

**LOCAL PERCEPTIONS OF HOUSEHOLD'S VULNERABILITY TO FOOD
INSECURITY IN BAHU DISTRICT, TANZANIA**

BY

GOSBERT SHAUSI

**A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE
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ABSTRACT

The study assessed household vulnerability to food insecurity as locally perceived in Bahi district. It was based on the four randomly selected villages namely Mpamantwa, Ibihwa, Mnkola and Bahi Sokoni. Primary data were collected by interviewing 100 farming households, village elders, village leaders and Ward Agricultural Extension Workers. The study addressed the local perceptions of food security and vulnerability to food insecurity; characteristics of households vulnerable to food insecurity and; the strategies employed by households during food shortages. It was locally perceived that a household which took less than 12 months to exhaust millet stock was food insecure and the household vulnerable to food insecurity was the one most likely to remain or become food insecure which was characterized by: owning a relative small piece of land; earning too small income to enable it buy household food; have no alternative source(s) of income other than sale of farm crops; have no livestock; headed by elderly; and does not have millet stocks. Sixty three percent of sampled households were food insecure while 80% were vulnerable to food insecurity. The ANOVA and t-test revealed that the number of food sources, household size, household's income, marital status of household head, ownership of livestock and size of land were significantly related to household food security. The study concludes that the presence of more vulnerable than food insecure households was an indication that even some of food secure households were at risk of becoming food insecure. The study recommended, among others, that strategies to address food insecurity should focus on both food insecure and vulnerable households.

DECLARATION

I, Gosbert Shausi, do hereby declare to the Senate of Sokoine University of Agriculture that this dissertation is my original work and that it has neither been submitted nor being concurrently submitted in any other Institution.

GOSBERT SHAUSI
(MSc Candidate)

Date

The above declaration is confirmed by:

DR. D. MWASEBA
(Supervisor)

Date

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DEDICATION

This work is dedicated to my dearest late father Daudi Lutatinisibwa Shausi and my mother Amelia Kokwemage Daudi who made a lot of effort in laying down the foundation of my education.

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LIST OF ABBREVIATIONS AND ACRONYMS

ANOVA	Analysis Of Variance
BDP	Bahi District Profile
CARE	Canadian Relief Everywhere
FAO	Food and Agriculture Organization
FEWS NET	Famine Early Warning Systems Network
FGDs	Focus Group Discussions
FIVIMS	Food Insecurity and Vulnerability Information and Mapping System
FHHs	Female Headed Households
HFS	Household Food Security
IFAD	International Fund for Agricultural Development
km	Kilometre
MAFC	Ministry of Agriculture Food Security and Cooperatives
MHHs	Male Headed Households
PRA	Participatory Rural Appraisal
SADC	South African Development Corridor
SCF (UK)	Save the Children Fund (United Kingdom)
SPSS	Statistical Package for Social Sciences
TFNC	Tanzania Food and Nutrition Centre
Tshs	Tanzania shillings
UN	United Nations
WFP	World Food Programme
USAID	United States of America International Development
WHO	World Health Organization

CHAPTER ONE

INTRODUCTION

1.1 Background

Food security and insecurity are terms used to describe whether or not people have access to sufficient quantity and quality food (Baldwin, 2006). Food security became prominent in the 1970s and since then it has attracted considerable attention of different nations, organizations and individuals at international and local levels (Kavishe and Mushi, 1993). According to FAO (2004), by the end of December 2004, there were 852 million undernourished people worldwide, 96.7% of whom were living in the developing countries.

Food security is perceived differently by different people. For example, Maxwell and Smith (1992) compiled more than 30 definitions of this term, suggesting that it can be applied to a broad range of situations. The multiple definitions of food security reflect the varied nature of food problems experienced by poor people. The early definitions of food security focused on food supply at the national and international levels. Yet, it is established that adequate food supply at the national level does not guarantee sufficient food at household level.

According to FAO (2001), food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active healthy life. FAO (2008) defines

household food security as the ability of all members of the household to acquire sufficient amount of food continuously over time for an active healthy life.

Food security involves three pillars; availability, accessibility and utilization of food. Food availability implies sufficient production or imports to meet the food requirements of the population (FAO, 2008). Access refers to the ability of people to obtain food, either through their own production or by purchasing it with money earned from other activities. Food utilization means that the nutrient intake associated with food consumption is not impeded by adequate nutritional information, poor sanitation, and problems in intra household distribution (FAO, 2008). Food insecurity exists when people do not have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active healthy life (Molapo, 2009). A household is said to be food insecure when it fails to meet its dietary intake in terms of quantity and quality (Molapo, 2009).

Efforts to measure food insecurity have sometimes relied, in part, on an index of coping strategies. Households that resort to unsustainable coping strategies such as selling productive assets or taking high interest loans, along with behaviors such as migration or resource augmentation are said to be vulnerable to food insecurity (Coates *et al.*, 2007).

Scaramozzino (2006) contends that, effective policies and interventions to reduce food insecurity must

put into account both those who are food insecure at present and those who are vulnerable to food insecurity. By vulnerability is meant the presence of factors that place people at risk of becoming food insecure (Scaramozzino, 2006). These factors can be external or internal. External factors include trends such as depletion of natural resources from which the population makes its living, environmental degradation or food price inflation; shocks such as natural disasters and conflict; and seasonality, such as seasonal changes in food production and food prices. Internal factors are the characteristics of people (age, sex, marital status, education level, household size etc), the general conditions in which they live and the dynamics of the household that restrict their ability to avoid becoming food insecure in the future (FIVIMS, 1998).

WFP (2007) reports that, food insecurity and vulnerability is present everywhere in rural Tanzania but varies regionally, with the central band of the country showing the highest proportion of households that are food insecure. For instance, it has been shown that in Dodoma, Singida and Tabora regions, 45-55% of the households are food insecure. There is also a high rate (between 24 to 27%) of households that are vulnerable to food insecurity in the regions of Singida, Tabora, Dodoma and Mwanza.

1.2 Problem Statement and Justification

Despite the efforts taken, there is no doubt that food insecurity continues to be a major problem and a recurrent phenomenon in different parts of Tanzania. An analysis of food production over the last 10 years indicates fluctuations of food production between years of surplus often followed by years of food deficits. As reported by WFP (2007), the central band of Tanzania shows the highest proportion

of households that are food insecure. A preliminary food crop production forecast survey done by the National Food Security Division (Crop Monitoring and Early Warning) for the year 2009/10 indicated that, nine regions had food deficit and these consist 40 districts including Bahi with high level of vulnerability (FEWS NET, 2009). Consequently, the report proposed that vulnerable areas will need to be subjected to an in-depth vulnerability assessment for necessary intervention by the government. A good understanding of the factors that determine food insecurity today and, more importantly, those which will influence food insecurity in the near future is therefore essential in reducing food insecurity over time.

The continuous reflection and work on food security recognizes two recent conceptual shifts (Maxwell, 1996): (1) shift in the analysis of household food security from a food perspective to a livelihood perspective; and (2) shift in the measurement of household food security from an objective approach to a subjective approach. The first shift is supported by the finding highlighted in the analyses of adaptive strategies during food shortages that is people may chose to go hungry to preserve assets and future livelihood (Frankenberger and Goldstein, 1990). The second shift surfaced when the complexity and diversity of household food security were acknowledged. The recommendation is now to integrate indicators derived from people's own perception of their food security status into household food security assessment and monitoring system (Migotto *et al.*, 2005; Nyborg and Haug, 1994).

One of the key criteria underlying the delivery of services from social assistance programs, humanitarian and emergency relief operations is vulnerability.

Identification of vulnerable groups and the assessment of the cause of vulnerability are critical to designing of appropriate assistance programs. Knowledge of whom and where the vulnerable are, helps to lower the costs for providing assistance to the people in need, therefore enabling effective targeting. This is one of the practical benefits of using the concept of vulnerability (Tollens, 1998 cited by Sango, 2003).

This study was conducted in the four villages in Bahi district with the main aim of describing how villagers perceived their food security problems and the solutions they sought to improve household food status. The rationale for this study was two-fold: Food security improvement interventions should be grounded in the ability of people to generate their own solutions in a sustainable way; location-specific indicators of household food security are required for monitoring, and they are better identified at community level, with the people themselves. It was hypothesized by this study that the findings would allow different stakeholders including the government to improve and monitor household food security in the study area.

1.3 Objectives

1.3.1 General Objective

The overall objective of this study was to investigate the household,s food insecurity and vulnerability to food insecurity based on respondents' own perception in Bahi District.

1.3.2 Specific Objectives

Specifically the study aimed to:

- (i) Explore local perceptions of food, food security, food insecurity and vulnerability to food insecurity.
- (ii) Determine the characteristics of households that are food insecure and vulnerable to food insecurity.
- (iii) Explore the coping strategies employed by households during food shortages.

1.4 Research Questions:

- (i) How do people in the study area perceive food, food security and vulnerability to food insecurity?
- (ii) What are the characteristics of food insecure and vulnerable households?
- (iii) What are the households' coping mechanisms to withstand food insecurity?

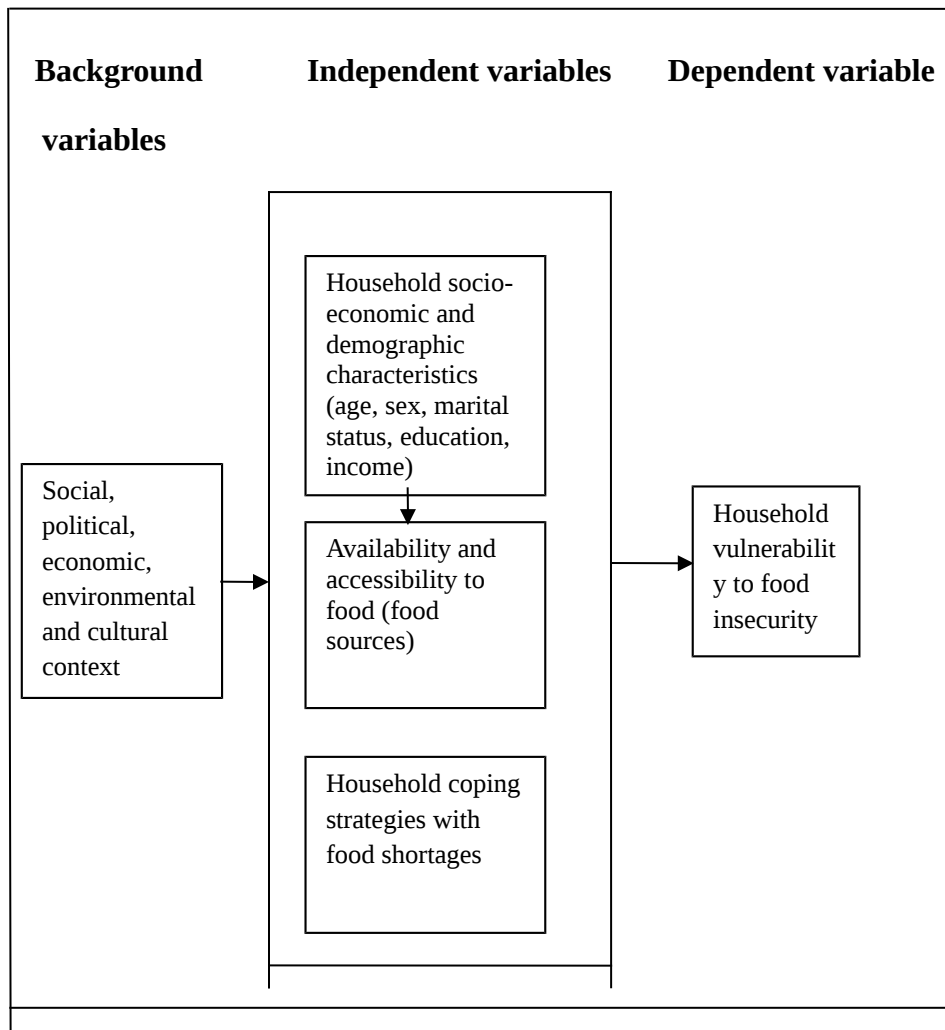
1.5 Hypotheses of the study

The following hypotheses of the study have been stated in the null form due to the fact that the findings on household vulnerability to food insecurity have tended to vary from one place to another.

