

**DO HOUSEHOLD COPING STRATEGIES MITIGATE
PERCEIVED HOUSEHOLD FOOD INSECURITY AMONG
SAMPLE HOUSEHOLDS IN DASSE ADMINISTRATIVE AREA,
GASH-BARKA ZONE, ERITREA?**

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ABSTRACT

This mini-dissertation sets out to examine the perceptions of farmers in the Dasse Administrative Area of Gash-Barka zone of the impact of agro-ecological, socioeconomic and infrastructural constraints on food insecurity, and the coping strategies employed by 101 sampled farm households in order to understand how these strategies increase vulnerability or mitigate the effect of food shortages.

Agricultural productivity was low and average cereal production provided only 39 per cent of annual household requirements. Self-sufficiency in grain obtained from own production sustained households for only four months a year. In line with this, the study examined the impact of agro-ecological, socio-economic, and infrastructural constraints to the problem of food insecurity as perceived by the farmers. Farmers perceived drought, erratic rainfall, and weed infestations as major agro-ecological constraints that hindered self-sufficiency in food production. Shortage of draught animals and labour and lack of cash and off-farm income, were most conceived socio-economic constraints that affected production. Lack of farm credit, health problem (malaria), and inadequate farmers advisory service were most perceived infrastructural constraints that affected production and household food security. This shows that food security interventions need to be built around mitigating these perceived causes.

The study also investigated coping strategies and their impact on increasing vulnerability or mitigating the effect of food shortages. The coping strategies applied by the studied households were largely consumption-based and non-erosive, indicating that households were relatively resilient to food security shocks. However, these strategies could be detrimental to the nutritional well being of household members, as they determined dietary intake. These coping strategies were particularly detrimental to household food security, as proper nutrition is critical for active and productive life. Thus, health and nutrition related interventions are highly required to address these problems. Food security interventions need to support livelihoods in ways that protect and buffer the natural resilience of households, providing direct assistance when erosive coping strategies are employed to ensure that households remain resilient to the fragile and variable situations in which they exist.

DECLARATION

I, Yergalem Taages Beraki declare that:

- The research reported in this mini-dissertation, except where otherwise indicated, is my original research
- This mini-dissertation has not been submitted for any degree or examination at any other university
- This mini-dissertation does not contain other persons' data, pictures, graphs or other information, unless specifically acknowledged as being sourced from those persons.
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Signed: 

..... Date 30 January 2009.....

As Supervisor, I agree to submission of this mini-dissertation for examination.

Signed: Date

Prof Sheryl L Hendriks

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CHAPTER 1: THE PROBLEM AND ITS SETTINGS

1.1 Household food insecurity in Eritrea

According to the United Nations Food and Agricultural Organisation (FAO) and the World Food Programme (WFP) Crop and Food Supply Assessment Mission's (CFSAM) 2004 report (FAO/WFP 2004) Eritrea is among the least developed countries that experience chronic food deficits in the world. The per capita Gross Domestic Product (GDP) (about US\$200 in 2001) declined by an additional 1.2 per cent in 2002 after severe drought induced the collapse of agricultural production. The overall poverty estimate for Eritrea is 66 per cent (where 6.6 out of 10 persons are living below the minimum threshold standard of living). Among these, approximately 37 per cent are living in extreme poverty (National Statistics and Evaluation Office (NSEO) 2003).

In good years, the country produces about 60 - 70 per cent of its total food needs, while in low production years, not more than 25 per cent of food needs is produced (Ministry of Agriculture (MOA) 2001). During the last decade, the country's per capita cereal production fluctuated from an annual low of 29 kg per capita in 1996 to 148 kg in 1998 (MOA 2001). Once in every ten years the country is threatened with famine. This national food insecurity translates into widespread household food insecurity (Government of the State of Eritrea (GSE) 2004) and leaves many farming households entirely dependent on food aid for most of their food needs (Hansen 1994).

On average, from 1993-2003, domestic food production met less than half of national requirements, and cereal production met only about 40 per cent of the total cereal requirements (140 kgs per person per annum). Food vulnerability has increased as a result of Eritrea's extremely limited and declining commercial food import capacity on the one hand, and because people face increasingly stressful situations in trying to cope (FAO/WFP 2004) on the other. Moreover, the GSE (2004) explained that increasing the food supply alone would not eliminate this problem, since it would not necessarily improve the incomes and purchasing power of the poor. The lack of food security is associated with a lack of purchasing power of people and nations. The scope and depth of poverty and food insecurity problems in Eritrea manifested

directly in the inadequacy of farm output by households, lack of access to food which is related to poor purchasing power of households, and the inadequacy of food intake, reflected by malnutrition and vulnerability to disease. The poor have the least access to resources, entitlements, employment opportunities and income. They are also the most vulnerable to acute food insecurity when external shocks, such as drought or migratory pests, such as locusts, cause food shortages. Thus, there is a strong convergence between the objectives of reducing poverty and increasing food security (GSE 2004).

Agriculture is the mainstay of Eritrea's economy, with more than 80 per cent of Eritrean households depending on agricultural livelihoods. While explaining the negative effect of this situation, the GSE (2004) outlined that, due to heavy dependence on crop production, harvest failure leads to household food deficits. Concomitantly, food prices also rise, which makes vulnerability to food insecurity severe. According to GSE (2004) long-term factors such as the interaction between the environment, high population growth, diminishing land holding sizes, and a lack of on-farm technology innovation have led to a significant decline in productivity per household. The falling crop yields that characterise marginal areas are a result of the loss of massive quantities of topsoil throughout the country; declining soil fertility; a reduction in soil organic matter as manure is burnt for fuel; and shrinking holding sizes. These trends, combined with drought, have substantially eroded the productive assets of communities and households. A loss of community assets (e.g. pasture and forest) has led to increasing environmental degradation and increased pressure on farms, leading to declining investment in soil and water conservation practices. More importantly, households are less able to cope with shocks because they cannot accumulate savings (e.g. livestock holdings and food stores) even in good years. (GSE 2004); this is mainly due to poor asset base and low levels of agricultural productivity.

Food insecurity and malnutrition are realities faced by rural households (GSE 2004). Iannotti *et al.* (1998) pointed out that the food and nutrition situation in Eritrea is complex, given the post-war context, ongoing drought and persistent poverty. Rates of malnutrition are among the highest in the world. The situation is especially tenuous for infants, children under three years and women. Micronutrient deficiencies, particularly vitamin A, iron and iodine, are also a serious problem. There are few income-generating activities in the country other than agricultural related

incomes to provide households with the means to additional food. Other problems related to the utilisation of food, such as disease, limited access to healthcare, and low levels of knowledge, also contribute heavily to malnutrition.

Soil degradation and recurrent drought lead to dwindling rural farm and non-farm income, resulting in a growing number of people migrating to urban centres, seeking opportunities for employment and income. The HIV/AIDS pandemic has led to increased food insecurity and vulnerability, in both urban and rural communities (GSE 2004). Generally, although drought and war are the main factors that have exacerbated the food security problem in Eritrea, there are other factors that cause food insecurity and are listed in Table 1.1.

Table 1.1: Causes of food insecurity at national and household level in Eritrea (MOA 2001, 2004)

Underlying causes of national food insecurity
Drought
War
Population growth
Poverty
Fragile ecosystems
Unsupportive policies
Lack of foreign exchange to import food
Lack of capacity to forecast droughts and predict impending food shortages
Lack of capacity to store and transport food where and when it is needed
Major causes of household food insecurity
Dwindling rural farm and non-farm income resulting from soil degradation and recurrent drought
Lack of food in markets
Isolation from markets
Lack of capacity to produce food or earn income to purchase food
Lack of knowledge of nutrition and sanitation or proper childcare practices
Cultural practices that deny food to particular groups

1.2 Food insecurity in Gash-Barka zone

Gash-Barka zone is part of the Sudano-Sahelian agro-climatic zone and covers 27 per cent of Eritrea's total land area (IFAD 2002). With an area of 370,000 square kilometres (KM) it is the largest of the six zones in Eritrea. The majority of Eritrea's national cereal stock comes from Gash-Barka zone, as represented by 37 per cent of the cultivated land and 40 per cent of national production (FEWS NET 2004). However, the people of Gash-Barka zone have experienced severe food insecurity, triggered by a combination of factors that include war, recurrent droughts and poor productivity of the agriculture and livestock production system (Eyob 1999, Hansen 1994, IFAD 2002).

This zone has faced thirty years of war, ending in 1991, a widespread severe drought that killed people and destroyed crops and livestock in 1984 - 85, and a less severe drought between 1989-91 (Hansen 1994). The situation showed some improvement between 1991 and 1998. Due to its proximity to the border with Ethiopia, and as a major battlefield during the recent war and previous war for independence, the livelihoods of the people of Dasse Administrative Area are severely threatened by the death of people and livestock, migration of people, and destruction of farming and productive resources (Eyob 1999). This situation has been aggravated by recurrent droughts that adversely affect agricultural production, leading to fluctuations in per capita production, a constant consumption gap (Eyob 1999) and widespread poverty.

Gash-Barka zone has experienced long-term problems that affect food security. Due to the long-term wars for independence, many farmers have sacrificed their lives for independence and many others have migrated, leaving their families, villages and country. This has caused a tremendous increase in the number of female-headed households. Hence, women have taken over the responsibility for agriculture, including those tasks that were traditionally carried by males (Hansen 1994).

According to the International Fund for Agricultural Development (IFAD 2002) two-thirds of households in Gash-Barka zone categorise themselves as poor, and are unable to produce enough food to satisfy household food requirements. In years of average rainfall, just 10 per cent of

households are categorised as food secure. Livestock and crop production for household consumption are the main sources of income, although the poorest households - many of them headed by females - rely on cash or food-for-work programmes and food donations because they have no livestock and few labour resources. The role of women varies greatly among the ethnic groups and ranges from women doing most of the work around the homestead in some agro-pastoralist communities, to an almost complete seclusion of women in certain pastoralist communities (IFAD 2002).

