Thomason, A. M. (1996). *Food Security in Tanzania:* Transport, Markets, and Poverty Alleviations. United Republic of Tanzania, Ministry of Agriculture and Cooperatives. 71pp.

McCalla, A. F. (1999). Prospects of Food Security in the 21st Century with Special Emphasis on Africa. *Agricultural Economics* (20): 95-103.

Mhinte, A. R. (2001). Analysis of Food Insecurity and Household Coping Strategies: A Case Study of Kilosa District. A Dissertation for the Award of Masters Degree of Rural Development of Sokoine University of Agriculture, Morogoro Tanzania. 30-36pp.

Msola, D. K. (2007). The Role of Wild Foods in Household Income and Food Security in Mufindi District, Tanzania. Dissertation for Award of Master Degree of Rural Development of Sokoine University of Agriculture, Morogoro, Tanzania.42pp.

Mtebe, K. P., Mamiro, C. W., Njebele, E. E., Nyangali and Malekela, S. (1988). *Household Food Security in CSD* Prgramme Area in Morogoro Region. A survey Report in Household Food Security. 32pp.

Mutangadura, G., Mkurazita, D. and Jackson, H. (1999). *A Review of Household and Community Responses to the HIV/AIDS Epidemic in the Rural Areas of Sub-Saharan Africa.* 20pp.

Mwagile, M.Y. (2001). Gender-based Coping Strategies Against Food Insecurity in Dodoma Rural District, Tanzania. Dissertation for Award of Master

Degree of Rural Development of Sokoine University of Agriculture, Morogoro, Tanzania. 38-43pp.

Nguya, N. R. (2006). The household Food Security Coping Strategies Among the Poorest of the Poor in Mvomero District,Tanzania. Dissertation for Award Degree of in Rural Development of Sokoine University of Agriculture, Morogoro, Tanzania. 39 pp.

Njiro, E. I. (1994). *Gender and Household Dynamics in Coping with Food Shortages in Rural Kenya:* A Case Study of Mbeere a Semi-Arid District of Eastern Kenya. Mid-term Research Report Presented during Africa Rural Social Sciences Research Networks (ARSSRN) Workshop at Cotonou, Republic of Benin, July 21-26, 57pp.

Ogbu, J. U. (1993). Seasonal Hunger in Tropical Africa as a Cultural Phenomenon. *International African Institute,* XIII. (4): 317-332.

OXFAM, (2002). Briefing Paper No. 23. Crisis in Southern Africa. 3pp.

Rukuni, M. and Eicher, C. K. (Eds). (1987). *Food Security in Southern Africa.* University of Zimbabwe/ Michigan State University Food Security Project. 406pp.

SADCC. (1987). SADCC Energy. *SADCC Energy Bulletin* (14):55pp.

Seenapa, M. (1987). Household Food Security in Tanzania: A Rapid Assessment Survey of Few Village in Shinyanga, Mtwara and Zanzibar. 75pp.

Teokul, W., Payne, P., and Dugdale, A., (1986). Seasonal Variations in Nutritional Status in Rural Areas of Developing Countries: A Review of Literature. *Food and Nutrition*, 8 (4): 7-9.

Tanzania Food and Nutrition Centre (TFNC). (1992).Comprehensive Food Security Program. Volume I. *Main Report*. Ministry of Agriculture. 52pp.

Tesha, L. (2000). *Land Use and Gender in Tanzania*. Women Advancement Trust. University of Dar-es-Salaam.

Tibaijuka, A. K. (2003). Opening Address, UN-HABITAT: the 2nd COASAD General Assembly and Pan- Africa Congress on Food Security, Trade and Sustainable Development. Nairobi, Kenya, April 2003. [http://www.unhabitat.org/director/coasad.asp]. Site visited on 27/10/ 2010.

United Republic of Tanzania (URT). (2005). *Agricultural Sector Strategy for HIV/AIDS and Other Related Chronic Diseases.* Dar es Salaam, Tanzania.14pp.

United Republic of Tanzania (URT). (1999).*The Economic Survey.* The Planning Commission, Dar-es-Salaam, Tanzania.222pp.

United Republic of Tanzania (URT). (1997). *Tanzania Demographic and Health Survey,* 1996. Bureau of Statistics, Dar- es-Salaam, Tanzania.156 pp.

United Republic of Tanzania (URT). (2003). *Population and Housing Census General Report.* National Bureau of Statistics, Presidents Office. Dar-es-Salaam.53pp.

USAID. (2003). Issues Briefs: HIV/AIDS and Nutrition. **http://www.usaidgovt**. Site Visited on 11/10/2010.

Wagao, J. H. (1991). *Household Food Security and Nutrition of Children and Women in Tanzania.* A Consultancy Report Submitted to UNICEF Regional Office. Nairobi, Kenya, 87pp.