- (i) There is no statistical significant relationship between household vulnerability to food insecurity and personal characteristics, namely: age, sex, marital status and education of household head.
- (ii) There is no statistical significant relationship between household vulnerability to food insecurity and availability of food through own production.
- (iii) There is no statistical significant relationship between household vulnerability to food insecurity and food access through purchase.

1.6 Conceptual framework for the study

Figure 1: Conceptual Framework for the study



CHAPTER TWO

LITERATURE REVIEW

2.1 Perceptions of food, food security/insecurity and vulnerability to food insecurity

2.1.1 Food

Food is any substance consumed to provide nutritional support for the body. It is usually of plant or animal origin, and contains essential nutrients, such as carbohydrates, fats, proteins, vitamins, or minerals. The substance is ingested by an organism and assimilated by the organism's cells in an effort to produce energy, maintain life, and/or stimulate growth (James, 1997).

Historically, people secured food through two methods: hunting and gathering, and agriculture. Today, most of the food energy consumed by the world population is supplied by the food industry, which is operated by multinational corporations that use intensive farming and industrial agriculture to maximize system output.

Overall, attention to food security has dwelt on the potential quantity of food consumed rather than its quality expressed in terms of food preferences. People's preferences on certain foods over others are based on taste, which is in part culturally constructed. It follows that it is through food taste and food preparation, that, culture plays an important role in determining what is classified as food (MAFC, 2006). Considering the subjective nature of taste and hence preferences for certain types of

foods, what constitutes food would vary from one society to another. Consequently, food is one of ‘the primary ways in which notions of “otherness” are articulated’ and ‘one of the strongest of ethnic and class markers’ (James, 1997; Weismantel, 1988).

Moreover, as Aberra *et al.* (1994) found in Kyela, rice is synonymous with food, and its availability is equated with food security. This is not only because rice is the preferred food, but also because other foods are produced on a smaller scale. Mwaseba *et al.* (2007) further reports that, in addition, when using the term ‘food’, reference is usually made to the main component of the meal, such as rice, which can – if necessary - be substituted by other food-stuffs such as *ugali* or bananas. Therefore, in this usage, attention is not paid to the remaining part of the meal, that is, complementary products, or *mboga* (relish) in the Kiswahili language, usually composed of fish, meat, milk and beans.

2.1.2 Food security

According to the World Food Summit in 1996, “Food security exists when all people at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life” (FAO, 1996). This definition integrates stability, access to food, availability of nutritionally adequate food and the biological utilization of food.

The conceptualization of food security goals by Adams (1999) and Huang and Smith (2000) goes beyond the adequacy of food quantity and quality and extends to the four A's: availability, accessibility, acceptability and adequacy. Food security requires that a sufficient supply of food be available (quantity) and that it be accessible to all equally. Acceptability addresses food's cultural and symbolic value, that the food available and accessible should respect individuals' cultural traditions.

Wilhemina (2008) asserts that it is not just the quantity of food entitlement that matters, but also the "quality of entitlement". Thus, the highest state of food security requires not just secure and stable access to a sufficient quantity of food, but access to food that is nutritionally of adequate quality, culturally acceptable, procured without any loss of dignity and self-determination, and consistent with the realization of other basic needs. The balance between quantity and quality cannot be decided without reference to food insecure people themselves, and the second modification is precisely to give greater weight in definitions of household food security to the perceptions of the food insecure. In this view, food insecurity is not an objectively defined level of access to food or quality thereof, but rather the level or quality that people perceive to be inadequate (Wilhemina, 2008).

Maxwell and Frankenberger (1992) elucidate that, food security at national level is a satisfying balance between food demand and food supply at reasonable prices. This intends to indicate a situation where there have been no major upheavals in food markets in the recent pasts, where adequate food is available and where most of the populations have access to that food. Moreover, at national level, changes in food

security can be identified over time by rising prices. Access to food implies that the people in a given location have both physical and economic access to obtain food. Physical access implies a food supply system which ensures easy availability of required foods, and is determined by local production augmented by imports and by the food distribution system. Economic access implies that those requiring food have the economic means to acquire food that is physically available. It is determined by income status of people and by other entitlements through transfers. Access to available food is also determined by the consumption pattern within the household units and by intra-household food distribution systems. Food distribution, employment and income levels and non-market entitlements reflect access to food (Eide *et al.*, 1991).

A food secure household is the one having sets of entitlements from food production, cash income, reserves of food or assets and/or assistance from government programmes, such that in times of need they will be able to maintain sufficient nutrient intake for physical well-being (Benson *et al.*, 1986). According to Maxwell and Frankenberger (1992), the above definition of HFS has four core concepts, these are (a) sufficiency of food, which is defined as the calories needed for an active healthy life; (b) access to food, defined by entitlement to produce, purchase or exchange food or receive it as gift; (c) security, defined by the balance between vulnerability, risk and insurance; and (d) time, where food insecurity can be chronic, transitory or cyclical. Therefore HFS is an integral concept and is highly complex multi-sectoral issue composed of inter-sectoral, macro and micro relationships and

which require an interdisciplinary approach and involvement of different actors (Liwenga, 1995; SADC, 2003).

It has been shown that food insecurity is widespread in the sense that there is always 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 situation such as localized floods and droughts (UN, 2006). Three forms of food insecurity can be distinguished as: transitory food insecurity, which occur when population suffers a temporary decline in consumption; and chronic food insecurity which occurs when households lack the resources to acquire enough food for a healthy and active life but the households are not directly threatened by starvation; and emergency food insecurity is a situation of acute and unpredictable food shortage which arise as a result of natural calamities (Maxwell and Frankenberger, 1992).

Food insecurity is determined by the immediate causes of hunger, underlying determinants of conditions in a community (affecting poverty, food production and ability to respond to shocks), and the impact of shocks (Baldwin, 2006). FAO (1999) observed that, it is difficult to identify the number of individuals who are food insecure, given intra household inequalities of differing natures in different regions as well as changes over time. Depending on factors such as agro-ecological characteristics, access to land, diversity of income and state of development of the economy, food insecure households can be members of different socio-economic and demographic groups in different areas. Nevertheless, some common characteristics of the food insecure emerge, of which poverty is central (Coates *et al.*, 2007).

A household is considered food insecure when, due to lack of money, it faces problems such as limited or uncertain availability of nutritionally adequate and safe foods, or limited or uncertain ability to acquire acceptable foods in socially acceptable ways. Thus, the concept of household food insecurity includes not only undernutrition and hunger but also households' perceptions of problems with the quantity and quality of food available, uncertainty of food supply and experiences of going hungry (Ericksen, 2008). Nevertheless when food insecurity is severe or prolonged, hunger is likely to be present (Coates *et al.*, 2006).

Despite the fact that food can be obtained from the market, food security as locally perceived seems to be associated with the availability of foods grown at home (Mwaseba *et al.*, 2007). This is because, even though people could obtain food from the market, in most cases they are not able to do so because of lack of cash. Normally, the money obtained from rice sales is not intended for buying food. Rather, it is used to meet other cash obligations, such as health and education costs, building a house or buying clothing (Mwaseba *et al.*, 2007).

2.1.3 Vulnerability to food insecurity

Regardless which definition of food security is adopted, four core concepts are common to most definitions: access, security, sufficiency and time (Maxwell & Frankenberger, 1992). As such, household vulnerability must be assessed in terms of not only immediate access, but also in terms of the stability and sustainability of those channels through which the household mediate its food access. Thus, risk considerations must be an integral part of such an assessment. For example, a

household can improve its access to food by disposing off assets or by investing in a riskier or less sustainable activity, but its vulnerability is likely to increase as a result of such action.

A household may derive its food entitlement from its own production, income (from the sale of labour or of surpluses), and disposal/use of assets. When the households are able to generate a surplus above their basic food requirements, the excess resources are diverted into assets, from which the household can draw in the event of a food crisis. Within this perspective, each household has a portfolio of assets and claims that are managed according to evolving household food security coping strategies: the breadth and riskiness of these options will map the vulnerability profile of each household (Swift, 1983).

According to Oni (2008), vulnerability is the propensity to fall below the (consumption) threshold, and its assessment therefore deals not only with those who are currently poor but also those who are likely to become poor in the future. Vulnerability to food insecurity is determined by: the risks faced by households and individuals in making a living; the options available to households (individuals, communities) for making a living (including assets, activities, market and non-market institutions, and public service provision); the ability to handle this risk. In the food security literature (WFP, 2007), vulnerability to food insecurity is seen as a function of the nature of risks and the individual's or household's responses to such risks.

2.2 Household characteristics and food security status

2.2.1 Household income level and food security status

In order to categorize a household as poor or otherwise various criteria of wealth ranking are used. For example, a study conducted by Temu (1995) established three ranks: low, medium and high. The criterion used was the perception of representative households and their assessment of the economic and social well being of various households in the neighbourhood. This approach was also used by Beerlandit and Huysman (1999) in Bukoba. However, most wealth ranking studies present similar conditions for wealth ranking. The low wealth rank group was viewed as poorest. They were deprived of major farm activities, had limited off-farm income activities, no shops, informal trade or cattle keeping (Huysman *et al.*, 1999). Such households normally depend on family labour, produce less food, had poor houses and limited assets like bicycles and radio (Huysman *et al.*, 1999).

The medium rank group was manifested by better socio-economic status than the low ranked group. In this group households were better agricultural producers; and though not rich had good houses; depend on family labour but sometimes hire labour or tractors; and possessed some assets like bicycles and radio. The high wealth ranked group members were apparently better off (Temu, 1995).

2.2.2 Household size and food security

Throughout history large families have been considered a blessing. However, changes in economic patterns and life style have created a lot of economic hardship to large

families, and children are no longer economic assets. Population increase had rendered some rural families to have less land to cultivate, while urban families have faced difficulties in securing income to support large families (Johnson, 1986). Findings from studies conducted in thirteen years in Africa, Asia and Latin America reported that food insecure households tended to be large and have higher number of dependents and younger age composition (FAO/WHO, 1992).

In rural areas people eat what they produce, store and prepare (Johnson, 1986). The amount of food per meal is closely related to the number of persons sharing a particular meal. Therefore if the quantity of food prepared is small and is equally shared by many, the family is then likely to be underfed (Ishengoma, 1998). In Sumbawanga it was found that families that ran short of maize before harvest were larger households as compared to small households, which had maize surplus (Ashimogo, 1995). Although household size affects food security it is not easy to establish a specific level of household size at which food insecurity starts. However, at the same level of income or food production, large families are more prone to food shortages than small families (Francois *et al.*, 1982).