Discussing the economic situation of the people in Gash-Barka, IFAD (2002) pointed out that the people of Gash-Barka are poor because they depend on low-productivity crop and livestock enterprises, have few other opportunities for generating income, and cannot easily gain access to essential social services. Low and unreliable rainfall, malaria, tuberculosis, diarrhoea and mother and child health problems generally constitute the greatest livelihood risks.

Livestock play an important social and economic role, not only for pastoralists and agro-pastoralists, but also for agriculturalists. They are a source of food and cash income, a means of capitalisation, and a source of wealth and work (as draught and pack animals). Livestock are also an important buffer/insurance against droughts and other crises (Bonfiglioli 1998). Bonfiglioli further stated that due to ecological fragility, seasonal extremes and variability of resources, livestock production has always constituted an important ecological adaptation, and for centuries has permitted communities to survive and develop.

For Eritrean agriculturalists and agro-pastoralists, seasonal mobility of animals is a strategy aimed at sourcing forage and/or escaping localised shortages of rangelands and feed (Bonfiglioli 1998). Its main purpose is to bring animals into areas where more abundant and better pasture may be found. Contrary to the transhumance of pastoralist groups, for the large majority of agriculturalists and agro-pastoralists, seasonal movement is limited. Hansen (1994) pointed out that there appear to be four general patterns of transhumance in Gash-Barka. The first pattern is total stability, when the village stays in one spot and the people remain in the same house all year. A second pattern involves the entire village moving seasonally from one site to the other. The third pattern involves farmers moving to the fields during all or part of the cropping season.

The fourth pattern concerns people with more livestock, where one or more men live away from the village for part of the year herding the livestock (Hansen 1994).

1.3 Introduction to the research problem

While the food insecurity problem is recognised as a severe and major development challenge by the government, as stated in its National Food Security Strategy Paper (GSE 2004) adequate information on food insecurity is scant. Although local communities in Gash-Barka zone employ many coping strategies in response to the food crisis, these strategies are often damaging to livelihood sustainability and incur risks that may actually increase vulnerability to food insecurity in the long term (Hansen 1994). The effectiveness of food insecurity coping strategies in achieving food security in Eritrea has not been investigated. CARE/WFP/ERREC included coping strategies as one of the indicators in the 2003 Eritrea Rural Livelihood Survey, but no research into the impact of these strategies on household resilience has been conducted.

In order to plan appropriate food security interventions, decision makers need to appreciate why people are food insecure. People's own perceptions of the causes and determinants of food insecurity are an important aspect of understanding household food security and how coping strategies perpetuate or mitigate household vulnerability. Policy and programmes designed to address food insecurity in sustainable ways need to recognise the diversity of food security strategies and support the natural resiliency of households. Policy priorities should provide households and individuals with choices regarding support that contribute to self-determination and autonomy in livelihood strategies (Chang 2005).

The aim of this study is to examine farmers' perceptions of the impact of agro-ecological, socio-economic and infrastructural constraints on food insecurity and the coping strategies employed by farm households, in order to understand how coping strategies applied by the households increase vulnerability or mitigate the effect of food shortages in the Dasse Administrative Area of Gash-Barka zone. The study contributes to current knowledge of the food security situation in Gash-Barka zone, and develops an understanding of how household coping strategies affect future household food security – an element that food security and agricultural development

project reports, such as the IFAD Agricultural and Livestock Development Project report of 2002 and other documents, have failed to address.

This study, therefore, has both basic (academic) and applied (practical) purposes and will contribute to addressing the literature gap regarding the causes, duration and dimensions of food insecurity and coping strategies. It will contribute to improved food security information systems and improve knowledge and understanding of the livelihood systems required to better manage humanitarian interventions, and safeguard the food and livelihood security of vulnerable groups and households. It will thus also help the government's policy and strategy development aimed at reducing food insecurity in Eritrea.

1.4 Statement of the problem

The aim of this study is to examine farmers' perceptions of the impact of agro-ecological, socio-economic and infrastructural constraints on food insecurity and the coping strategies employed by farm households, in order to understand how coping strategies applied by the households increase vulnerability or mitigate the effect of food shortages in the Dasse Administrative Area of Gash-Barka zone.

1.5 Sub-problems

In order to address the above research problem, the researcher has identified the following sub-problems:

Sub-problem one: How do households perceive the impact of each of agro-ecological, socio-economic, and infrastructural constraints to the problem of household food insecurity?

Sub-problem two: What coping strategies do households employ and how do the coping strategies applied by the households increase vulnerability or mitigate the effect of food shortages in the Dasse Administrative Area of Gash-Barka zone?

1.6 Study limits

No substantial research in the area of food security at national and household levels has been conducted in Eritrea. Therefore, there is a dearth of adequate reference materials for comparisons and examination of historical trends.

This study relies on survey data that is limited by the memory of individuals from sample households, who could only recall the current situation and recent past. Moreover, due to the unstable socio-economic environment and the highly fragile eco-system with its climatic irregularity, the current study may not give an adequate retrospective overview of the food insecurity situation of the study area.

Due to the fact that the Gash-Barka zone is a relatively large region, the study focused on a few villages in the Dasse Administrative Area that are predominantly inhabited by the Kunama ethnic group. Hence, the study does not give a comprehensive picture of the situation in the zone as a whole. Due to difficulties in obtaining detailed livestock information, the study focused on crops data to determine the per capita energy intake, and may not give an all-round picture of the food insecurity situation in the study area.

1.7 Assumptions

The following assumptions were made in this study:

- Taking into account the high degree of homogeneity in the livelihood systems of the people of the study area, the sample size (10 per cent of total household number) has been assumed to be representative of people in the areas under investigation
- It was assumed that the information provided by people was honest and a true reflection of their circumstances

1.8 Organisation of the mini-dissertation

This mini-dissertation has six chapters. The first chapter has presented the problem and its settings. Chapter two will present a review of the related literature that includes food security concepts and definitions, livelihood concepts, dimensions of food security in Africa and IGAD

sub-region, food security measurement and coping strategy theory. Chapter three provides the research methodology and includes the methods and procedures employed to answer the research questions. Chapter four presents characteristics of the study area and describes the demographic and socio-economic situation. Chapter five presents the results and discussions. Finally, concluding remarks and recommendations are presented in chapter six.

CHAPTER 2: REVIEW OF RELATED LITERATURE

The literature review for the study is organised into seven major sections. First, food security concepts and definitions are presented. Second, the sustainable livelihood framework is outlined and its relationship to food security coping strategies is explained. Third, the food security situation in Africa and the IGAD region is presented. Next, the available literature on household coping strategies in Eritrea is summarised. Finally, the measurement of food security and coping strategies is explored in order to establish a theoretical base for the methodology presented in Chapter 3.

2.1 Conceptual framework for food security

To establish a common understanding of food security and a better understanding of why so many people are food insecure, this section will discuss food security concepts and definitions through a review of the available literature.

The most frequently cited definitions of food security revolve around that proposed over a decade ago by the World Bank that suggests that food security is “access by all people at all times to sufficient food for an active, healthy life” (World Bank 1986, pp 1), although some authors have counted as many as 200 different definitions (Smith *et al.* 1992). The World Bank definition is generally accepted as it includes not only **food availability** (adequate supply of food) but also **food access** through home production, purchases in the market or food transfers. Hoddinot (1999a) notes that adequate access to food can be achieved without households being self-sufficient in their own food production. More important is the ability of households to generate sufficient income, which, together with their own production, can meet food needs. More recent definitions of the concept of food security introduce a third dimension, utilisation, which refers to the appropriate biophysical conditions (good health) an individual requires to adequately utilise food to meet specific dietary needs. This is referred to as nutrition security. Very recently the issue of sustainability has been (or has started to be) attached to food security. The concept of sustainability stresses the temporal dimensions of food security, where the food supplies must be sustainable through seasons and from year to year in order to remove the fear of

food insecurity (Food and Agriculture Organisation(FAO)/World Health Organisation (WHO) 1992).

Benson (2004) outlines the fact that nutrition security is achieved when secure access to food is coupled with a good sanitary environment, adequate access to health services and knowledgeable care, to ensure a healthy and active life for all household members. In trying to differentiate nutrition security from food security, Chang (2005) points out that food security is necessary, but not sufficient for adequate nutrition. This is because individual nutritional status depends not only on how much food is consumed, but also on how the human body actually makes use of the nutrients in the food that is consumed.

In line with this concept, a comprehensive technical food security definition was given in a draft document prepared by the United Nations Administrative Committee on Coordination/Subcommittee on Nutrition (UN ACC/SCN) according to which “a household is food secure when it has access to the food needed for a healthy life for all its members” (UN ACC/SCN 1991, pp 6). The food security concept addresses people’s risk of not having access to adequate food. This risk could arise from low income and/or inadequate food production. Even in a normal situation, risks are typically higher the closer the household is to inadequate dietary intake (von Braun *et al.* 1992). Riordan *et al.* (2003) point out that people could be said to experience food insecurity when they fail to consume proper diets, even when food is available. Similarly, food insecurity can occur when people consume proper diets, but poor health stands in the way of their bodies’ absorption of sufficient nutrients.