Watts, M, (1983). *Silent Violence, Food, Famine and Peasantry in Northern Nigeria.* University of California Press. 97pp.

WHO. (1982). Assessment of Nutritional Status of Community In: WHO Malnutrition, Behaviour and Social Organisation. *WHO Monograph*, No. 53:4-8pp.

World Bank. (1990). *Household Food Security and the Role of Women*. Paper by G.T. Hinger, J.P. Chernick, S. Horenstena and Saito, K. Washington DC. 62pp.

World Bank. (2008). World Bank Redefines Poverty Line. [http://www.undp.povertycentre.org]. Site Visited on 22/11/ 2010.

World Bank Institute. (2001). *Rural Poverty Reduction through Food Security and Agricultural Growth: A Distance Learning Course.* November 14-December 19, 2001. Global Distance Learning Centre, Dar es Salaam. 17-19pp.

World Food Summit. (2002). Globalization and Food Security. [http://www.fao.org/worldfoodsummit/english/fsheets/and.pdf] site visited on 09/11/ 2010.

Zeitlin, M.F. and von Brown, L. (1992). *Intergrating Diet Quality and Food Safety into Food Security Programs.* Nutrition Consultant Report Series. ESN/CRS FAO, Rome. 53pp.

Zinyama, L. M., Campbell, D. Matiza, T. (1987). Traditional Household Strategies to Cope with Food Insecurity in the SADCC Region. In: Rukuni, M. and Bernsten, R. H. (eds). Southern Africa*:* Food Security Policy Options. *Proceedings of the 3rd Annual Conference on Food Security Research in*

Southern Africa. 1-5 November, 1987. University of Zimbabwe/Michigan State University (UZ/MSU) Food security Project. Department of Agricultural Economics and Extension, University of Zimbabwe. Harare.

APPENDICES

Appendix 1

HOUSEHOLD QUESTIONAIRE FORM

Study topic: Assessment of the effectiveness and sustainability of household food insecurity coping strategies in Chamwino District, Dodoma region.

Household Identification and Demographic Information

Name of Enumerator……..
Date…….

Village……..
Division…….

Household Identification No. …….

Section A: Background information

A1. Name of head of household……..

A2. Respondent's sex

01. Male [ ]

02. Female [ ]

A3. What is your age …… (In Years)

A4. What is your marital status?

01. Single [ ]

02. Married [ ]

03. Divorced [ ]

04. Widowed [ ]

A5. What is your family size?

Age group	Male	Female

Below 15yrs		
16- 30 yrs		
31 – 50 yrs		
Above 50 yrs		

A6. What is your level of education?

01. None [ ]

02. Primary education [ ]

03. Secondary education [ ]

04. Above secondary education [ ]

05. Others (specify)…….

A7. For how long have you been residing in this village?..... (Years)

A8. What is your main occupation?

1. Farmer [ ]

2. Petty trader [ ]

3. Farmer and petty trader [ ]

4. Housework [ ]

5. Formal employee [ ]

6. Others (specify)…….

A9. Who is responsible for the household economic activity?.....

1. Husband [ ]

2. Wife [ ]

3. Both [ ]

4. Clan member [ ]

Section B: Agricultural production and food security

B1. Do you own land for agricultural activiti**es?**

1. Yes [ ]

2. No [ ]

B2.What is total acre of your farm land?

1. Less than 1ha [ ]

2. One hectare [ ]

3. More than one hectare [ ]

4. None of the above **[ ]**

B3.If yes in question B1, how did you acquire your land for agriculture activities?

1. Bought [ ]

2. Inherited [ ]

3. Given by village government [ ]

4. Hired [ ]

5. Other (specify)…….

B4.What was the total area cultivated during the year 2008/09 cropping season.....in hectares

B5. Does the available land enough for crop production?

01. Yes [ ]

02. No [ ]

B6. If the available land is not enough how do you overcome the problem?

1. Buy [ ]

2. Inherit [ ]

3. Given by village government [ ]

4. Hire [ ]

5. Other (specify)……

B7 .Who controls the household land?

01. Husband [ ]

02. Both [ ]

03. Wife [ ]

04. Clan members [ ]

B8. Agricultural production in the last cropping season: 2008/2009

Crop type	Area(has)	Yield(bags of 100kg)
Maize		
Millet		
Sorghum		
Groundnuts		
Sunflower		
Bambara nuts		
Cowpeas		
Pigeon peas		
Grapes		
Others		

B9. Which of the following crops is for sale?

Crop type	Area(ha)	Yield(kg)
Maize		
Millet		
Sorghum		
Groundnuts		
Sunflower		
Bambara nuts		
Cowpeas		
Pigeon peas		
Grapes		
Others		

B10. Do you keep any livestock?

1. Yes [ ]

2. No [ ]

B11. If yes in question 10 above, what type of livestock do you keep?