2.2.3 Education and household food security

Ignorance and malnutrition are complimentary and any successful effort to reduce one is likely to diminish the other (Maxwell and Frankenberger, 1992). Seenapa (1987) observed that increase in household food insecurity is, to a larger extent, associated with low education among members of a household. Low education among heads of household may lead to household food insecurity due to effects on purchasing power, sanitation, personal hygiene, feeding practices, food selection and budgeting (TFNC, 1988).

Missape (1988) reported that 76% of mothers who had no formal education had undernourished children compared to none of mothers with university education, 61% with primary school education and 28% for mothers with secondary education. However, although the knowledge in food budgeting and rationing is important for household food security, education for control of seasonal food insecurity is not necessarily formal (Njiro, 1997).

2.3 Characteristics of households vulnerable to food insecurity

In order to identify vulnerable households FAO (2008) examined the way vulnerability associates with other variables across different households. According to FAO the values that some household characteristics exhibit on average may include the following: Higher levels of vulnerability are associated with lower current calorie consumption; Demographic variables (household size, education and age of household head) and livestock assets have a direct relationship with vulnerability. In

all cases they are smaller for the least vulnerable class than for the most vulnerable one; Larger land operation is associated with higher levels of vulnerability; this relationship is weaker when land ownership is considered; Higher levels of vulnerability are associated with a higher share of income derived from on-farm activities; Higher levels of vulnerability are associated with a higher share of agricultural produce sold on the market.

In the literature, vulnerability is usually explained as a characteristic of poor people (Odufuwa, 2007; Odingo and Atieno, 2011; Siri *et al.*, 2005). Normally, a person becomes vulnerable when his/her initial capital has been depleted. The poor generally own small initial capital making them more exposed to shocks in their typroduction and trade, consequently leading their vulnerability. Apart from poverty, health and other physiological disorders are major causes of vulnerability. Biologically, vulnerable groups include pregnant and lactating women, solitary old persons, widows with children, female headed households, the handicapped, prisoners, orphans and unaccompanied children, street children and traumatized persons. Worst enough, biological vulnerability is usually superimposed on social economic vulnerability (Tollens, 1998 cited by Sango, 2003).

One of the important welfare aspect to which both the poor and biologically disadvantaged individuals are vulnerable to is food. According to CARE (2003), the study conducted in Shinyanga region, vulnerable groups classified as food insecure include:

- Agricultural laborers appear to be one of the most vulnerable groups as surveyed having the lowest food consumption levels;
- Those dependent on agriculture in high rainfall zones as their primary livelihood are more food insecure than the lower rainfall zones that depend primarily on livestock production. It appears in the high rainfall zones that the poorest households are employing coping strategies that increase their long term vulnerability. For example, the majority of poor households are consuming their planting seed stock and nearly half are selling off farm implements to respond to food scarcity;
- Half of the female-headed households are classified as poor;
- Those borrowing as a strategy were particularly high among middle income groups and lowest among the poorest and better off groups. The key finding here is that the middle income groups are likely to be carrying this debt for numerous years which could make them vulnerable to numerous shocks;
- Households with the least number of primary educated individuals also had the lowest consumption levels. This demonstrates that education is critical to creating livelihood opportunities and diversifying income;
- The most food insecure households are those from large households and those with the highest dependency ratios and;
- Households with higher dependency ratios also have the highest Coping Strategies Index values.

Maxwell and Frankenberger (1992) categorized food unsecured vulnerable households in Africa into five groups: capital poor families in arid and other marginal

areas; poor cattle breeders; urban poor; refugees, homeless and other war victims. Each of these categories of food vulnerable households is subjected to a particular source of risk. In the case of urban poor, for example, the major source of risks are changes in food price (large sudden price rises) and problem of unemployment.

In the literature on household vulnerability to food insecurity, there are several measures of food vulnerability. The strongest recommended method of identifying the vulnerable in a community is through the use of participatory methods (Tollens, 1998 cited by Sango, 2003). Advocates of this method argue that the vulnerable in a given community are invisible in the sense that they can't be identified through visiting the community for only a short while. They argue that identification of vulnerable groups can only be successful if the concerned community members will be involved in the assessment activity using participatory appraisal techniques for longer periods.

The literature (Kavishe and Mushi, 1993) also suggests two other alternative measures of food vulnerability referred to as introspective and non-introspective measures. Non-introspective measures consider resources such as cash income and number of durable goods owned by a household in the analysis of vulnerability. On the other hand, introspective measures are, for example, personal ratings and comparisons of observations and experiences. Non-introspective and introspective measures are sometimes referred to as objective and subjective measures of food vulnerability respectively. Pertaining to this, Der Meer *et al.* (2007) argue that the terms introspective and non-introspective measures are better expressions than subjective and objective because the term subjective denotes biased and objective

denotes unbiased. During the past, non-introspective measures of vulnerability were thought to be more appropriate than introspective. Recently, however, the use of people's perception (introspective measures) as a measure of vulnerability is increasingly important. The conviction that non-introspective measures provide a more objective assessment of vulnerability is increasingly being questioned (Bennet *et al.*, 2008; Littrell and Hobbs, 1989; Der Meer *et al.*, 2007). This study therefore measured household vulnerability to food insecurity based on respondents' own perception of their food security and vulnerability status.

2.4 Coping strategies to food insecurity

Various authors have attempted to define coping strategies. Devereux (2001) defines coping strategies as a response to adverse events or shocks. The definition by Snel and Staring (2001) captures the broad notion of coping strategies, namely that "all the strategically selected acts that individuals and households in a poor socio-economic position use to restrict their expenses or earn some extra income to enable them to pay for the basic necessities (food, clothing, shelter) and not fall too far below their society's level of welfare" (Snel and Staring, 2001). The latter definition implies that coping strategies involve a conscious assessment of alternative plans of action. The definition is based on the assumption that within the limited options available to households, the households are asset managers with freedom of choice in relation to their actions (Devereux, 1993; Ellis, 2003). This does not necessarily mean that their choice of strategies is always successful in achieving their intended objectives. In fact, the coping strategies often have unintended negative effects. For example, if you

borrow one's money or food and expecting to pay back in a stated period of time, it becomes different when you fail to do so. The consequence of this may be the distortion of social relationship between the lender and the borrower.

Ellis (2000) defines coping strategies as the methods used by households to survive when confronted with unanticipated livelihood failure. Coping comprises tactics employed when confronted by disasters, such as drawing down on savings; using up food stocks; receiving gifts from relatives; benefiting for community transfers; sales of livestock and other assets sales (Ellis, 2000). Due to varying degrees of wealth among households, different coping behaviours are adopted by households at different poverty levels. However, some coping strategies are common to all households, although the extent to which such strategies enable a household to remain afloat depend on the assets at their disposal (Devereux, 2001). Above all, the general tendency is that the lower the household asset status, the more likely the household would engage in erosive responses such as selling off of productive assets such as farm implements (Corbett, 1988; Devereux, 2001; Hoddinott, 2004). According to IFAD (2007), coping ability can be defined as reducing fluctuations in income. Faced with an income or food shock, households may either protect their food consumption by purchasing or receiving food from other sources such as friends and relatives (Davies, 1993; Corbett, 1988).

Dercon (2000) and Burg (2008) distinguish between risk management (income smoothing) and risk coping strategies (consumption smoothing). The former attempts to reduce the ex-ante risk impacts e.g. through income diversification. Households

smooth income by making conservative production or employment choices and diversifying economic activities. In this way, households take steps to protect themselves from adverse income shocks before they occur (Murdoch, 1995). Risk coping strategies deal with consequences (ex-post) of risk (Burg, 2008). Households smooth consumption by borrowing and saving, adjusting labour supply and employing formal and informal insurance arrangements. These mechanisms take force after shocks occur and help insulate consumption patterns from income variability (Murdoch, 1995). Furthermore, risk-coping strategies involve self-insurance (through precautionary savings) and informal group-based risk-sharing (Dercon, 2000; Davies, 1993). Households can insure themselves by building up assets in “good” years, to deplete these stocks in “bad” years (Dercon, 2000).

Typically, food insecure households employ any of four types of consumption coping strategies. First, households may change their diet (switching from preferred foods to cheaper, less preferred substitutes) (Maxwell, 1996). Second, the household can attempt to increase their food supplies using short-term strategies that are not sustainable over a long period (borrowing, or purchasing on credit; more extreme examples are begging or consuming wild foods, or even seed stocks). Third, households can try to reduce the number of people that they have to feed by sending some of (anything from simply sending the kids to the neighbour’s house when they are eating, to more complex medium-term migration strategies). Fourth and most common, households can attempt to manage the shortfall by rationing the food available to the household (cutting portion size or the number of meals, favouring

certain household members over other members, skipping whole days without eating etc) (Maxwell *et al.*, 2003).

Maxwell *et al.* (2003) further contend that it will be clear that all these types of behavior indicate a problem of household food insecurity, but not necessarily problems of the same severity. A household that does not eat for an entire day is evidently more food insecure than one that has simply switched consumption from rice to cassava. The basic idea is to measure the frequency of these coping behaviours (how often the coping strategy is used?) and the severity of the strategies (what degree of food insecurity do they suggest?).

Food purchase has been reported as an important means of acquiring food for the household during shortage period (Davies, 2001). Rural households therefore design different ways to raise income for purchasing food. Selling labour is the most common income strategy in many African countries. In Malawi, the period of high labor requirement coincides with that of food shortage (Davies, 2001).

Although coping strategies differ with local conditions, there is a common pattern in sequence of responses. Corbett (1988) gave examples of coping strategies as dispersed grazing, changes in cropping and planting practices, migration to towns in search of urban employment and increased petty commodity production. Other coping strategies identified by Corbett (1988) include collection of wild foods, use of inter-household transfers and loans, use of credit from merchants and money lenders, migration to other rural areas for employment, rationing of current food consumption,

sale of possessions, sale of firewood and charcoal, consumption of food distributed through relief programmes, sale of productive assets, breakup of the household, and distress migration.

Moreover, about 70% of food shortage households in Kondoa District in Tanzania had to buy food to cater for deficit while the rest had to work as casual labourers in other people's fields and get payment in form of cash or food (Liwenga, 1995). Therefore, attaining enough food through purchases becomes impossible for the majority of farmers in the rural areas. Furthermore, apart from working as casual labourers, other income generating strategies adopted by rural people have been identified. The strategies include sale of livestock, sale of cash crops, sale of local brew, employment seeking, small business, oxen lease, sale of domestic assets and lease of farm machines and equipment (Ashimogo, 1995; Liwenga, 1995; Makundi, 1996; Ishengoma, 1998).

Various mechanisms used to lessen the adverse effects of the crisis have been widely reported in Tanzania. For example, Wagao (1991); Ishengoma (1998); and Mgondo *et al.* (1996) reported that, in Tanzania, residents in rural areas have diversified strategies to lessen the adverse effects of the crisis. These include coping with food shortages by reducing the frequency of and changing the content of meals consumed daily; undertaking more income earning activities and buying or borrowing from either relatives or friends; and selling important productive and non-productive assets such as furniture and radios to meet food requirements in times of food scarcity. Other coping strategies mentioned include food aid and redistribution of children

where many poor households send their children to be cared for by relatives and friends over period of time when households are experiencing difficulties in meeting livelihood needs.