Based on the temporal dimension, two types of household food insecurity can be distinguished: chronic and transitory. Riordan *et al.* (2003) suggest that chronic food insecurity is a consistently inadequate diet caused by the inability to acquire sufficient food. Riordan *et al.* (2003) further explain that chronic food insecurity is rooted in poverty, while transitory food insecurity is a temporary decline in a country’s or household’s access to food. At the country level, transitory food insecurity results from instability in food production or export earnings. At the household level, transitory food insecurity results from instability in production, household income or employment, or raised food prices. Chronic food insecurity translates into a high degree of

vulnerability to famine and hunger whereas ensuring food security eliminates this vulnerability. With slight abnormalities in the food production-distribution-consumption process, vulnerable populations can reach the stage of famine. Therefore, in times of famine, there is always chronic food insecurity (Melaku 1997).

In the context of subsistence households, food security refers to the ability to establish access to productive resources such as land, livestock, agricultural inputs and family labour, to produce food (Diriba 1995). Consistent with this, Bonnard (1999) points out that with respect to the three components of food security, agriculture constitutes the most important factor in availability - a primary factor in access, where livelihoods are agriculture-based, and a complementary factor with regard to food quality and processing. In attempting to describe the function of aggregate food at a national level to household food security, Clover (2003) argues that food insecurity is no longer simply seen as a failure of agriculture to produce sufficient food at a national level, but instead as the failure of livelihoods to guarantee access to sufficient food at the household level.

In explaining the concerns of food security policy makers, Diskin (1994) points out that conventional wisdom among many policymakers who are concerned with food security has been that high degrees of correlation exist between food availability and access, between food access and consumption, and between food consumption and nutritional status. In other words, increased food availability leads to increased access, which leads to increased consumption, which in turn leads to increased nutritional well-being. Due in part to this "wisdom", efforts to solve the nutritional problems facing African countries have largely focused on strategies for promoting agricultural production, and sometimes income generation, with the implicit assumption that increases in production and incomes automatically lead to improved food consumption and nutritional welfare. However, Diskin (1994) points out that evidence in the literature suggests that, in many cases, and for many reasons, assumptions of strong and straightforward linkages along the pathway from food production to nutrition outcomes are not well founded. Many factors, other than household food production and income, for instance, may affect rural food consumption, for example intra-household resource allocation patterns. In addition, many factors other than food consumption may affect nutritional status, for example infectious diseases.

2.2 Sustainable livelihoods and food security

Agricultural production alone does not ensure food security, and very few households rely solely on own production for food security or their livelihoods. Instead, livelihoods consist of a mix of strategies aimed at mitigating risk and ensuring that multiple household goals are achieved. Among the outcomes of sustainable livelihoods is improved food security (as reflected in the Department for International Development (DFID) Livelihoods Framework presented in Figure 2.1).

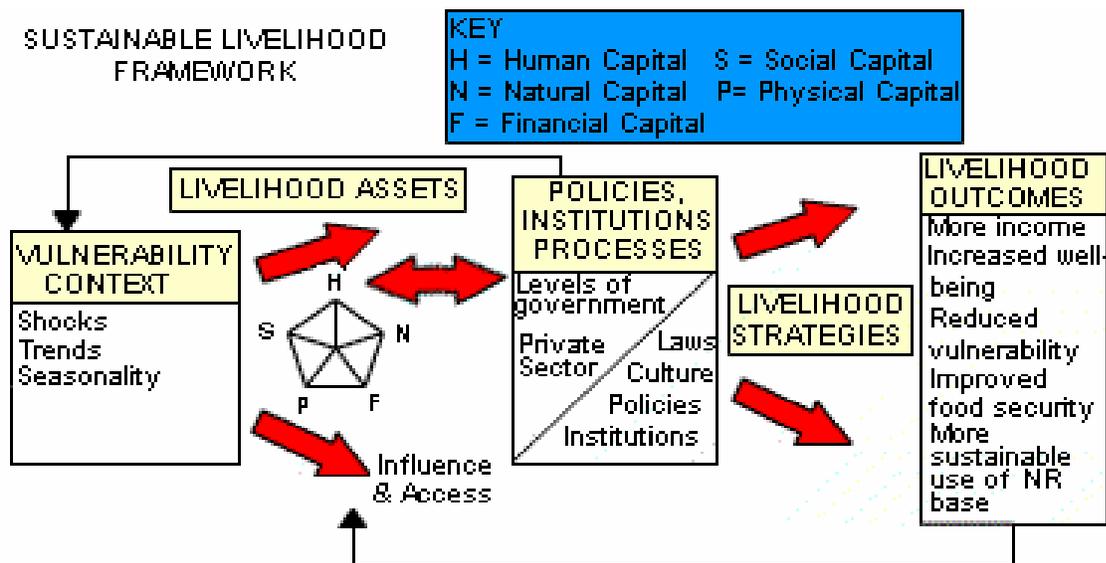


Figure 2.1: Sustainable Livelihoods Framework (DFID 1999, pp 1)

The word *livelihood* can be used in many different ways. The following definition captures the broad notion of livelihood: ‘A livelihood comprises the capabilities, assets (including both material and social resources) and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base (DFID 1999, pp1).

The Sustainable Livelihood Framework (SLF) presented in Figure 2.1, has been developed by DFID (1999) to help understand and analyse the livelihoods of the poor. It is also useful in assessing the effectiveness of existing efforts to reduce poverty. The framework endeavours to

provide a way of thinking about the livelihoods of poor people to stimulate debate and reflection, as it presents people as operating in a context of vulnerability, but with access to assets that can help reduce poverty within their prevailing social, institutional and organisational environments.

The concept of livelihoods broadens traditional understandings of food security. In a livelihood system, the goal is to procure all the capabilities, assets and activities required for a means of living in which adequate food is a central concern, but not the only one (World Food Programme 1998). By investigating how poor households meet their basic needs and cope with shocks and stresses, the importance of adaptation and risk diversification in the battle against vulnerability is understood. The implication for policy-making is the realisation that increased agricultural productivity is not the only solution to food insecurity, but that supporting diversification of income sources and assets and promoting investments and activities, help households face shocks and reduce risks (WFP 1998).

While most food security assessment methods focus on food availability, the livelihoods approach focuses on food access (Famine Early Warning System Net Work (FEWS NET 2005). Thirty years of food security research in highly food insecure countries has shown that poorer households in low-income countries rely on a balance of livelihood strategies to make a living and gain access to their basic needs, including food. Livelihoods analysis strives principally to clarify the mechanisms by which people obtain access to food and other essential resources, and services within communities (FEWS NET 2005).

2.3 Understanding household coping strategies

Households actively try to protect their livelihoods, adopting several actions and mechanisms when faced with shocks and stresses that affect their livelihood or livelihood outcomes, one of which is food security. These behavioural responses are termed “coping strategies” and encompass a wide range of economic, social, political and behavioural responses to declining food security or perceived threats to food security. They need to be understood in terms of strategies with easily reversible effects, versus strategies that incur unacceptable costs (Young *et al.* 2001, pp5).

Webb and von Braun (1994) discovered that coping mechanisms adopted by households form a continuum of strategies from “risk minimization” to “risk absorption” and finally to “risk taking”. Risk minimization involves asset accumulation, saving and income diversification. Risk absorption follows on from risk minimization and involves drawing on savings and existing food reserves, and often restriction of consumption of food and non-food items. The final stage is risk taking which involves households taking desperate measures, such as breaking up the family through migration, consumption of survival or famine foods and sale of private possessions. Many of the household responses, especially during the last phase, clearly have irreversible impacts on household well-being, and conditions get worse unless external assistance arrives. Due to the irreversible nature of the risk-taking strategies and their adverse impact on post-crisis recovery, households would be reluctant to sell assets, especially agricultural assets in an agrarian community, and would only do so as a measure of last resort (Webb and von Braun 1994).

Different studies present a variety of coping strategies that households are likely to adopt when faced with food shortages. For instance, when faced with famine, Ethiopian villagers were shown to draw on savings, use food reserves, diversify sources of income and reduce expenditure on non-food items in the initial stages of the famine, whereas during the later stages of the famine, they switched to consuming famine foods, and even migrated (Webb and von Braun 1994). According to Corbett (1988) the sequence of responses farm households typically employ when faced with food crisis are divided into three distinct stages.

- *Stage one:* In the earliest stage of the crisis, households employ types of risk minimizing and loss management strategies. These typically involve a low commitment of domestic resources, enabling speedy recovery once the crisis has eased
- *Stage two:* As the crisis persists, households are increasingly forced into a greater commitment of resources just to meet subsistence. There may be a gradual disposal of key productive assets, making it harder to return to a pre-crisis state. At this stage the household’s vulnerability to food insecurity is extremely high.
- *Stage three:* Strategies are signs of failure to cope with the food crisis and usually involve destitution and distress migration

Maxwell *et al.* (2003) distinguish between two different classes of coping strategies: short-term adjustments to consumption patterns and more permanent adjustments to food production. Davies (1993) discriminates between adaptive, diversification, and insurance strategies – which involve the expansion of the resource base and the means of acquiring food in order to minimize the risk of future disruption, and coping strategies – a set of responses to an atypical situation, often requiring a mortgaging of the means of production with a potentially irreversible impact on future livelihoods.

According to the International Fund for Agricultural Development (IFAD 1996) the determinants of coping ability are classified as follows: determinants that reduce fluctuations in income, and determinants that reduce fluctuations in consumption, given the fluctuation in income. Perhaps the most important determinant within the first category is the degree of diversification of a household's livelihood strategy or, in other words, the way in which household members allocate their time in pursuit of various means of earning a living. Poor rural households seldom allocate the entire labour time of all their members to a single pursuit. The harsh experience of life has taught these people not to 'put all their eggs in one basket'. Diversification is an essential feature of their livelihood strategy. However, the degree of diversification differs from one household to another, depending on household resource constraints and the constraints and opportunities presented by the external environment. The greater the degree of diversification, the better the ability to cope with temporary shocks. The second category, namely the scope for consumption-smoothing strategies, refers to the ability of a household to maintain the normal level of food consumption in the face of an income shock (IFAD 1996).