Type of livestock	Number
Cattle	
Sheep	
Goat	
Pigs	
Chicken	
Guinea fowl	
Others	

B12. Do you engage in any off- farm activities?

1. Yes [ ]

2. No [ ]

B13. If yes in question B12 above, indicate the type of off- farm activity you are engaged in

1. Small business/ kiosk [ ]
2. Local brewing [ ]
3. Casual labour [ ]
4. Charcoal and firewood selling [ ]
5. Local midwife/tradition healing [ ]
6. Livestock selling and crop middle man [ ]
7. Handcraft [ ]
8. Others (specify)…….

B14. Indicate income from the following farm and off- farm activities for the last two years

Enterprise	2008			2009		
	Quantity sold	Price/unit	Amount	Quantity sold	Price/unit	Amount
Crop sales						
Maize						
Millet						
Sorghum						

Groundnuts						
Sunflower						
Bambara nuts						
Cowpeas						
Pigeon peas						
Grapes						
Simsim						
Livestock						
Cattle						
Goat						
Sheep						
Pigs						
Chicken						
Guinea fowl						
Off-farm activities						
Small business/ kiosk						
Charcoal/firewood						
Local brew sales						
Local midwife/traditional						
Handcraft						

B15. What is the households' source of food supply?

Source and type of food	Quantity(in kg, bags, tins)	Source and type of food	Quantity(in kg, bags, tins)
Own production		Purchased	
Maize		Rice	
Millet		Beans	
Sorghum			
Groundnuts			
Sunflower			
Bambara nuts			
Cowpeas			
Pigeon peas			

B16. Do you store any of your food crops for future use?

1. Yes [ ]

2. No [ ]

B17 If yes in question B16 above, what is your means of food storage?

1. Vihenge [ ]

2. Silo [ ]

3. Sacks [ ]

4. Others (specify)……

b) If no to question B17 above, why?.....

B18. Does the amount of food stored last until next season?

1. Yes [ ]

2. No [ ]

B19. Do you encounter any problem during food storage?

1. Yes [ ]

2. No [ ]

B20. If yes to question B19, Please list the problems encountered during food storage……
…..

B21. Do you have any knowledge/ training on food storage?

1. Yes [ ]

2. No [ ]

B22. What are the major uses of food grains produced in your household?

(1)Consuming [ ]

(2) Ceremonies [ ]

(3). Selling for income [ ]

(4) Others (specify)……..

Section C: Coping Strategies against food insecurity

C1. In which month did you harvest your crops?.....

1. January, February, March [ ]

2. April, May, June [ ]

3. July, August, September [ ]

4. October November, December [ ]

C2. What are the most important foods you prefer for the family?

01. Maize [ ]

02. Sorghums [ ]

03. Finger millet [ ]

04. Others (specify)…….

C3. Are you able to eat your preferred foods frequently?

01. Yes [ ]

02. No [ ]

C4. If no to question C3 above, what do you eat instead?……...

C5. Have you ever been faced with food shortages, say for the past 4 years?

01. Yes [ ]

02. No [ ]

b) If yes, to question C5 which months did it happen?

1. January, February, March [ ]

2. April, May, June [ ]

3. July, August, September [ ]

4. October November, December

C6. What is the major cause of food shortage?

1. Drought [ ]

2. Insect pest [ ]

3. Animals/rodents [ ]

4. Others……..

C7. What do you consider to be important means of improving food availability and accessibility in general?

1. Drought resistant crops [ ]

2. Proper drying [ ]

3. Proper storage [ ]

4. Multiple crops [ ]

5. Food processing [ ]

b) Mention the drought resistant crops you know/grow……

……..

D. Effectiveness and Sustainability of coping Strategies

D1. What of the following coping strategies are effective and sustainable to food insecurity?

1) Small business/ kiosk [ ]
2) Local brewing [ ]
3) Casual labour [ ]
4) Charcoal and firewood selling [ ]
5) Local midwife/tradition healing [ ]
6) Livestock selling and crop middle man [ ]
7) Handcraft [ ]

CHECKLIST FOR GROUP DISCUSSION

Study topic: Assessment of the effectiveness and sustainability of household food insecurity coping strategies in Chamwino District, Dodoma region.

Village…… Ward……Division…….
…….

District……Date…….. Checklist no…….

1. How do you perceive about food insecurity……

2. What strategies employed in the village to cope with food insecurity?

3. a) Are the coping strategies employed effective?
i) Yes ii) No

b) Are the coping strategies employed sustainable?
i) Yes ii) No

4. If yes in question 3a above what indicator was used for the coping strategies to be effective?
…….

5. If yes in question 3b above what indicator was used for the coping strategies to be sustainable …….

6. What are your comments on the coping strategies employed by the household during food shortage?

7. What advice do you suggest to solve the problem of household food insecurity among the smallholder farmers?

THANK YOU FOR YOUR COOPERATION