2.5 Shocks and strategies for coping with household food insecurity

Shocks refer to sudden and unexpected occurrences (Davies, 1993, MAFC, 2006). The exposure to shocks triggers coping strategies and a household's coping capacity results in either failure or success to attain food security (Davies, 1993). The ability to respond to shocks is determined by the degree of vulnerability of a household (Ellis, 2003; Devereux, 2001). Households are vulnerable when they are unable to cope with and respond to risks, stresses and shocks (Ellis, 2003). The ability of households to respond to risks and shocks can be substantially weakened by multiple or successive shocks (Burg, 2008). Responses to shocks and the ability to cope with vulnerability depend on the level of available assets. The inability to buffer food security shocks leads households to draw on liquidity or assets (Burg, 2008; Devereux, 2001). Without doubt, drought, floods, conflicts shocks are the root causes of a substantial proportion of both acute and chronic vulnerability in the SADC region (FAO, 2003; Dercon, 2000).

CHAPTER THREE

METHODOLOGY OF THE STUDY

3.1 Study Area Description

3.1.1 Geographical location

This study was conducted in Bahi District, which is one amongst six districts that make up Dodoma region. It extends between latitude 4° and 8° South and between longitude 35° and 37° East. The district has an area of 5948 km, and borders Kondoa District to the North, Manyoni to the West, Dodoma Municipality to the South West and Chamwino district to the East (District Council profile, 2010). Bahi District was chosen as the study area because, based on the research by FEWS NET (2009), it is among the worst affected areas in Tanzania in terms of food shortages.

3.1.2 Area, Administration, and Population

The District has a total area of 77 372 km², of which arable land is only 596 800 hectares. Administratively the district is divided into four divisions of Chipanga, Bahi, Mundemu and Mwitikila. The four divisions have a total of 21 wards, 56 villages and 1539 hamlets. There is also one parliamentary electoral constituency namely Bahi. The 2002 National Population and Housing Census showed that the district had a population of 179 724 people, of which 88 430 were males, and 94 294 were females. Based on the annual average growth rate of 2.3%, the district population by 2010 was projected at 212 794 people, where 104 695 are males and 107 989 are females.

3.1.3 Occupation

The District has a dry Savannah type of climate, which is characterized by a long dry season lasting between late April to early December, and a short single wet season (unimodal rainfall) lasting between late December and early April. The District is predominantly rural with about 98.8% of people residing in the rural areas and the remaining 1.2% in trading centers like Bahi, Chipanga and Kigwe. The district's economy is almost entirely dependent on agriculture and livestock rearing, which is characterized by low productivity, resulting from low and erratic rainfall, high evapo-transpiration and low moisture holding surface soils.

As mentioned earlier (in section 3.1.2 above), the District has 596 800 hectares of arable land. Out of 596 800 hectares of arable land, only about 164 637 hectares are used for crop production. However, the production of most crops tends to be concentrated in the southwestern and northeastern parts of the District where there is at least good climatic condition. Major crops grown are sorghum and millet (drought resistant crops). Other crops include maize, paddy, beans, groundnuts, simsim, sunflower and cassava. There is also small-scale production of vegetables and fruits such as tomatoes and onions (BDF, 2010).

3.2 Research Design

The present study was household based and was cross-sectional. This design, according to Babbie (1990), allows data to be collected at a single point in time without repetition, by asking questions to a representative sample of the population.

This design is useful for description purposes as well as for the determination of relationships between and among variables.

This study was conducted in two phases: During phase one, the researcher conducted a reconnaissance visit to the study area in December 2010, to identify the study villages and gather relevant preliminary information on the area. The specific objectives of the visit were to establish contacts with district officials and village leaders, and explore local perceptions of food, food security and vulnerability to food insecurity through focus group discussions (FGDs). The information obtained in phase one was used to construct the tools (interview schedule) for data collection during phase two of the study. In the second phase, data were collected through the household survey and in-depth interviews for the selected households.

3.3 Sampling Procedure

3.3.1 Study Population

The target population for this study comprised of all farming households in Mpamantwa, Ibihwa, Mnkola and Bahi Sokoni villages. A household was defined as people who ‘normally lived together’ (slept under the same roof) and shared food from common kitchen. This implied that temporary visitors were excluded but temporary stay-aways were included.

3.3.2 Sampling Techniques and Sample size

The multistage probability sampling technique was used in the selection of two wards (Bahi and Ibihwa), four villages (Mpamantwa, Ibihwa, Mnkola and Bahi Sokoni) two

from each ward and 100 households (25 from each village) to constitute the study sample. The selection of two wards and four villages involved the use of lottery method from a list of wards and that of villages whereby each ward and a village was assigned a unique number and a random selection was made. Simple random sampling technique was used to obtain 25 households from each of the four selected village households. With respect to village level sampling, in each village, a register was used as the sampling frame. Of the interviewed households, two deemed to be poor, food insecure and vulnerable were purposively selected for in-depth interviews.

3.4 Methods for Data Collection

To address the study objectives a combination of methods were used. In this section information about the data collection methods, their main purpose and the type of information obtained from individuals and households are presented. Qualitative and quantitative methods of data collection were used to achieve triangulation (i.e. confirmation of the same information by different methods or sources) to increase the validity of the results. Qualitative methods used included semi-structured interviews with key informants, focus group discussions, participant observation and case studies. The quantitative method used was the household survey. A short description of the methods used is presented below:

Key informant interviews

The advantage of key informant interviews was that the researcher could access information which otherwise would not have been easy to get. The interviews which were held with key informants (village leaders, village elders and ward extension

workers) were also used to get general information about the people and situation in the village, including the changes in food security situation during the past five to 10 years. Interviews with key informants were informal and guided by a checklist of open-ended questions. Sometimes the researcher explored relevant topics as the informant brought them up during the interview.

The interviews were conducted in Kiswahili and covered the following issues:

Origin of the village, recent history and major events in the village; People's livelihoods in the village; Trends in food security situation in the respective village; Causes of food insecurity in the village; Trends in crop production in the village over the past five to 10 years and strategies employed by households during food shortages.

Focus group discussions (FGDs)

Focus group discussions are among the most widely used methods in qualitative research. The method takes advantage of the interaction between small groups of people. Participants respond to and build on what others in the group have said. Ideally, it is a synergetic approach that helps in generating insightful information and encourages the participants to give concrete answers (Krueger, 1988). In this study, the FGDs involved people who represented different gender categories in the village. The groups were composed of seven to 11 people of varied ages. Some were mixed while others consisted only women or only men. The composition of focus groups and the topics discussed are summarized in Table 1.

Table 1: Composition and topics of FGDs

No.	Composition	Topic(s) discussed
1.	Mixed (men and women)	Major crops grown in the area; local perceptions of food and food security; trends in food security situation in the village; household coping strategies with food insecurity
2.	Women	Major crops grown in the area; local perceptions of food, food security and food insecurity; responsibilities in household food preparation;
3.	Men	Same as in FGD 2
4.	Youth (boys and girls)	Perception of food, food security and food insecurity

With regard to all topics participants in the FGDs were asked to compare the present situation with that of five to 10 years ago. Free listing was used during FGDs to derive definitions of variables and indicators to be used for food security concepts. These definitions and indicators informed the formulation of items for the interview schedule. The discussions were conducted in Kiswahili, tape-recorded and then transcribed then translation from Kiswahili to English was done for data analysis.

Household survey

This method allows the collection of empirical data on specific variables from a larger sample. The survey was conducted from December 2010 to mid-February 2011. Data were collected by the researcher with the assistance of two trained research assistants who interviewed the sampled respondents. The tool used was the interview schedule which was prepared in English and later translated into Kiswahili for effective administration. Prior to actual household survey the tool was pre-tested

on 10 respondents (household heads) from Ibihwa and Mnkola villages who were not later included in the study sample. The pre-testing of the tool enabled the researcher to make necessary corrections to it in the light of the experience gained during the pre-testing and thus helped to ensure its validity. Data were collected through face-to-face interviews.

The case study

The case study method is used when ‘how’ or ‘why’ questions are explored and when the focus is on phenomena that are occurring within real life contexts (Yin, 2003). This method was used to obtain information on the critical life experiences of individuals in the households so as to understand changes over time in their lives. It facilitated studying the changes, dynamics and the problems of coping with food insecurity in daily life. It also made possible the follow-up on the important day to day events of these households, and revealed how families generate their livelihood and how they cope with food insecurity. The in-depth interviewing in the framework of applying the case study method also allows for revealing people’s own perceptions and how they experience their situation. After the survey, with the help of village leaders, two cases were selected based on the following criteria: headship (male-headed and female-headed); resource and asset ownership (poor); food security status (food insecure).

3.5 Data processing and analysis

3.5.1 Data processing

The collected data were edited to detect errors and omissions and thereafter coded prior to analysis.

3.5.2 Data analysis

The coded data were analyzed using the Statistical Package for Social Sciences (SPSS) computer program. Descriptive statistics such as frequencies, percentages, and cross tabulation were used for making inferences. The chi-square statistic, t-test and ANOVA were used to determine relationship between dependent (effect) variables and independent (causal) variables. The dependent variable was household vulnerability to food insecurity while the independent variables included age of household head, sex of household head, marital status of household head, education level of household head, landholding and possessions, crop production, and livestock ownership. The statistical significance test was done at $p \leq 0.05$ levels.

3.6 Limitations of the study

Much of the primary data for the study were collected through interviews. It is therefore expected that the typical limitations of this type of research approach will equally apply here as well. The enumerator error is one such limitation. Two enumerators were trained and hired to conduct the interviews. The second limitation is the error that might have resulted from respondents as they were asked to recall on the household annual income, the quantity of crops harvested and the frequency of use of different coping strategies.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Perceptions of food, food security, food insecurity and vulnerability to food insecurity

4.1.1 Food

This study aimed at exploring the local perceptions of food in Bahi District. The results of focus group discussions (FGDs 1, 2 and 3) (Table 1) revealed that, traditionally, for the people of Bahi (mostly the *gogo*), food means millet, commonly known as *ugali wa uwele* (millet-based stiff porridge) saved with *mlenda* (mostly), *chipali or safe* (traditional vegetables). It was reported that maize-based *ugali* was also eaten but by only few people did so. Although this study did not explore how big a meal should be so that it is considered enough to be eaten, it was said that in good times (period of food security) people would eat until they are satisfied. Most importantly, the size of food which is prepared will depend on the number of people it is prepared for. Millet was considered the preferred food in the area because, first it tastes good and also it lasts longer in the stomach. One focus group participant who was also supported by others said,

“If I eat millet-based ugali, I enjoy eating, feel satisfied and I can work longer in the farm because it gives me enough muscular energy. It is better to eat a little of millet-based ugali than eating much of any other food”.

Furthermore, a discussion with the youths (FGD 4) (Table 1), gave almost similar results. For them, when explaining of what they considered to be food, they said the common food was maize-based *ugali* but they would prefer millet-based one. Further probing as why the youths considered millet as the main staple food, they simply said

it is just because it tastes good. It was revealed from focus group discussions (FGD 2 and 3) (Table 1) that at household level both wife and husband together with their children are involved in all farm operations for crop production. But, a woman (wife for a married couple) is the one responsible for cooking the household food with the assistance from her daughter(s) if at all they are available in the household.