2.4 Food security in Africa

In Africa, food has become the most important item in any discussion of development during the last three decades. To this end, there have been attempts of varying degrees to find effective ways of ensuring that all Africans have access at all times to the minimum quantities of food necessary to lead active and healthy lives (Economic Commission for Africa (ECA), 1992). In spite of this intention, and the great emphasis on the food production sector, food deficiency remains a persistent problem in Africa, particularly in Sub-Saharan Africa. As a result, the number of hungry and malnourished people in the 1970s reached 80 million, which jumped to a

level exceeding 100 million in 1984 (Tekolla 1990). The corresponding figure in the 1990s was projected to be 140 million. Currently, Sub-Saharan Africa produces less food per person than it did three decades ago (FAO 1998).

Dittoh (2003) points out that food and nutrition insecurity is still very prevalent in almost all parts of Africa. Africa is the only region in the world currently facing widespread chronic food insecurity and persistent areas of hunger (Dittoh 2003). The most food insecure environments in Africa are arid and semi-arid zones, where drought is the major recurring factor. Benson (2004) points out that food and nutrition security remain Africa's most fundamental challenges for human welfare and economic growth. Far too many people on the continent are unable to acquire and effectively utilise at all times the food they need for a healthy life. Undernutrition is the major risk factor underlying over 28 per cent of all deaths in Africa (some 2.9 million deaths annually) (Benson 2004). In explaining the severity of the food insecurity problem in the continent, Yambi (1999) points out that Africa remains the most malnourished region in the world: one in every three under the age of five years is underweight and about 42% are stunted. The continuing human costs of inadequate food and nutrition are enormous, and aggregate costs of food and nutrition insecurity at the national level impose a heavy burden on efforts to foster sustained economic growth and improved general welfare (Benson 2004).

The causes of food crises in Africa are numerous, varied and complex (see Table 2.1). Clover (2003) indicates that analysts generally believe that Africa's current food emergencies are the result of a combination of problems, and that no single factor is responsible. Southern Africa, for instance, Clover (2003) argues, is no stranger to natural hazards, but this time a very broad area has been affected by drought, and many countries did not have strategic grain reserves. There are also a far higher number of dependents and child-headed households because of HIV/AIDS. What is undeniable is that "Africa's persistent vulnerability is arguably due as much to a failure of understanding as to a failure of interventions" (Devereux and Maxwell 2001, pp 2).

Table 2.1: Causes of food crisis in Africa (After FAO 2004 and Clover 2003)

Climatic hazards
Severe environmental degradation
Rapid population growth outstripping agricultural growth
Unstable macroeconomic environment and inappropriate government policies in some nations
Low purchasing power of the people (poverty)
The absence of food security policies at national or regional levels
Lack of storage facilities
Limited access to infrastructure and basic services
Civil wars
Inappropriate incentives
Low productivity of agriculture resulting from insufficient fertilizer use and poor control of weeds
HIV/AIDS

Clover (2003) argues that the reasons why action plans to address food security have continued to fall short can be attributed to faulty analysis and faulty actions by governmental and non-governmental actors involved in food security interventions. What is needed is an understanding that goes beyond conventional, orthodox wisdom to work more strategically in developing and implementing effective, international, national and regional policies. Availability, access and affordability are all elements of food security; complex issues that encompass a wide range of interrelated economic, social and political factors, internal and external, which challenge Africa's ability to address food security (Clover 2003).

Although progress has been made in reducing nutrition insecurity globally, estimates of reductions in malnutrition have been an unfortunate exception to these trends (de Onis *et al.* 2004). Over the period 1980 to 2000, stunting rates in Africa declined by less than four per cent, so that, with population growth, the actual number of stunted children actually increased by more than 12 million. Both relative and absolute numbers of underweight children in Africa increased over the same period. The African continent is now the continent receiving most food aid, with some 30 million people requiring emergency food aid in any one year. Sixty per cent of the WFP's work now takes place in Africa (Clover 2003).

Benson (2004) concludes that food and nutrition insecurity is a critical constraint to economic growth in Africa and an immediate cause of widespread suffering. Millions of Africans seek

enhanced food and nutrition security. National governments and their development partners can do a great deal on many different scales to facilitate and ensure their citizens' access to the tools that will allow them to meet their food and nutrition requirements.

2.5 Food security in IGAD Sub-Region

According to FAO (2000) , the horn of Africa is one of the most food-insecure regions in the world. The seven countries of the sub-region, which are also members of the Inter Governmental Authority on Development (IGAD)¹, have a combined population of 160 million people, 70 million of whom live in areas prone to extreme food shortages (FAO 2000). Over the past 30 years, these countries have been threatened by famine at least once in each decade. In the sub-region as a whole, more than 40 per cent of people are undernourished, and in Eritrea and Somalia the proportion rises to around 60 and 70 per cent respectively.

Ahmed and Teka (1999) outline the fact that the horn of Africa is characterised by four broad based systems of land use. These systems are pastoralism, agro-pastoralism, rain-fed and irrigated agriculture. However, these four systems are closely interlinked through symbiotic relationships. High potential areas are normally put under agriculture, whether rain-fed or irrigated, and have a better chance of supporting the systems of livelihoods that use them.

Even in normal years, the IGAD countries do not have enough food to meet their peoples' needs. The sub-region, which is only 75 per cent self-sufficient in its food requirements, imports at least 1.5 million metric tones of cereals each year (FAO 2000). In four of them - Eritrea, Ethiopia, Kenya and Somalia - the average per capita dietary energy supply (DES) is now substantially less than the minimum requirement (Table 2.2). This has a devastating effect on children, in particular, who face lifelong physical and cognitive disabilities. Poor nutritional and health status indicators are another dimension of high food insecurity (Table 2.2).

¹ The Inter-Governmental Authority on Development (IGAD), with its headquarters in Djibouti, was founded in 1996. IGAD member states include Djibouti, Eritrea, Ethiopia, Kenya, Somalia, the Sudan and Uganda. IGAD has a task of revitalising and expanding cooperation among member states. Its mandate is to coordinate the efforts of member states to advance their development goals in economic cooperation, political and humanitarian **affairs, food security and environmental protection.**

Table 2.2: Nutritional indicators in IGAD member countries (After FAO 2002)

IGAD member Countries	Dietary energy supply (DES) (1998-2000)*	% of infants with low birth weight	% of under-fives (1995-2003*) suffering from:			Vitamin A supplementation coverage rate (6-59 months)	% of households consuming iodized salt
			Underweight	Wasting	Stunting		
			1998-2003*	Moderate & severe	Moderate & severe	Moderate & severe	2002
Djibouti	-	-	18	13	26	91	-
Eritrea	1710	21	40	13	38	51	68
Ethiopia	1880	15	47	11	52	16	28
Kenya	1960	11	20	6	31	91	91
Somalia	1600	-	26	17	23	60	-
Sudan	2360	31	17	-	-	93	1
Uganda	2330	12	23	4	39	46	95

According to FAO (2000), the main natural hazard affecting food security in the horn of Africa is drought. Large parts of the region are arid or semi-arid. The rainfall is low, unreliable and unevenly distributed and, although there have always been cycles of drought and flooding, there is evidence that the climate is becoming unstable and the weather more severe. Drought is frequent in the region, which the pastoralists regard as ‘an act of God’. A rough collection of recorded incidents in the previous century suggests major incidents occur every 10 years. Droughts are remembered because they are usually accompanied by famine (Markakis 2004). What all of this means is that crop cultivation using locally available technology cannot be relied upon to sustain a sizeable human population in the arid region. It does not mean that cultivation is not pursued, but it is a precarious and unreliable enterprise (Markakis 2004). Faced with this unstable environment, the people of the region have developed specific coping strategies. Farmers, for example, stagger their crop planting and, when the situation is exceptionally bad, they may even resort to hunting and gathering. Pastoralists, too, have various options: they can split their herds, set aside pasture land to provide grazing reserves, or migrate to new pastures. Nevertheless, even the best coping mechanism can be overwhelmed by an extended drought (FAO 2000).

In explaining the role of cross-border trade in food security of pastoral communities, Little *et al.* (2001) points out that because most herders in the sub-region finance food purchases through the sale of livestock, any downward trends in cross-border commerce and prices would have a

negative effect on pastoral food security. Cross-border trade networks affect the food security situation in the border areas in one or more of the following ways: Firstly, cross-border trade broadens available market options for commodities produced in the area, and pastoralists benefit from increased demand for their animals. Secondly, people in the area consume food items produced elsewhere and imported across the border that could not be supplied officially or cheaply from domestic markets (Little *et al.* 2001).

The fact that almost 80 per cent of the population of the countries of the IGAD sub-region is rural and depends almost exclusively on agriculture for its consumption and income needs, means that measures to address the problems of poverty and food insecurity must mainly be found within the agricultural sector (FAO 2000). Furthermore, the United States Agency for International Development (USAID 1994) pointed out that at the root of this alarming description of food insecurity is an unstable social and political environment that has precluded sustainable economic growth. A number of factors have converged to create this instability: poor economic policies, retarded economic growth, growing population pressures, civil strife, scarcity of democratic institutions, uneven natural resource base and limited areas of high agricultural production potential (USAID 1994). The civil wars, droughts and famines of the last decade (1986-1996) have culminated in a widespread food shortage with intense human suffering and many deaths, especially among children, women and the elderly, due to malnutrition (Ahmed and Teka 1999). The farmers living at subsistence level in the higher rainfall areas form the sub-region's largest group of food-insecure, who tend to have little land and very few assets, and typically work in remote areas far from markets. Also at risk are the 15 to 20 million pastoralists inhabiting the vast areas of arid and semi-arid lowlands. In times of drought, these herding communities not only go hungry, but can also lose their productive assets (FAO 2000).