4.1.2 Household food security/insecurity

Based on FGDs 1, 2 and 3 (Table 1), food security is determined by the quantity of millet available in the household food storage structure(s) (*kilindo*) which is ready for household consumption. Thus, a food secure household is the one with enough stored millet to feed the household members throughout the year. A household that does not have enough stored millet to feed its members throughout the year and at the same time it doesn't have enough money or other assets like livestock that can be sold or exchanged with food is considered food insecure. It was also reported that a food secure household is the one whose members are able to get two enough millet-based meals per day. Based on this criterion, any household which is not able to provide its members with two meals a day is considered food insecure. However, eating once a day was common in both food secure and insecure households. This is because food secure households would eat once a day during the periods of farm operations as they spent a day-time (from morning to evening) in the distant farm fields.

Since local perceptions of food security are associated with millet produced at household level, the number of months a household took to exhaust its own produced millet was used as an indicator for household food security. Specifically, households

that took 12 months (from 2009/10 to the 2010/11 season) to exhaust household millet stocks were categorized as food-secure. On the other hand, households that had no millet stock and the one that took less than 12 months to exhaust millet stock were classified as food-insecure. Using this indicator, of 100 interviewed households, about 37% and 63% households were food secure and food insecure respectively (Table 2).

4.1.3 Household vulnerability to food insecurity

Based on focus group discussions (FGD 1, 2 and 3), a household was considered vulnerable to food insecurity if it usually or always does not have enough and preferred food (millet) and/or it is at risk of failing to have enough and preferred food (millet) in the future. For them a household vulnerable to food insecurity is one with the following characteristics:

- A small piece of land that is not enough for the household crop production;
- Misuses or does not properly handle the available food (excessive selling, making local brew, exchanging with local brew);
- It is confronted with shocks like diseases, deaths, and accidents;
- Lack of alternative sources of income other than relying on the sale of farm produces;
- Has no livestock that can be sold or exchanged for food;
- Is headed by a very old person (70 years and above);
- Has many dependents (children under 13 years and old persons of over 70 years old) and;

- Has chronically ill and physically disabled members. These chronically ill and physically disabled persons can be household heads or ordinary household members whom a household has to take care of.

Based on the above criteria, it was hypothesized by this study that local perceptions of food security is one of the good indicators of food insecurity vulnerability. Using this indicator, the study intended to establish the proportion of households in the study area that are vulnerable to food insecurity. As presented in Table 2, 80% of the sampled households perceived themselves as being vulnerable to food insecurity whereas 20% perceived themselves as non-vulnerable to food insecurity. These findings are in line with a study by Molapo (2009) who found that, a large proportion of households (53%) are at risk of food insecurity in the Southern Lowlands. Furthermore, the study reported that the majority of vulnerable households did not hold any cereal stocks remaining from the immediate post harvest period; chronic illness, unemployment and erratic weather patterns are causes of food insecurity in the Southern Lowlands.

Table 2: Distribution of respondents by food security and vulnerability status (n = 100)

Variable	Frequency	Percentage
Household food security status		
Food secure	27	27.0
Food insecure	63	63.0
Household vulnerability to food insecurity status		
Vulnerable	80	80.0
Non-vulnerable	20	20.0
Village food security situation		
Good	1	1.0
Bad	93	93.0
Moderate	6	6.0

4.2 Demographic and socioeconomic characteristics of respondents

4.2.1 Age of household head

Age is an important variable because it determines various inter-household and intrahousehold characteristics including ownership and control of resources such as land and household assets. Age may also give a picture of a household's labor and income. The ages of respondents ranged from 24 to 80 years with the average of 50 years and standard deviation of 15.43. As presented in Table 3, majority (70.0%) of the household heads were in the economically active age group, i.e. less than 64 years, whereas the remaining (30.0%) were in the dependent age group, i.e. 64 years and above. However, of the 70% economically active household heads, 37.0% and 33.0% perceived their households as being vulnerable and non-vulnerable to food insecurity respectively.

The chi-square test results ($\chi^2 = 13.807$, $p = 0.017$) as presented in Table 3 indicate that there is a statistical significant difference between the mean ages of household

head among the two categories of households vulnerable to food insecurity at $p \leq 0.05$ and thus household vulnerability to food insecurity is significantly related to the age of household head. However, this contrasts with the t-test results which indicate a p-value of 0.081 indicating that there is no statistical significant difference between age of household heads in households vulnerable to food insecurity and those that are not vulnerable to food insecurity. Considering the age groups of the sampled household heads, it was expected to have fewer households that are vulnerable to food insecurity than non-vulnerable ones because the majority of respondents (about 70%) were in the economically active age group and thus would be able to produce enough of the household food.

4.2.2 Sex of respondents

A household being headed by a female or a male may influence food security within the household. Most of the Female Headed Households (FHHs) are those that are headed by old widows who have lost their spouses and they are normally characterized by not only having a burden of dependents (mostly grand children) but also have low income.

Among the 100 surveyed households, male headed households (MHHs) were 63% of which 35% and 28% perceived their households as being vulnerable and non-vulnerable to food insecurity respectively. These findings depict that there are more MHHs in the study area than FHHs. FHHs were 37% of which 28% perceived their households as being vulnerable to food insecurity whereas nine percent perceived themselves as non-vulnerable to food insecurity (Table 3) at the time of household

survey. This figure (28%) is smaller but closer to the one given by Due and Ziervogel (2004) who reported that almost 30% FHHs were vulnerable to food insecurity among smallholder farm households in Tanzania. According to FAO (2008), FHHs tend to be food insecure because they are poor and face gender specific obstacles, adversely affecting their ability to produce enough food for their households. The chi-square test results ($\chi^2 = 4.048$, and $p = 0.044$) and *t*-test results ($t = 2.033$, $p = 0.045$) further show that there is a statistical significant difference in household vulnerability to food insecurity between MHHs and FHHs.

4.2.3 Marital status of respondents

Married couples are likely to be more productive than single ones due to labour reinforcement (synergy) in accomplishing farm and non-farm activities; hence the former are likely to be in a food secure situation. Households with widowed, separated and divorced household heads are normally characterized by more dependants than their married counterpart. Of 100 interviewed households, 65% were married while the remaining were not married because of different reasons as indicated in Table 3. Of the 65 households, 33% and 32% perceived their households to be vulnerable and non-vulnerable to food insecurity respectively.

The results of chi-square test ($\chi^2 = 12.548$, $p = 0.014$) indicate that there is a statistical significant difference in the marital status of a household head among the households vulnerable to food insecurity and the non-vulnerable ones. When an independent *t*-test was conducted, the results ($t = 3.277$, $p = 0.001$) revealed too that there is a

statistical significant difference in food insecurity vulnerability status of a household between the different categories of marital status. It can be concluded that marital status of a household head is significantly related to vulnerability of household to food insecurity.

4.2.4 Level of education of respondents

Educational attainment by the household head could lead to awareness of the possible advantages of modernizing agriculture by means of technological inputs, enable them to read instructions on fertilizer packs and diversification of household incomes which, in turn, would enhance households' food supply (Najafi, 2003). It is argued that higher education in the rural community opens up better employment opportunity and diverts people from subsistence agriculture to off-farm economic activities. This can help to increase the access to food through increase in level of income. Furthermore, farmers' education is very important for their ability to efficiently utilize the advice and information offered by the extension service and other development agents (Ragnar and Jørn, 2003). For instance, Luhasi (1998) purports that, education is perceived as among the factors that influence an individual's perception of an intervention before making decision to take part. Luhasi further argues that education also imparts desire to the individual to learn more, attend training and seek information regarding agricultural and non-agricultural activities.

In this study, respondents were requested to state whether they had attended school (formal education) or not. As shown in Table 3, of the interviewed household heads,

77% had attended at least primary school while the remaining (23%) had no formal education at all. This suggests that the majority of respondents (about 77%) had at least attended primary school which enabled them to be able to read and write in Kiswahili, which is also an indication of high literacy rate in the study area. When related to the food insecurity rate, it was expected to have fewer food insecure households in the study area than it is now because of the presence of high literacy rates. The chi-square test ($\chi^2 = 17.647$, and $p = 0.001$) shows that there is a statistical significant difference between the education level of household heads in the food insecure vulnerable and non-vulnerable households. The t-test ($t = -4.310$, $p = 0.000$) further reveals this significance. It can be concluded from these results that education level of a household head plays a crucial role in household vulnerability to food insecurity.

Table 3: Household characteristics

Variable	Vulnerable (n=80)		Non- vulnerable (n=20)		Total (n=100)		χ^2 -test	T-test
	n	%	n	%	n	%		
							P- Value	P- value
Age in years of household head								
24 – 33	11	11.0	5	5.0	16	16.0		
34 – 43	12	12.0	9	9.0	21	21.0		
44 – 53	9	9.0	13	13.0	22	22.0		
54 - 63	5	5.0	6	6.0	11	11.0	0.017	0.081
64 - 73	20	20.0	3	3.0	23	23.0		
74 - 83	7	7.0	0	0	7	7.0		
Sex of household head								
Male	35	35.0	28	28.0	63	63.0	0.044	0.045
Female	28	28.0	9	9.0	37	37.0		
Marital status of household head								
Married	33	33.0	32	32.0	65	65.0		
Never married	2	2.0	0	0.0	2	2.0		
Divorced	14	14.0	3	3.0	17	17.0	0.014	0.001
Widowed	14	14.0	2	2.0	16	16.0		
Education level of household head								
No formal education	3	3.0	20	20.0	23	23.0		
Incomplete primary school	2	2.0	10	10.0	12	12.0		
Primary school	19	19.0	44	44.0	63	63.0	0.001	0.000
Secondary school and beyond	2	2.0	0	0.0	2	2.0		
Household size (number of household members)								
1 – 3 (small)	23	23.0	4	4.0	27	27.0		
4 – 6 (medium)	29	29.0	27	27.0	56	56.0	0.013	0.073
>6 (large)	11	11.0	6	6.0	17	17.0		

4.2.5 Household size

The household size in this study meant the total number of individuals in a given household. It denotes the availability of labour force for food production and at the same time it gives an account on the number of people to be fed in the household).

The descriptive statistical analysis results show that the smallest household had only one member whereas the largest had 15 members with the average of 4.81 members per household and standard deviation of 2.182. Based on focus group discussions (FGD 1) (Table 1), a household with less one to three members is regarded as small,

the middle sized one has four to six members whereas the large one has more than six members. The study findings in Table 3 show that, 27% of the sampled households were small, 56% were medium sized whereas 17% were large. This implies that more than half (56%) of the sampled households were medium sized (with four to six members

Based on the respondents' own perception of food insecurity and vulnerability, it was hypothesized by this study that the likelihood of a medium sized household to be food insecure or being vulnerable to food insecurity would be very small. The chi-square test results ($\chi^2 = 8.743$, and $p = 0.013$) show that there is a statistical significant difference in household size between vulnerable and non-vulnerable households.

4.3 Factors associated with household food security and vulnerability to food insecurity

In this section, as a result of focus group discussion is aiming at exploring perceptions of food security and vulnerability to food insecurity in the local context, a number of factors used to characterize the households that are vulnerable to food insecurity are discussed.