Mochoge and Zziwa (2004) summarise the food security challenges facing the IGAD region and Africa at large as including (1) the determination of governments to make real change in implementing policies and strategies (2) proper planning in the use of resources in viable investments, institutions, infrastructure, storage facilities, and enhancing productivity (3) mainstreaming food security concerns in the ongoing Poverty Reduction Strategy Papers (PRSP) process.

2.6 Household food security coping strategies in Eritrea

As outlined in section 1.1 food insecurity is severe and a perpetual problem in Eritrea. However, Eritrean communities have developed indigenous social welfare systems and ecological coping mechanisms that protect the poor from hunger, starvation and death, even under the most difficult circumstances (GSE 2004).

When the normal agro-pastoral system of production faces difficulties, the community supports one another by rebuilding the herds of destitute families to the level at which they can be self-supporting. Whereas the ecological coping mechanisms are ultimately vulnerable to climatic hazards, the social mechanisms can continue to function during periods of crises. They begin to decline only when the extent of poverty is so pervasive and so deep that the well-off members of the community also become impoverished and the traditional safety net system buckles. The GSE (2004) distinguished the coping strategies employed by Eritrean rural households into social coping mechanisms and ecological coping mechanisms.

The social coping mechanisms include three groups of people. The first group includes those who look for alternative sources of income such as fetching gold and forest products, ploughing the fields of villagers who have neither plough animals nor labour to do the job, and collecting water or firewood and selling it in villages and towns. The second group includes those who seek jobs in towns and neighbouring countries, selling the remaining productive assets to keep the family alive, and, as a last resort, selling jewellery that was given to the women of the households on their marriage (GSE 2004).

Ecological coping mechanisms include three groups of people. The first group of people are the conservationists, who lived in the same environment for many generations and have a deep knowledge of the natural vegetation. For example, knowledge of the trees whose leaves are edible therefore becomes important, because such leaves are available year round and can compensate for the seasonally restricted availability of the green leafy vegetables. The second group are the pioneers who moved away from their original habitats during the last generation or two, and left their barren, degraded fields in the highlands to seek their fortune in the great river basins of the lower Mareb, the Gash, and the Barka rivers. They see their habitat as a production

site. The third group is pastoralists. The pastoralists have a highly protective attitude toward the riverine forests that give them fodder for their animals, supplementary food for humans, construction materials for their homes, and materials for their craft products. They have an adequate body of knowledge of trees and use it in times of drought and famine (GSE 2004).

2.7 Measuring household food security

Household food security is an important dimension of well-being. Although it may not capture all dimensions of poverty, the inability of households to obtain access to enough food for an active and healthy life is surely an important component of their poverty. It is important, therefore, to measure and monitor food security over time because it is fundamentally linked to wellbeing. Measurement is necessary at the outset of any development project to identify the food insecure, assess the severity of their food short fall and characterise the nature of their insecurity (seasonal versus chronic). Furthermore, it provides the basis for monitoring progress and assessing the impact of these projects on the beneficiaries' food security (Hoddinot 1999_b).

Kassa (2000) points out that the multiple dimensions of food security in both space and time (local and regional, chronic and transitory, short-term and long term) as well as in levels (global, national/regional, household, and individual) make assessment of food insecurity a difficult task. The general tendency is, therefore, to work with indicators. Riely *et al.* (1999) point out that measures commonly reflect the various dimensions of food security, and that there are usually a number of ways of measuring any single indicator. For example, an indicator defined as the average energy consumption per capita may be measured through a detailed dietary intake survey based on weighing food portions, or from information based on a 24-hour recall. Similarly, measures of household income can be derived as a lump estimate based on the recall of a household head over the past month, or as an aggregate of income from an individual household member's activities, based on individual recall. Obviously, decisions regarding the measurement of indicators are critical to their eventual credibility, cost and interpretation (Riely *et al.* 1999).

Wolf and Frangillo (2000) explain that existing measures of regional or even local food availability are often inadequate for project level decision-making, since availability is only one

component of household food security. They further explain that other components, such as access to food and certainty of the food supply, are also important. Moreover, they suggest that one way to develop direct measures that include these components and compliment existing measures is to base them on an in-depth understanding of the experience of food insecurity at household level. Currently, the most common and well-recognised experiential food security assessment measures include the United States Food Security Core Module (FSCM) and the Coping Strategy Index (CSI).

The Coping Strategies Index (CSI) is an indicator of household food security that is relatively simple and quick to use, straightforward to understand, and correlates well with more complex measures of food security. A series of questions about how households manage to cope with a shortfall in food for consumption results in a simple numeric score. In its simplest form, monitoring changes in the CSI score can indicate whether household food security status is declining or improving (Maxwell *et al.* 2003)

The FSCM scale is designed to yield a single score (from 0 to 10) denoting severity of household food insecurity over the past twelve months. Different types of experiences and behaviours indicate insecurity as measured by the FSCM, and this score serves as a useful starting point against which to assess other country and subpopulation experiences (Coates 2004).

Although currently there are a number of descriptors commonly applied to describe experiential measures, the most useful descriptor, which applies equally well to any of the questions in the FSCM scale and to several conceptually similar types of instruments (including the CSI) is experiential – derived from peoples’ experiences. The experiential food insecurity scale can be understood as a measure that quantifies a range of behaviours known to reflect food-related stress (Coates 2004). This 18-item scale, now called the Food Security Core Module (FSCM) or simply the United States Food Security Scale, essentially measures qualitative and quantitative compromises in food intake with declining household resources, recognising differences between adults' and children's experiences of resource constraints (Coates 2004).

2.8 Summary

This chapter presented a comprehensive literature review of food security concepts and coping strategies. It shows the importance of examining the causes, determinants, and magnitude of the food shortages faced by farm households, as this is crucial to enhancing understanding of food security strategies, which could then lead to better food security interventions. The literature review has also discussed the livelihood approach as a framework for livelihood and food security analysis, and indicated various internal and external factors that could influence livelihood processes and outcomes. Investigating a food security situation from the livelihood perspective is thus essential to understanding how various man-made and environmental factors contribute to food security/insecurity.

The food security situation in Africa and IGAD was summarised, and it was shown that Eritrean rural households employ a variety of traditional coping mechanisms during food shortages. Adopting any of the coping strategies has implications for the household and its members, and this is why we need to study these strategies. Therefore, studying and anticipating these strategies becomes important. Only when we are able to anticipate the reaction of the food insecure can we design pre-emptive measures to strengthen the resilience of households against shocks, without their having to suffer the adverse consequences of resorting to potentially harmful coping mechanism (Qureshi 2007).

CHAPTER 3: RESEARCH METHODOLOGY

This chapter provides a description of the various data collection methods proposed for the study. Methodological notes are important for transparency in any study in order to allow the reader to know the procedures followed in the data collection so that he/she is able to gauge the validity of the research conclusions. This section, therefore, includes research methods and techniques used, justification for using them, and the techniques by which the gathered data are analysed.

3.1 Research design

Considering the time available for field research, the long distances between villages, lack of access to transportation between villages and the hot climate of the area, the study was conducted in one administrative area. The study used various data collection methods. It is designed as a holistic assessment, comprised of both quantitative and qualitative components, to capture information on multiple characteristics of household food (in)security.

3.2 Sampling

A list of all households in the study area was obtained from the Dasse Administrative Area administration office. All six villages under Dasse Administrative Area were included in the survey. Male and female-headed households were selected to participate in the household survey. Due to similar agro-ecological conditions, which in turn lead to similar agricultural production systems, the livelihood support mechanisms prevailing in all six villages are more or less the same. Taking into account the high degree of homogeneity in the livelihood systems of the people of the study area, only 10 per cent of the households from each village were included in the survey. The same percentages of households from both male and female-headed households were selected. In this case, 5 per cent of female-headed households and five per cent of male-headed households were selected from each village by randomly selecting names from the list of people from each village that were provided by the local administration. For focus group discussions, the village chief and the researcher selected six to ten people for each group discussion from the villagers' lists. Village elders with good reputations as community leaders were in discussion with the local administration office and were consulted to identify names of

people from the village who had reliable and useful knowledge about the locality. Both male and female villagers were included in each group.

3.3 Data collection tools

The study included a household survey questionnaire and qualitative assessment tools. Secondary data sources provided basic information regarding livelihood and the food security situation, and essential contextual information about rural households and communities in the study area.

3.3.1 Household surveys

Household surveys were carried out to obtain information on the food security status at household level. The community profiles, which were obtained during earlier phases of the preparation of the questionnaires, were helpful in designing questionnaires for both focus group discussions and household sample surveys. Household sample surveys generated both qualitative and quantitative data pertaining to social, demographic and economic characteristics. Information on food consumption patterns and food security indicators were also collected through the surveys. The researcher, assisted by locally available enumerators, carried out face-to-face interviews with selected sample households at six selected villages, namely; Dasse (it is also the name of the administrative area), Darettele, Shigilliti, Ugaro, Aburna, and Berbere. The quantitative household survey was designed to collect the following information (see questionnaire in Appendix A).

- *Household demographic information:* including age, gender and level of education of the household head
- *Household access to resources:* ownership of household assets, access to land for farming, and ownership of livestock
- *Livelihood activities:* activities in which household members are engaged, which include agricultural production and sales, other sources of cash income, and borrowing
- *Household livelihood outcomes:* estimates of household food consumption per family member, source of household food, basic social services (education, health)
- *Coping strategies:* household's response in case of food shortages

3.3.2 Focus group discussions

Focus group discussion is a technique whereby a sample of people (as few as 6 and as many as 30) is brought together for a joint interview (Bernard 1988) with a group leader getting people talking about an issue. In this study, focus group discussions were held in the study communities before the household survey. The participants involved were representatives of various villages of the communities and from both genders to maintain a gender balance. The participants were asked to express their own feelings (perceptions) and to offer their experiences regarding the issues under study (see Appendix B on the issues included in the focus group discussion). In collaboration with village elders and local administrators, six groups of six to ten people were selected in the study area.