4.3.1 Household Food Availability and Access

As stated earlier, the major source of household food in the study area was through own farm production. Food crops that were being grown included maize, sorghum, millet, simsim, groundnuts and rice. The study found that apart from groundnuts

Number of food sources								
One	9	9.0	4	4.0	13	13.0		
Two	11	11.0	54	54.0	65	65.0	0.000	0.000
Three	0	0.0	18	18.0	18	18.0		
Four	0	0.0	2	2.0	2	2.0		
Type of food sources								
Own farm production	7	7.0	1	1.0	8	8.0		
Purchase	3	3.0	4	4.0	7	7.0		
Own production and purchase	16	16.0	48	48.0	64	64.0	0.000	0.000
Own production, purchase and government support	0	0.0	19	19.0	19	19.0		
Own production, purchase, government support, and food gifts	0	0.0	2	2	2	2.0		

(b) Millet production

The results of focus group discussions (FGD 1, 2 and 3) (Table 1) revealed that the main staple food in the study area was millet. Thus it was anticipated that the crop would be grown by majority of households. Indeed results in Table 5 show that majority (57%) of the surveyed households had grown millet in the 2009/10 agricultural production season of which 22% harvested less than one bag, 31% had their millet harvests ranging from one to five bags, and five percent harvested more than five bags. Furthermore, the study explored the reasons why others did not grow millet. It was revealed that, some people in the study area are not growing millet because of low productivity of this particular crop. In this regard, one respondent said,

“I am not ready to spend much of my time and other resources working in a three acres millet field only to harvest one tin (20kg) of millet. We used to grow millet in those days when one could harvest enough millet from just a small piece of land”.

Similarly, the Ibihwa Ward Agricultural Extension Officer attributed the failure of some farming households to grow millet due to reduced productivity of the crop.

Table 5: Distribution of households by the amount (bags) of millet harvest in 2009/10 (n=100)

Category	n	%
Less than one	21	21
One to five	31	31
More than five	5	5
Total	57	57

4.3.2 Household income

Income is one of the important with respect to food security due to the fact that it is used to buy farming inputs and foodstuffs particularly during the period of food deficit (Aikael, 2010). Lack of income can hinder one's ability to afford buying food, rendering him/her to be food insecure. Income is more important to rural people who are engaged in activities other than farming (Woolard *et al.*, 2007). This is true for example, carpenters as well as urban dwellers who depend solely on income buying all kinds of foodstuffs.

In this study, it was felt important also to know the common sources of income in the study area. Table 6 shows that the three major sources of income were sale of farm crops (35.1%), small business (31.3%) and casual labour (19.0%). Also the study found that the crop which was commonly sold was groundnuts and to a lesser extent

maize. Furthermore, it was observed that, the petty business involved the sale of local brew (*choya, kangara and komoni*) all prepared by using millet and sugar.

Table 6: Distribution of respondents by type of income source(s) (n=100)

Household income source	Frequency	Percent
Sale of farm crops	63	35.1
Small business	56	31.3
Casual labour	34	19.0
Remittances	16	9.0
Sale of animals and animal products	10	5.6

Respondents were also asked to state the number of sources from which the household acquired its income. This ranged between one and three, which included: sale of farm produces, sale of animals and animal products, petty trading, formal employment, remittances, casual labour, tailoring and local brew business. The study results in Table 6 show that 35% of all the respondents relied on only one source of income, 50% relied on two sources whereas the remaining 15% relied on three sources. It can be observed that more than half of the respondents (about 65%) relied on multiple sources of income. The chi-square test ($\chi^2 = 4.440$, $df = 2$ and $p < 0.109$) revealed that there is no statistical significant difference in the number of income sources between the food secure and food insecure households among the surveyed households at $p < 0.05$ indicating that there is little or no relationship between number of income sources and household's food security status.

Also the study sought to know the annual income per household in Tshs obtained from the sources mentioned above for the year 2009/10. This was divided by 12 to get monthly average income for a given household in that particular period. The

results in Table 6 show that more than (52%) half of the surveyed households earned less than Tshs 20 000/= per month, of which five percent and 47% were food secure and food insecure respectively; 12.0% earned between Tshs 21 000/= and 40 000/= of which two percent were food secure and 10% were food insecure; 17% earned between Tshs 41 000/= and 100 000/= of which five percent were food secure and 12% were food insecure, and 19% earned more than 100 000/= of which 14% were food secure and five percent were food insecure.

Table 7: Distribution of respondents by number of income sources and monthly average income (N=100)

Variable	Food secure		Food insecure		Total		χ^2 -test
	n	%	n	%	n	%	P value
Number of income sources							
One source	5	5.0	30	30.0	35	35.5	0.109
Two sources	15	15.0	35	35.0	50	50.0	
Three sources	6	6.0	9	9.0	15	15.0	
Income in Tshs							
< 20 000	5	5.0	47	47.0	52	52.0	0.000
21 000 – 40 000	2	2.0	10	10.0	12	12.0	
41 000 – 60 000	1	1.0	7	7.0	8	8.0	
61 000 – 80 000	2	2.0	3	3.0	5	5.0	
81 000 – 100 000	2	2.0	2	2.0	4	4.0	
> 100 000	14	14.0	5	5.0	19	19.0	

However, the average monthly income for the household was Tshs 66 752/= with the minimum, maximum and standard deviation of Tshs 3000/=, 816 666/= and 127 705 respectively. These findings contradicts with those of Aikaeli (2010) who reported that the average rural household monthly income is Tshs 40 000/=. Nevertheless, this value might not give a true picture of household income in the study area because of the high variation in income observed among the respondents which is indicated by standard deviation value (127 705). The chi-square test results ($\chi^2 = 32.718$, $df = 5$ and $p < 0.000$) indicate that there is a statistical significant difference in income levels between the food secure and food insecure households among the surveyed households at $p < 0.01$. This indicates the association of household income and food security.

4.3.3 Landholding and land use

Land is one of the principal means of agricultural production. Access to land enables a farmer to produce either for subsistence (to get food for consumption only) or for cash to enable one buy non-food items for example soap, clothes and others.

According to Najafi (2003), food production can be increased extensively through expansion of areas under cultivation. Therefore, under subsistence agriculture, holding size is expected to play a significant role in influencing farm households' food security. Respondents were asked to state whether they owned land or not and for those who owned land they were also requested to state the average size of land they owned. Moreover, respondents were asked to state how much of the land was planted with crops in the 2009/2010 agricultural production season. Furthermore, they were asked to state if the land they had/owned was enough for household food production or not.

The findings in Table 8 show that of the interviewed households 42% owned less than two hectares, 33% owned between two to five hectares, 19% owned more than five hectares whereas six percent owned no land at all. Of the 94% of respondents who owned land, 61% had enough land while (33%) complained the land was not enough. Considering that 33% of all the surveyed households had no enough land is an indication of land shortage problem in the study area. This could contribute to household food insecurity problem bearing in mind that these were farming household whose main livelihood activity was crop production (farming).

Furthermore, this study sought to know the ability of households to cultivate the available land for a given household in the 2009/10 agricultural production season. This study found that, apart from owning land, some households were unable to cultivate even the little land they had. Of the 94% of respondents who reported to

own land, 53% reported to have cultivated all the land while 43.6% did not cultivate all the household land in the stated period (Table 8).

Table 8: Distribution of respondents by land size, opinion on land size and reasons for not cultivating all the household land

Variable	Food secure		Food insecure		Total		χ^2 -test
	n	%	n	%	n	%	P value
Land size in hectares owned by the household							
No land at all	4	4.0	2	2.0	6	6.0	0.000
<2	4	4.0	38	38.0	42	42.0	
2 – 5	9	9.0	24	24.0	33	33.0	
>5	9	9.0	10	10.0	19	19.0	
Enough land?							
Yes	14	14.9	47	50.0	61	64.9	
No	7	7.4	26	27.7	33	35.1	
Cultivated all the land in 2009/10							
Yes	12	12.8	41	43.6	53	56.4	
No	11	11.7	30	31.9	41	43.6	
Reasons for not cultivating all the land							
Inadequate labour force in the household	4	9.8	16	38.9	20	48.7	
Poor working tools	0	0	6	14.7	6	14.7	
Discouraged by the unpredictable rainfall	1	2.4	5	12.2	6	14.7	
Working as a casual labourer in other people's fields	0	0	3	7.3	3	7.3	
Inadequate money to manage the farm	0	0	4	9.8	4	9.8	
Following for improving fertility	2	4.9	0	0	2	4.9	

Various reasons were given behind households' inability to cultivate all their land (Table 8). The three most important reasons for not cultivating all the household land were shortage of labour force in the household (48.7%), the use of poor working tools (14.7%) and discouragement by the unpredictable rainfall patterns (14.7%). The shortage of labour force was much contributed by some household members falling

sick, elderly members and the young children who spent much of their time attending schools.

Hand hoe was found to be a commonly used farm implement with only a few households using drought animals. Some households reported not to have cultivated their land because of erratic weather patterns. The commonly mentioned weather related problem was drought which caused most crops to dry in the fields before maturity resulting into poor or no harvest at all.

4.3.4 Food storage and handling

(a) Storage structures

Food storage has an implication towards household food security status. It determines the extent to which the household is able to store its grains/cereals and other food stuffs for present and future use. Focus group discussions with village elders found that, traditionally, people in the study area used to store harvested cereals in local food storage structures commonly known as *vilindo*. One *kilindo* had the capacity of storing at least thirty sacks of cereals. Results (Table 9) show that, only nine percent of the surveyed households had *vilindo* in which they could store their food stuffs while the remaining 91% reported to use sacks/bags to store the household foodstuffs. It can also be observed from data in Table 9 that all the households with *vilindo* were food secure at the time of household survey.

Further investigation found that these traditional food storage structures (*vilindo*) were widely used in the past when the households were able to get good harvests. The focus group discussion members indicated that the current harvests are too little to be stored in *vilindo* which is an indication of reduced food availability in the study area as compared with the past.

The study also sought to know the proportion of households which had some stored food at the time of household survey which would reflect the extent of food availability in the study area. The majority of households (82%) did not have any food stored in the household at the time of the survey and/or future consumption at the time household survey.

Table 9: Distribution of respondents by food storage structure (n=100)

Variable	Food secure		Food insecure		Total	
	n	%	n	%	n	%
Type of food storage structure(s)						
Store in bags/sacks	21	21.0	70	70.0	91	91.0
Store in local storage structures (<i>kilindo</i>)	9	9.0	0	0	9	9.0
Do you have stored food?						
Yes	13	13.0	5	5.0	18	18.0
No	7	7.0	75	75.0	82	82.0

4.3.5 Ownership of livestock

Ownership of livestock has a very big contribution towards ensuring household food security as a source of household food and income. Liquid assets, such as small animals, are often used by poor rural households for consumption smoothing and as a form of insurance against the risk of food entitlement failure. Livestock production also acts as a buffer during food shortages. Cash can be generated from sale of livestock products and used to buy food and other household requirements (Kang'ara *et al.*, 2001).

Of the surveyed households, 36% owned livestock at the time of field survey while the remaining 64% were not indicating limited ownership of livestock in the study area. As it can be seen in Table 10, a large proportion (28%) of the respondents owned chicken of which the majority (16%) owned between one and five chickens, goats (16%) and cattle (13%). It can be seen from the results in Table 10 that the number of livestock per household in the study area was very small indicating the narrow household resource base which might limit the household access to enough food.