In order to supplement the results of the household survey, focus group discussions were centred on identification of primary coping strategies and community perceptions of the degree of severity of each strategy. In addition to the seasonal variations of food availability, food shortages, coping strategies, climatic and other seasonal events were discussed during the focal group discussion.

3.3.3 Secondary data sources

Data obtained from various sources have been important sources of information that complement the results of the household survey. Household demographic data obtained from Dasse Administrative Area office have been important secondary sources for demographic characteristics of the population and their surroundings. Other supplementary data that included rainfall data, market price, cultivated areas and production, and availability of service-giving institutions were gathered through discussions with governmental and non-governmental institutions involved in food security and related topics in the study area. Information obtained from zone and sub-zone Ministry of Agriculture (MoA) offices on agricultural and natural resources development issues supplemented the household survey results.

3.3.4 Topographic maps and satellite images

Existing topographic and thematic maps are the sources of data on physical resource bases (agro-ecology, vegetation cover and soil) of the zone and their implications for agricultural production. Satellite imagery products, mainly developed for supporting food security early warning information needs, were of great value in the identification of the agro-ecological situation in the study area.

3.4 Data analysis

The household survey data was coded and entered into a computer for analysis. The Microsoft Excel Data Analysis Tool Pack (version 2003) was used for data analysis. Tables and graphs were generated and analysed in line with the outcome of household surveys, focus group discussions and observations made by the researcher. The household food balance model was used to quantify food availability at the household level. The point score analysis was employed to measure farmers' perceptions about the predominant causes of household food insecurity, ranking perceptions according to the scores recorded. The relative frequency score recorded during the household surveys was multiplied by the severity score. The severity levels were grouped into three scores and were represented as zero to nil, one to moderate, and two to severe. The Coping Strategy Index (CSI) was employed to identify the most important coping mechanisms farm households employ in cases of serious food shortages. Spearman's rank correlation was used to explore correlations between coping strategies and other variables (as used by Chingondole 2008, Mnjonono 2009, Ngidi 2008 and Shisanya 2008).

3.4.1 Matrices and tables

Matrices and tables are ways of representing qualitative information in a visual way. This technique was used to analyse information that was gathered using semi-structured and open-ended interviews with groups of men and women, as well as some data collected through observations and informal conversations.

3.4.2 Coping Strategy Index (CSI)

The CSI is a measurement of behaviour, namely, the things that people do when they cannot access enough food. There are several regular behavioural responses to food insecurity – “coping strategies” for short – that people use to manage household food insecurity. The CSI revolves around the answers to the question: “What do you do when you don’t have enough food, and don’t have enough money to buy food?” The answers to this simple question comprise the basis of the CSI tool (Maxwell *et al.* 2003).

The CSI measures the frequency and severity of a household’s coping strategies for dealing with shortfalls in food supply. Information on the frequency and severity are combined into a single CSI score. The CSI gives a quantitative score for each household and is a cumulative measure of the level of coping — and therefore the measure of food insecurity. In brief, the higher the numeric score of the CSI, the more coping a household has reported — and therefore the more food insecure it is. A lower score means fewer coping strategies were employed, and so, the more food secure the household is. Comparing scores and averages gives a good comparison of overall household food security and establishes the baseline for monitoring trends in emergencies and for measuring the impact of interventions (food aid) (Maxwell *et al.* 2003).

A list of the 11 questions developed by WFP/CARE through focus group work and field-testing the CSI were used for this exercise (Table 3.1).

Table 3.1: Coping strategy questions

-
1. Rely on less preferred and less expensive foods?
 2. Borrow food, or rely on help from friends or relatives?
 3. Purchase food on credit?
 4. Gather wild food?
 5. Consume seed stock held for next season?
 6. Send household members to live elsewhere?
 7. Limit portion sizes at mealtimes?
 8. Restrict consumption of adults so children can eat?
 9. Reduced the number of meals eaten in a day?
 10. Skip entire days without eating?
 11. Sold farm implements to purchase food?
-

This list of strategies was included in the survey questionnaire with four relative frequency categories ranging between ‘every day per week’ to ‘never’. This same list of coping strategies was included in participatory focus group discussions. Through focus group work, the assessment collected contextual information on the relevance of coping strategies among sample communities and determined the relative severity of each coping strategy by assigning a value between one and four to each strategy – or severity score. To analyse the data, the relative frequency score recorded during the household surveys was multiplied by the severity score (following Maxwell *et al.* 2003). These individual scores were then summed to give an overall score or quantitative indicator for the household.

In order to rank the severity level, the coping strategies listed above were grouped into four categories, where one = the least severe category, and four the most severe. Based on these categories, six focus groups were consulted about their perceptions of the severity of the various strategies (see Appendix E).

CHAPTER 4: CHARACTERISTICS OF THE STUDY AREA

4.1 Country background

Eritrea is a country of north eastern Africa bordered on the east by the Red Sea, the south by Djibouti and Ethiopia, and the north and west by Sudan. It is located between latitudes $12^{\circ} 42' N$ to $18^{\circ} 2' N$ and a longitudes $36^{\circ} 30' E$ to $43^{\circ} 20' E$ in the north eastern part of Africa. Eritrea is a relatively small country that covers a total area of 124,324 square kilometres (KM). It is divided into six agro-ecological zones based on agro-climate and soil parameters (FAO 1994). An estimated 80 per cent of the country's population is dependent on subsistence farming. Subsistence farming is characterised by the use of local varieties of crops and livestock, manual labour and animal traction. It is a multi-ethnic, pluralistic society. The ethnic pattern and composition of its population is complex and consists of nine distinct indigenous or linguistic groups (Eyob 1999).

4.2 Gash-Barka zone

With an area of 370,000 square kilometres (KM) Gash-Narka is the largest of the six zones in Eritrea. It borders Maekel zone to the east, Debub zone to the southwest and Anseba zone to the west (Figure 4.1).

Internationally, Gash-Barka zone borders Sudan to the west and northwest, and Ethiopia to the south and southeast. It lies between $14^{\circ} 25''$ and $15^{\circ} 51''$ north and between $36^{\circ} 44''$ and $38^{\circ} 15''$ east. According to the Ministry of Agriculture's National Food Information Project (MOA/NFIS 2005), Gash-Barka zone is sub-divided

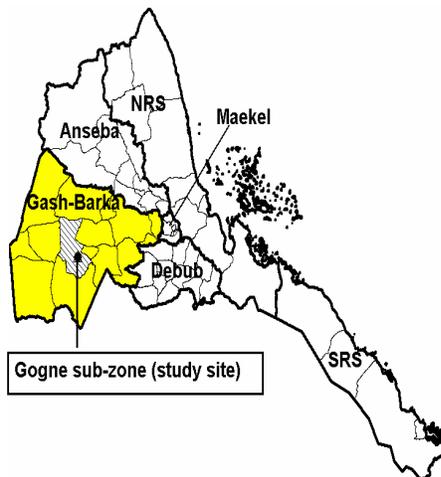


Figure 4.1: Map of Eritrea which locates administrative zones and the study area (Famine Early Warning System Network (FEWS NET) 2004, pp 4)

into 11 sub-zones and 176 Kebabis (local administrative areas) within which there are 784 villages (MOA/NFIS 2005). The institutional capacities of the zone and sub-zone administrations are very restricted. At the community level; organisation, leadership and orientation towards supporting the least advantaged community members are strong and constitute a good basis for a community-led interventions (IFAD 2002).

4.2.1 Population

Nine ethnic groups namely, the Bilen, Hidareb, Kunama, Nara, Rashaida, Saho, Tigre and Tigrigna, inhabit Gash-Barka zone. The Tigre and Hidareb ethnic groups are semi-sedentary pastoralists while the remaining ethnic groups are sedentary agro-pastoralists, except the Rashaida who are mobile, following their goats and being actively involved in cross border trade (MOA/NFIS 2005).

In 2002, the local Government estimated the population of Gash-Barka zone to be 512,764. With an average household size of 3.9 persons, the population density was estimated as 14 persons per square kilometre and 1.5 persons per hectare of cultivable land. Gash-Barka has 92.4 per cent of its population in rural areas, deriving their livelihoods from animal and agricultural production.

4.2.2 Physiographic conditions

With the exception of Dighe, Logo Anseba and Molqui sub-zones, where the terrain is rather mountainous and hilly, form part of the highlands, the remaining sub-zones belonging to the western lowlands. There are valleys in the highlands of the east and northeast. The vegetation coverage is rather poor in almost all areas, except in some parts of Gulu and La'elay Gash sub-zones, and riverine areas along the banks of river Gash, Barka and Setit. The altitude of the zone varies between 630-2300 meters above sea level. Gash-Barka zone can be divided into three distinct areas based on altitude. These are:

The Highland (2000-2370 meters above sea level) that consists mainly of the high grounds which include parts of sub-zone Logo Anseba, Molqui and Dighe. The major crops that grow in these areas are barley, wheat, maize, sorghum and horse beans.

The Midland (1500-2000 meter above sea level) includes parts of sub-zone Logo Anseba and Molqui, Barentu, Lae'lay Gash, Guluj, Shambqo, Mogolo, Gogne and Haikota. Major crops such as wheat, barley, sorghum, maize, finger millet, chickpeas, horse beans, peas and lentils are grown.

The Lowland (630-1500 meters above sea level) consists of sub-zones Akurdet, Forto, Mensura, Tesseneay and parts of Haikota and Dighe. The major crops grown in these areas are sorghum, pearl millet and sesame.