Table 10: Distribution of respondents by ownership of livestock (n=100)

	Cattle		Goats		Sheep		Donkeys		Pigs		Chicken	
	n	%	n	%	n	%	n	%	n	%	n	%
One to five	5	5.0	2	2.0	4	4.0	0	0.0	4	4.0	16	16.0
Six to 10	2	2.0	6	6.0	4	4.0	2	2.0	0	0.0	5	5.0
More than 10	6	6.0	8	8.0	1	1.0	0	0.0	0	0.0	7	7.0
Total	13	13.0	16	16.0	9	9.0	2	2.0	4	4.0	28	28.0

Different benefits (Table 11) were mentioned by respondents who owned livestock in the study area and they included: sale of livestock and livestock products (42.8%); household consumption as meat, milk, eggs (30.0%); manure (20.0%); and farm drought power (7.1%). It was not enough just to mention the benefits obtained from livestock keeping, but when this is compared with the number of livestock per household in the study area; again it can be concluded that there are no enough livestock (Table 11) in the study area to provide enough of the mentioned benefits.

Table 11: Distribution of respondents by benefits obtained from livestock (n=100)

Benefits from livestock keeping	Number	Percent
Sale of livestock and livestock products	30	42.8

Manure	14	20.0
Farm drought power	5	7.1
Consume as meat, milk, eggs etc.	21	30.0

4.4 One-way analysis of variance (ANOVA) and independent t-test

For the purpose of determining the contribution of selected independent variables to household food insecurity and vulnerability to household food insecurity, ANOVA test and an independent t-test were conducted. The results are presented in Table 12. Both ANOVA and t-test results show that, of eight variables, six were found to be significantly related to food security at $p \leq 0.001$ and those variables included number of food sources, household size, household income, size of household land, ownership of livestock and marital status of household head (married or single). Sex of household head was found to be significantly related to household food security at $p \leq 0.005$. The variable that was found not to be significantly related to household food security was the number of income sources (single or multiple sources).

Table 12: An analysis of the effects of selected independent variables on household food security (ANOVA and T-Test)

Variable	Test for equality of variances (ANOVA)		T-test for equality of means		
	F	Sig.	t	Df	Sig. (2-tailed)
Number of income sources	3.446	0.066	1.856	98	0.066
Number of food sources	19.629	0.000	-4.430	98	0.000**
Household land size	23.751	0.000	4.873	98	0.000**
Household income	52.615	0.000	7.254	98	0.000**
Ownership of livestock	3.995	0.048	-1.999	98	0.048*
Household size	7.255	0.008	2.693	98	0.008**
Sex of household head	5.366	0.023	-2.316	98	0.023*
Marital status of household head	6.366	0.013	-2.523	98	0.013*

**Significant at $p \leq 1\%$; *Significant at $p \leq 5\%$; $R^2 = 0.679$

4.5 Perceived causes of household food insecurity

The study explored opinions from respondents on the perceived causes of household food insecurity in the study area. Table 13 summarizes the causes of food insecurity in the study area as perceived by the respondents. The three most important reasons perceived to cause household food insecurity were: drought, little rainfall and uneven availability of rainfall (37.8%); poor farm implements (mainly hand hoe) (14.8%) and local brew business (11.0%). Climate related factors caused the crops to dry in the fields before maturity, the result of which was poor harvest or sometimes the lack of harvest at all. The use of hand hoe could not enable a given household to cultivate enough land for household food production and thus contributing to increased household food deficit.

Local brewing was reported to have reduced the household labour force. Majority of people in the study area spent much of their time drinking local brew instead of working in their farm fields/plots. This was witnessed even by the research team when they were visiting the sampled households. Six of the household heads could not be found at their homes during morning hours because they went to drink local brew at the nearby shop. Also it was reported that some people used the little harvested cereals (maize, millet and sorghum) to make local brew and/or sometimes exchange with already prepared local brew.

Table 13: Distribution of respondents by perceived causes of food insecurity (n=100)

Variable	Frequency	Percent
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Perceived Cause of food insecurity		
Drought/little rainfall (climate)	90	37.8
Poor working tools (hand hoe)	32	14.8
Local brew business	24	11.0
Low fertility of farms	19	8.0
Planting non-drought resistant crops	17	7.1
Poverty	22	8.8
High food prices	12	5.0
Unavailability of agric inputs	10	4.2
Relying on single source of income	8	3.3

4.6 Respondents' opinions on how to improve food situation in the village

Respondents were requested to give suggestions on what measures to be taken in order to improve the food situation in their respective villages. Several suggestions were given as shown in Table 14 but the most important three were: The subsidized food from the government should reach the needy (intended) ones and should be evenly available at affordable prices (30.1%); households should not rely on food crop only for food and income (21.6%) and; agricultural inputs should be made available in the village at right time and at affordable prices (17.0%).

During interviews with respondents and village leaders they indicated that the government rarely brought food which was sold at a subsidized price. However, it was reported by some respondents that the food that was brought by the government sometimes did not reach the intended people. Instead, it was bought by some few food secure households who later on sold it to others at a higher price. Respondents further requested that this should be done regularly and continuously because of the persistence of food shortage. The government was requested to enable poor village households to start and run small businesses whose income would supplement the income from the sale of farm produce. Respondents (Table 14) reported that if the

inputs are available in the village shops at affordable prices, the villagers would buy and apply them into their fields and thus increase agricultural yields. This would reduce the problem of food shortage in the study area.

Table 14: Distribution of respondents by their opinions to improve food situation (n=100)

Variable	Frequency	Percent
Opinion to improve food situation		
The subsidized food from the government should reach the		
needy (intended) ones and should be at affordable prices	57	30.1
Households should not rely on food crop only for food and cash	32	21.6
Inputs should be available in the village at right time and at		
affordable prices	29	17.0
Encourage villagers to work hard and handle the available food		
properly (village leaders)	24	12.7
Stop local brew business or allow it during the weekends only	17	9.0
Adequate extension services should be available	16	8.4
Insist drought resistant crops	10	5.3
Build water wells and dams for irrigation agriculture	6	3.2

4.7 Household Strategies in Coping with Food Shortages

As described in the previous sections (4.4.1b and 4.4.3), farmers in the study area often failed to produce enough grain for household consumption to carry them through the year. Thus, it was inevitable that they depended on alternative food sources and/or had to optimally use what they had produced to escape household food shortages. The range of coping and adaptive strategies employed by people is copious, and they differ according to prevailing conditions. Attempts were made to identify the most employed coping strategies through household surveys, focus group discussions and informal discussions with village elders. This section describes how people in the study area coped with food insecurity situations (Table 16).

When confronted with an economic and social environment that limits or changes access to food, respondents made compromising changes to their diets. The analysis

revealed that about 71% of the sampled households relied on less preferred food when they were faced with food shortages. This was also revealed during the focus group discussions (FGD 1) (Table 1) where it was frequently mentioned that because of inadequate resources to buy the preferred food, most people used to eat whatever was available in the household.

Sixty percent of the respondents practiced work for food or work for money. That means they went out for casual labour work from which they were paid food or money. This proportion of the population is higher than the one given by Liwenga (1995) who conducted a study in Kondoa district. One of the poor household head (Case study) interviewed reported to rely on casual labour work as the only source of household income. He remarked:

“The only source of income for my household is from casual labor work. I have been given piece works and paid money or sometimes given food. At some moments I borrowed some money from a neighbour and paid back through casual labour work although it is very difficult in this village to get somebody who is ready to lend you some money because everybody is complaining”.

This strategy is detrimental to household food security in the future because, as long as members do not have time to work in their own farm and become vulnerable to food insecurity. This problem was also came out during focus group discussions (FGD 3) (Table 1) and was the most widely employed coping strategy during food insecurity periods.

Altering meal patterns was also mentioned. A decrease in the frequency of food consumption was expressed more directly than a decrease in the quantity of food

eaten per meal. About 56% of households reported to have reduced the number of meals eaten per day especially during the time of food deficit. However, reducing the number of meals per day was found to be commonly practiced in the study area even by the food secure households. This study revealed that some households used to have only one meal per day (evening meal) especially during farming period simply because they spent the day time (from morning to evening) working in their farms which were far from their homes.

Fifty two per cent of sampled households borrowed food or relied on help from friends or relatives to cope with food insecurity. Borrowing food or relying on help from friends or relatives is indicative of strong social networks among rural households (Chambers, 1989; Monde, 2003). However, this strategy can destroy the social relationships between the lender and the borrower especially when the borrower fails to pay back in time or even when there is a complete failure to pay back whatever was borrowed. Apart from indicating a strong social network, this strategy is not sustainable and thus would make a household vulnerable to food insecurity.

Other strategies that were employed by households during different periods of food shortages are as shown in Table 15. Wilhemina (2008), Wilna (2006) and Ververs (2010) who did studies in other parts of Africa reported similar findings. A study conducted in three most deprived and poverty stricken regions of Ghana, for example, showed that households use a wide range of mechanisms and communal support networks to cope with the situation which includes collection of wild foods, market

purchases, in-kind (food) payment, support from relatives and friends, sales from livestock and household valuables, migration and wage labor, reduction in the number of meals served each day, reduction in the portions/ sizes of meals and consumption of less preferred foods (Wilhemina, 2008). Also, a recent study conducted in Southern Sudan has identified some common coping mechanisms used by the small holder farming communities, which includes eating immature crops, reducing the size and number of meals, consuming less preferred foods, increasing collection and consumption of wild foods (Ververs, 2010). Furthermore, a study conducted in informal settlements in South Africa listed commonly used coping strategies as follows: cooking a limited variety of foods, maternal buffering by limiting the caregiver's intake to make food available for the children, skipping of meals and limiting portion sizes (Wilna, 2006)

Table 15: Distribution of respondents by coping strategies employed during food shortages (n=100)

Coping strategy	Percentage of households using the strategy
Relied on less preferred food	71
Practiced work for food or work for money	60
Reduce number of meals eaten in a day	56
Borrowed food, or relied on help from a friend or relative	52
Consume seed stock for next planting season	46
Limit portion size at meal times	46
Restricted consumption of adults in order for small children to eat	41
Went out entire days without eating	41
Purchased food on credit	41
Send household members to eat elsewhere	13
Gather wild food or harvest immature crops	11
Sell household livestock	10
Sell part or all of household land	5

The study went beyond identifying the coping strategies by categorizing them during focus group discussions (FGD 1) and (Table 1) into positive and negative coping strategies as perceived in the study area (Table 16). The positive coping strategies are the ones that were non-detrimental to future food security of households whereas negative coping strategies were considered to be detrimental to current and future household food security and some were also regarded to be socially undesirable.

Positive coping strategies included: relying on less preferred and less expensive foods; limiting portion size at meal times; reducing number of meals eaten in a day; and restricting consumption of adults in order for small children to eat. Negative coping strategies included: purchase of food on credit; consumption of seed kept for next agricultural season; going entire day(s) without eating; gathering wild food or harvest immature crops; and selling of livestock assets which could not be sold under

normal situation. Other negative coping strategies were selling part or all of the household land; borrowing food, or relying on the help from a friend or relative and sending household member(s) to eat elsewhere such as to a neighbour or fellow villager who is not a close relative.