4.2.3 Climate and water resources

There are three main rivers of interest in Gash-Barka, namely the Gash, Barka and Setit. The River Setit, which flows to Sudan throughout the year, forms the southern border of Gash-Barka with Ethiopia. The banks of the Setit were known for their grazing potential and used to be an important grazing area during the dry season before the border war broke out. Many of the livestock from other parts of Gash-Barka are taken there for grazing. The other two rivers (Gash and Barka) are seasonal, with running water for a maximum of three to four months after the rainy season (MOA/NFIS 2005).

Rainfall occurs between June and September. Its intensity is greater in the southern part but gets weaker as it reaches the northern part of the zone. Rainfall ranges from below 300 mm per annum in the northwest lowlands, to above 700 mm per annum in the mountainous and sub-mountainous areas in the southeast of the zone. Over 70 per cent of the zone receives less than 500 mm per annum and only 10 per cent of the zone receives 700 mm or more. There are large variations in annual rainfall among some parts of the zone (MOA/NFIS 2005).

4.2.4 Agricultural production systems

Crop production is predominantly rain-fed and cereals-based. Major crops grown are sorghum, pearl millet and sesame, which are all drought resistant. Oxen and camels are used for draught power. Very few fields are ploughed by tractor but available tractors were rented from the MOA or private individuals (MOA/NFIS 2005). There is only one rainy season in Gash-Barka zone - between June and September. Subsistence crop production is exclusively dependent on rain and

is based on traditional methods of production (see Figure 4.1). Average yields of most crops are very low and do not exceed one Metric Tonne per hectare (MT/ha) (MOA 2003).



Farmers ploughing their land by oxen plough in Dasse village of Dasse Administrative Area



Farmers ploughing by camel plough in Shigilliti village of Dasse Administrative Area



Herds of sheep and cattle moving in search of water and pasture in Dasse village

Figure 4.2: Photographs of agricultural activities in the study area.

The majority of national cereal stock comes from Gash-Barka zone, which represents 37 per cent of the cultivated land and 40 per cent of national production. Sorghum was by far the most important cereal crop in the zone followed by pearl millet, which represented 87 and 88 per cent of cereals in terms of area covered and yields, respectively (FEWS NET 2004). As illustrated in Table 4.1, sorghum covered on average about 94 per cent of the cultivated area and 95 per cent of production in Gash-Barka zone.

Table 4.1: Cereal production in Gash-Barka zone between 1999-2003 (MOA 2006)

Crop types	Cultivated area in hectare and production in metric tones (MT)											
	1999		2000		2001		2002		2003		Average	
	Area	Yield	Area	Yield	Area	Yield	Area	Yield	Area	Yield	Area	Yield
Sorghum	170,772	148,454	79,797	39,478	78,428	41,434	134,162	21,440	136,379	51,688	115,790	60,499
Maize	941	1,123	1,172	1,272	1,182	79	217	38	636	83	830	519
Pearl millet	15,181	6,026	5,747	398	11,637	3,588	12,298	1,089	41,513	8,303	11,216	3,881
Finger millet	2,347	1,272	878	89	1,781	732	2,524	74	4,791	623	1,883	558
Wheat	21	26	207	24	273	27	0	0	386	50	177	25
Barley	1,630	95	2,540	277	8,034	1,056	2,404	99	2,900	348	3,652	375
Teff	233	54	555	1	337	125	0	0	410	53	307	46
Hanfets*	154	62	0	0	42	49	63	3	303	61	112	35
Total	2,017	157,113	3,095	41,538	8,413	47,089	151,668	22,741	187,318	61,209	41,298	8,242

*Mixture of barley and wheat

As depicted in Figure 4.3, productivity per unit area of cereals in Gash-Barka zone was on average 0.30 MT/ha. Sorghum had a relatively better yield of 0.5 MT/hectare compared with other cereals (see Figure 4.3). These figures were extremely low when compared with regional and global levels. Cereal production in sub-Saharan Africa, Southeast Asia, and Latin America were estimated to be between 0.5 - 1, 2 - 2.5, 2 - 2.5 MT respectively (FAO 1996).

4.3 Characteristics of Dasse Administrative Area

Dasse Administrative Area is located in the south eastern part of Gash-Barka zone and is inhabited by the Kunama ethnic group, one of nine ethnic groups in Eritrea. Although Kunamas rely more on crops than livestock for food, almost all villagers in the Dasse administrative area are agro-pastoralists, which means that they rely directly on both crops and livestock. Both crop producers and pastoralists rely on livestock for draught power. Thus, livestock is an essential part of the crop production system. Although the villagers in Dasse Administrative Area are primarily oriented toward producing crops and raising livestock for own-home use, most people are

involved in market (buying and selling) activities. The villagers are oriented primarily towards producing food to eat, with something to sell or exchange for other commodities. Sorghum and pearl millet are sold and bartered, and sesame is a cash crop (Eyob 1999).

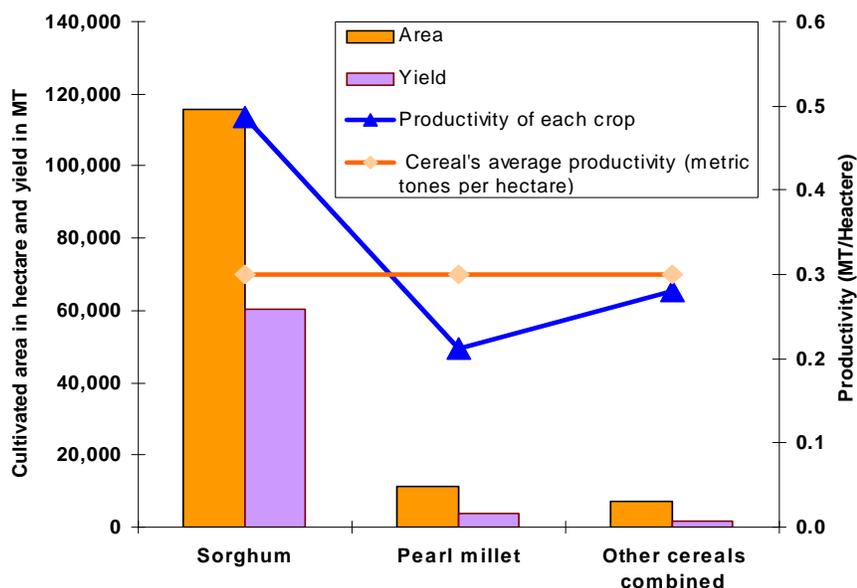


Figure 4.3: Area covered, production, and productivity per unit of land of cereal in Gash-Barka zone (1999–2003 average, data collected from MoA’s Planning and Statistics Unit, January 2006)

Dasse administrative area is situated about 20 km south of the capital of the Gash-Barka zone, Barentu. It is located near a road that reaches the sub-zone, Laelay Gash, and extends to the border of Ethiopia in the south. The central market area of the administrative area is located in a small town called Dasse. In Dasse there are some service and administrative facilities that include a well with a hand pump, a central clinic for the administrative area, an elementary school, the administration office of the administrative area and a local market, which people from these villages and from other nearby villages use.

4.3.1 Demographic features

Dasse Administrative Area is predominantly inhabited by Kunama, who comprise about two per cent of Eritrea’s population and are adherents of Islam and Christianity, with a few practitioners of the traditional religion. Their Nilotic languages distinguish them sharply from the majority of

Eritrean people, whose languages fall into the Afro-Asiatic and Semitic groups (Gebremedhin 1996). All the Kunama people in this country reside in Gash-Barka zone. Most Kunama people are included in the crop/livestock mixed production system where people never shift homes during the year and crop production is more important. Kunama people are thus agro-pastoralists, and cultivating farmland is more important to them than keeping animals. However, animals are also important in their economy.

The administrative area has a population size of around 3690 people, from 1000 households. Table 4.2 summarizes characteristics of surveyed households in terms of households' composition and by gender. Overall, the average household size was five persons. Male-headed households had slightly larger household sizes than female-headed households. Household size ranged from 3.9 in Ugaro to 6.3 in Darettele villages.

Table 4.2: Households' composition by gender in Dasse Administrative Area, November 2005 (n = 101)

Villages	Household members by gender and head of households						Total household size (mean)
	Female-headed households (n = 58)			Male headed households (n = 43)			
	Female	Male	Total	Female	Male	Total	
Aburna	3.0	1.7	4.7	2.2	2.8	4.8	4.8
Berbere	2.2	2.0	4.2	2.9	2.0	4.9	4.5
Darettele	3.5	2.2	5.7	1.5	5.4	6.9	6.3
Dasse	3.1	2.6	5.7	2.5	3.0	5.5	5.6
Shigilliti	3.3	1.6	4.9	2.5	3.2	5.7	5.3
Ugaro	2.3	1.6	3.9	1.9	2.0	3.9	3.9
Total	3.0	2.0	4.9	2.3	3.1	5.5	5.0

In order to study the impact of household structure on food consumption, the number of dependent household members was compared to the number of working members to identify the dependency ratio. In this case, a dependency ratio was defined as individuals younger than 15 years or older than 65 years of age, relative to the total number of people in the household (CARE International(CARE)/World Food Programme (WFP)/Eritrean Relief and Rehabilitation Commission (ERREC) 2003). The result revealed that the age dependency ratio was 52 (out of 100) which was almost similar to the result of the national Rural Household Survey that was conducted jointly by CARE, WFP, and Eritrean Relief and Rehabilitation Commission (ERREC) in 2003, in which the dependency ratio was found to be 53.

Older dependents constituted the largest proportion of dependents (57 out of 100). Table 4.3 shows the disparity in the study villages, with ranges from 45 dependents per 100 household members in Shigilliti to 57 dependants in Aburna. A slight variation in the age dependency ratio was observed between male-headed and female-headed households with female-headed households having higher dependency ratios than male-headed households.