Reasons were advanced why some coping strategies were considered negative. For example, purchasing food on credit and borrowing food were believed to put the borrower into the burden of paying back (sometimes including interest) the debt in the future. This could also distort the social relationship between the two parties if the borrower could fail to pay back in time. Consuming seed stock (eating as food or selling), selling livestock and all/or part of household land were believed to make the household more vulnerable to food insecurity. This is because consumption of seed stock and selling of household land would make the household unable to grow crops in the future (next cropping season) while selling of livestock assets would reduce or diminish the household resource base. Going the entire day without eating was believed to put a person's life in jeopardy while sending household members to eat elsewhere was believed to be socially undesirable (it was believed to be shameful). In this regard, one participant said,

“Rather than sending my child to eat from my neighbours’ home, I better let him die of hunger”.

Table 16: Categorization of households’ coping strategies in the study area

Positive	Negative
<ul style="list-style-type: none"> • Relying on less preferred and less expensive foods 	<ul style="list-style-type: none"> • Purchasing food on credit • Consuming seed held for next season

-
- Limiting portion size at meal times
 - Reducing number of meals eaten in a day
 - Restricting consumption of adults in order for small children to eat
 - Going entire days without eating
 - Gathering wild food, hunt or harvest immature crops
 - Selling livestock assets
 - Sell part or all of household land
 - Borrowing food, or rely on help from a friend or relative
 - Sending household members to eat elsewhere
-

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

Based on the study hypothesis and findings of the study the following conclusions can be made:

- (i) Millet was perceived to be a staple food in the study area. Thus, a household without millet would culturally consider itself food insecure although it might have access to other food stuffs. The household that could consume its millet stocks in less than 12 months was considered food insecure while vulnerability was perceived as a state of remaining food insecure and/or being at risk of becoming food insecure.
- (ii) There were more households (80%) that were vulnerable to food insecurity in the study area than the food insecure households (63%) during the study period.
- (iii) Household's vulnerability to food insecurity was significantly related to some personal characteristics like age, sex and marital status of household head. All the households headed by the elderly were vulnerable to food insecurity, while, majority of female headed and single headed households were vulnerable to food insecurity.
- (iv) Household vulnerability to food insecurity was significantly related to food availability through own production.

5.2 Recommendations

Based on the conclusions above, the study recommends the following:

- (i) It is important to address the problem of food insecurity and vulnerability to food insecurity based on local perception of food and food security in a given locality. Therefore any intervention to combat or overcome the problem of food insecurity in Bahi district should aim at improving the production of millet as it is the preferred food in the area.
- (ii) Since more households were vulnerable to food insecurity than the food insecure ones, this implies that if proper strategies to address the problem of household vulnerability to food insecurity are implemented, there will be fewer food insecure households in the future than there are today. Any intervention to address the food insecurity problem should focus on those factors which make a household vulnerable to food insecurity including having small farm plots, relying on single source of income, having no livestock and having no millet stocks.
- (iii) Interventions to address food insecurity and thus reduce household vulnerability to food insecurity in Bahi district should aim at improving production of millet at household level. This can be reached by encouraging farmers to cultivate their farms using drought animals.

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APPENDICES

Appendix 1: Household Interview Schedule

Instructions to the interviewer:

1. Please make sure you introduce yourself and explain the purpose of the study.
2. Ask each question the way it is written.
3. Ask the applicable question and record answer(s) appropriately in the space provided before asking the next question
4. Use a pencil.
5. Options like “other specify” need to be followed by details
6. Ensure that you adequately complete the questionnaire at time of interview
7. Remember to thank the respondent after the interview
8. **Please get CONSENT BEFORE you start filling in the interview schedule**

GENERAL INFORMATION

Household identification number

Name of household head

Date of interview.....

District

Ward

Village

Name of Enumerator

A: RESPONDENT’S CHARACTERISTICS (Fill in or tick one)

A1. What is your age in years?

A2. Sex of household head (Male/Female)

A3. What is your marital status?

1. Married
2. Never married
3. Divorced
4. Separated
5. Widowed

A4. What is your level of education?

1. Non-formal education
2. Primary school
3. Ordinary secondary level
4. Advanced secondary level
5. College

6. Others (specify)

A5. Do you have any kind of disability? (Yes/No)

A6. If YES in A5 above, what type of disability is that?

.....

A7: Do you suffer from any chronic disease(s)? (Yes/No)

A8: If yes in A7 above, what type of disease(s) is that?

.....

B: HOUSEHOLD SOCIO-ECONOMIC CHARACTERISTICS (Fill or tick one)

B1. Please fill in the information of all members of the household in the table below

S/No	Name	Sex: (Female/Male)	Age in years	Education level	Main occupation
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
Total					

B2: What were the household's sources of income in the year 2009/2010? (The answer can be more than one)

S/No	Income source	(Tick)	Amount obtained in Tshs.
1	The sale of farm produces		
2	The sale of animals		
3	The sale of animal products		
4	Small business		
5	Household head's formal employment		

6	Remittances		
7	Other (specify)		
Total amount obtained			

C: HOUSEHOLD FOOD SECURITY STATUS

C1: What was your household source(s) of food supply for the 2009/2010 calendar year?

- (i) Own production
- (ii) Purchase
- (iii) Own production and purchase
- (iv) Receive food as gift from friends or relatives
- (v) Government support
- (vi) Other(specify)

.....

C2: If own production was one of the sources, how much food crop did your household harvest in that season?

	Type of crop	Quantity harvested in (kg, bags, tins etc.)
1	Millet	
2	Sorghum	
3	Maize	
4	Cassava	
5	Rice	
6	Other (specify)_____	

C3: Was the amount of millet harvested enough to feed your family until the next harvesting season? (Yes/No)

C4: If the answer in C3 is No, what type of crop(s) did you consume as food for the remaining days of the year?

.....

C5: Does your household buy food? (Yes/No) **(If No go to C8)**

C6: Where does your household buy its food?

- (i) From fellow villagers (producers)
- (ii) From food retailers
- (iii) From government store

(iv) Other (specify)

.....

C7: Is your household able to buy its food? (Yes/No)

C8: Does your household own any livestock? (Yes/ No)

C9: If Yes in C8, what type(s) of livestock do you have?

	Type of livestock	Number (Quantity)
1	Cattle	
2	Goat	
3	Sheep	
4	Chicken	
5	Donkey	
6	Pig	
7	Guinea fowl	
8	Others (specify)_____	

C10: Indicate the benefit(s) obtained from the livestock owned by the household.

(You can tick more than one)

Benefit from livestock	(tick)
Selling of livestock	
Selling of livestock products	
Manure	
Exchange with food	
Farm drought power	
Household consumption	
Other (specify)	

C11: What is your opinion about the food security situation in your village?

.....

C12: What are the possible causes of food insecurity in this village?

.....

C13: In your own opinion, how can the food security situation be improved in your village?

.....

D: HOUSEHOLD VULNERABILTY TO FOOD INSECURITY

D1: How much land does your household have for crop production? hectares

D2: Do you think the land you have is enough for your household to produce it own food? (Yes/No)

D3: If 'No' in D2, how do you get more land to produce enough food for the household?

- (i) Buy land
- (ii) Hire land
- (iii) Get land assistance from friend/relative
- (iv) Other (specify)

.....

D4: Did you cultivate all the household land in the 2009/2010 farming season? (Yes/No)

If No, Why?

.....
.....

D5: How much of the household land was planted millet in the 2009/2010 farming season? hectares

D6: Do you use any improved modern seeds? (Yes/No)

If No, Why?

.....
.....

D7: Do you use fertilizer/manure in your farm? (Yes/No)

If No why?

.....
.....

D8: Do you use any pesticides in your farm? (Yes/No)

If No why?

.....
.....

D9: Do you have any food stored in your household? (Yes/No)

If Yes how much of it is millet? (bags, tins, vilindo, etc) and how much is of other crops? (bags, tins, vilindo etc)

D10: Do you add anything to the food stuffs during storage? (Yes/No)

D11: If yes in D10, what do you add to your food stuffs?

Type of food	What added?
1	
2	
3	

D12: If No in D10, why?

.....

D13: Indicate in the order of importance the major uses of grains produced in your household? (use 1, 2,)

Grains used for	
Household food	
Ceremonies	
Selling for household income	
Making local brew	
Other (specify) _____	

D14: What do you think are the factors that put a household at risk of becoming food insecurity?

.....

E: HOUSEHOLD COPING STRATEGIES DURING FOOD SHORTAGE

In the past one year, if there have been times when you did not have enough food or money to buy food, how often has your household had to:

Coping Strategy	Relative frequency		
	Several times	Rarely	Never
E1. Rely on less preferred and less expensive foods?			
E2. Borrow food, or rely on help from a friend or relative?			
E3. Purchase food on credit?			
E4. Sell labour power?			
E5. Sell part of household land?			

E6. Sell livestock which could not have been sold under normal circumstances?			
E7. Gather wild food, or harvest immature crops?			
E8. Consume seed stock held for next season?			
E9. Send household members to eat elsewhere?			
E10. Limit portion size at mealtimes?			
E11. Restrict consumption of adults in order for small children to eat?			
E12. Feed working members of the household at the expense of non-working members			
E13. Ration the money you had and buy prepared food?			
E14. Reduce number of meals eaten in a day?			
E16. Skip entire days without eating?			

THANK YOU FOR YOUR COOPERATION

Appendix 2: Checklist for key informants' (village leaders and ward/village extension workers) interview.

Ward.....

Village.....

Date.....

1. What is your designation? (village leader, village elder or extension worker)
2. What do people in this village consider as food? (Composition of staple food)
3. What type of household do people in this village consider to be food insecure?
4. Have you ever experienced food insecurity problem in your village in the last five years? If yes, what was the trend of food insecurity in those years?
5. What are the causes of food insecurity in your area?
6. What strategies are used in the village to cope with the problem of food insecurity?
7. What types of households are mostly affected by the problem of food insecurity?
8. What are your comments on the coping strategies employed by the households during food shortage?
9. What is the local perception of household being at risk of becoming food insecure?
10. What do you think can put a household at risk of becoming food insecure in this village?
11. Who owns and controls resources in the household in your village?
12. What technologies are mostly used by people in food production?

THANK YOU FOR YOUR COOPERATION

Appendix 3: Checklist for In-depth qualitative study (Case Study).

1. Identification and demographic information
 - 1.1. What is the sex of the household head?
 - 1.2. What is the level of education of a household head?
 - 1.3. How many members does this household have?
 - 1.4. Can you mention their names, age, and level of education?
2. Production and decision about food
 - 2.1. Do you have land for farming activities?
 - 2.2. How big is that in acres?
 - 2.3. How was the land obtained?
 - 2.4. Do you put all the land under cultivation?
 - 2.5. Who decides on the use of farm produces?
3. Cooking and eating patterns
 - 3.1. How many meals do you get per day? (adults and children separately)
 - 3.2. What are the composition/ingredients of such meals?
 - 3.3. Who cooks the household food? Why?
4. Perception of food quality
 - 4.1. What do you perceive to be a good quality food?
 - 4.2. Do you usually eat a good quality food? If no, why?
 - 4.3. How many meals does your household usually have?
5. Daily concerns
 - 5.1. What are the daily activities of different members of this household?
6. Income sources and utilization
 - 6.1. What are the sources of income for this household?
 - 6.2. How do you spend that income?
7. Household food security information
 - 7.1. Can you tell me about the household food security situation in the last five years?
8. Coping mechanism
 - 8.1. How have you been coping with this situation?
9. Long term strategies to escape food insecurity
 - 9.1. What do you think can assist you so that you reduce or eliminate the problem of food insecurity?

THANK YOU FOR YOUR COOPERATION