Table 4.3: Households' age dependency ratio in Dasse Administrative Area, November 2005 (n = 101)

Villages	Average number of household members, below 15 and above 65 years age and total dependency ratio				Dependency ratio by heads of households	
	<15 years	> 65 years	Total number	Total dependency ratio	Female headed households	Male headed households
Aburna	0.8	1.8	2.6	0.57	0.57	0.57
Berbere	0.9	1.2	2.1	0.45	0.56	0.33
Darettele	1.5	1.5	3.0	0.50	0.53	0.46
Dasse	1.4	1.7	3.1	0.52	0.51	0.52
Shigilliti	1.1	1.6	2.7	0.50	0.43	0.57
Ugaro	1.1	1.0	2.1	0.52	0.53	0.50
Average	1.1	1.5	2.6	0.51	0.52	0.48

The illiteracy rate, defined as people without any primary or basic education, was found to be 64 per cent (see Table 4.4). Sixty nine per cent of members of female-headed households were found to be illiterate. This rate was 10 per cent greater than the rate recorded in male-headed households. Of all literate household members, the majority (79 per cent) had attained elementary and middle level education. The remaining 21 per cent of literate household members had a high school education. Male-headed households constituted a larger proportion of high-schooled members compared to female-headed households (see Table 4.4).

Generally speaking, the result of the data analysis of education levels reveal that the illiteracy rate in Dasse Administrative Area is high. The rate was found to be even higher than the national average of 44 per cent (GSE 2004).

Table 4.4: Education levels of the sampled households in Dasse Administrative Area, November 2005 (n = 101)

Households characteristics	Average household size	Illiterate household members		Level of education (average number of people per household)				
		Average number per household	Per cent of total	Elementary (Years 1-5)	Middle (Years 6 –8)	High school (Years 9-12)	Total	Per cent of total
Female headed households	4.9	3.4	69	0.8	0.5	0.2	1.5	31
Male headed households	5.1	3.0	59	0.7	0.8	0.6	2.1	41
Total	5.0	3.2	64	0.8	0.7	0.4	1.9	36

4.3.2 Livelihood systems

According to the baseline livelihood survey conducted by MOA/NFIS (2005), Gash-Barka zone has been divided into eight livelihood systems. Dasse administrative area belongs to Traditional Sedentary Agro-pastoralism in Lowlands livelihood system. The communities in this livelihood system are sedentary and have permanent villages with some members of the household migrating seasonally with their livestock to the banks of the Gash and Setit rivers.

Crops and livestock are of roughly equal importance to their livelihoods. It must be noted here that the migration is during the dry season. It is only for the livestock with one or two members of the family taking part. Some households in these areas arrange to send their livestock with other people. Major crops grown in this livelihood system include sorghum, pear millet, and sesame. The landform varies from hilly to flat alluvial planes. The livestock types include cattle, sheep, goats, camels, and donkeys. Camels are used for animal traction and donkeys are used for transportation and fetching water.

Other income generating activities include handcrafts from doum palm leaves, the sale of crops and livestock, and employment in towns. In sum, the farmers in the studied area follow an agro-pastoral livelihood system that combines both livestock and agricultural production as main sources of food and income. The area is not adequately provided with basic service-providing institutions and has poorly developed infrastructures.

4.3.3 Crop production system

The level of production in an average year in the study area was much lower than the zone average of 0.30 MT/ha. In good years, the productivity per unit area of sorghum and pearl millet combined (the major cereals in the study area) was 0.42 MT/ha. However, in an average year this was, on average, much lower, i.e., (0.19 MT/ha) (Table 5.5). Assuming the 1.5-hectare average cultivated land per household, total annual production per household per annum was 285 kg or 57 kg per person per annum. This was extremely low compared with estimated annual requirements of 140 kg/person (FAO/WFP 2004) for Eritrea

Table 4.5: Productivity of major crops under good and bad year conditions in Dasse Administrative Area (MOA 2006)

Crop type	Yield (MT/hectare)		
	Good year	Average year	Bad year
Sorghum	0.53	0.24	0.07
Pearl Millet	0.31	0.13	0.04
Sesame	0.19	0.08	0.02

All rain-fed crops are local varieties established by farmer selection over generations and are adapted to the short growing season (MOA 2003). Farmers broadcast the seeds by hand before ploughing, irrespective of the type of crop, and ploughing covers the seed. Land preparation is carried out with traditional ploughs drawn by oxen or camels. Weeding is done by hand or with hand tools if weeds are thorny. Sorghum and pearl millet are usually weeded once while sesame is weeded two to three times per season (Eyob 1999). Chemical fertilisers and other chemical treatments are rarely used.

On average, land-holding size per household was found to be 1.4 ha, which appears to be large compared to the figures for the national average of 0.60 hectare estimated in the rural household survey (CARE/WFP/EREC 2003). The holding size varied from 0.5 ha to 4.0 ha. Sixty seven per cent of the households indicated that they owned 0 – 1.5 ha, 32 per cent owned 1.6 – 3.0 ha while only one per cent owned above 3 ha of farmland (Table 4.6). Considering the relatively larger average holding size than the national average, it is apparent that land size was not a major constraint to production in the study area.

Table 4.6: Average landholdings in Dasse Administrative Area, November 2005 (n = 101)

Hectares of farm land per household	Number of respondents by head of households			Percentage of households that responded to the ranges of landholdings
	Female headed households	Male headed households	Total	
0 – 1.5	40	28	68	67
1.6 – 3.0	18	15	33	32
3.1 – 4.5	0	2	2	1
>4.5	0	0	0	0
Total	58	43	101	

Table 4.7 shows the disparity in the study villages regarding average land holding size, with ranges from 0.97 hectare in Aburna to 0.97 hectare per household in Ugaro. The land is predominantly used for rain-fed farming. As depicted in Table 4.7, none of the sample households reported that they owned irrigable land.

Table 4.7: Average land holding size by villages in Dasse Administrative area, Nove 2005 (n=101)

Villages	Average size (Hectare)	Rain fed	Irrigable	Total
Aburna	1.0	0.97	0	0.97
Berbere	1.3	1.3	0	1.3
Darettele	1.7	1.7	0	1.7
Dass	1.8	1.8	0	1.8
Shigilliti	1.4	1.4	0	1.4
Ugaro	1.5	1.5	0	1.5
Total	1.5	1.4	0.0	1.4

4.3.4 Livestock production system

Livestock play a significant role in the production system as a means of food, income and draught power. Table 4.8 depicts the average number of livestock per household and their distribution in the study area. The figures revealed that average stock holdings per household were very low. The principal livestock were found to be goats and sheep with averages of 2.7, and 1.5 respectively, followed by poultry (1.3 birds per household), cattle (1.0), donkeys (0.7) and camels (0.3). For an agro-pastoral farming area, the average livestock holdings per household in the study area appears to be very small and the farmers can generally be regarded as being very poor in terms of livestock resources. According to the GSE (2004) these figures are lower than the national average of 3-5 sheep and/or goats per rural household in Eritrea.

Table 4.8: Livestock holdings in Dasse Administrative Area, November 2005 (n = 101)

Livestock type	Livestock numbers per household				Average holding per household
	None	1	2-5	6+	
Cow	55	26	20	0	0.9
Oxen	80	18	3	0	0.3
Sheep	48	11	36	6	1.5
Goat	42	3	41	16	2.7
Donkey	33	65	1	0	0.7
Camel	76	20	5	0	0.3
Poultry	63	3	27	9	1.3

According to Table 4.9, there was a disparity in livestock holding size among villages in Dasse Administrative Area. The largest number of sheep per household was reported in Aburna (2.0) while the smallest number was in Berber (1.0). The number of goats was the highest in Aburna (3.0) and the lowest in Berbere (3.0).

Table 4.9: Household average livestock holdings by village in Dasse Administrative Area, November 2005 (n=101)

Villages	Cows	Oxen	Sheep	Goat	Donkey	Camel	Poultry
Aburna	1.3	0.4	1.6	3.0	0.6	0.5	1.8
Berbere	0.6	0.2	1.0	1.4	0.6	0.1	0.3
Darettele	0.9	0.3	1.3	2.2	0.6	0.3	1.0
Dasse	0.5	0.1	1.7	2.5	0.8	0.2	1.7
Shigiliti	0.8	0.1	1.6	4.1	0.6	0.3	1.5
Ugaro	1.1	0.4	2.0	2.7	0.8	0.3	1.4
Average	0.9	0.3	1.5	2.7	0.7	0.3	1.3

According to MOA/NFIS (2005), the deterioration of livestock-production and the reduction in herd size could be a result of the consecutive droughts experienced in the area over the past few years. The Norwegian People's Aid Development Fund (NPADF) (1996) highlighted animal diseases as being a further serious constraint on livestock production and productivity in the study areas. The NPADF (1996) identified the diseases that were present in the study area as rinderpest, pasteuriosis, anthrax, hemorrhagic septicaemia, black leg, tuberculosis, and trypanosomiasis. Another constraint to livestock production is related to poor grazing and increasing competition for grazing land.

CHAPTER 5: RESULTS AND DISCUSSIONS

This chapter discusses the results of the study in relation to the research sub-problems. As was described at the outset, the aim of this study was to examine perceived causes and determinants of household insecurity and the coping mechanisms employed by farm households to reduce the effect of food shortages in the Dasse Administrative Area of Gash-Barka zone. The outcome of the study will enhance understanding of the food security strategies employed by the rural households in the study area and contribute towards an improved capacity in food security information systems, particularly vulnerability assessment and monitoring of food security interventions.

In order to attain the study objectives, data were collected through household surveys, focus group discussions, secondary data sources, and formal and informal discussions with local government officials and Ministry of Agricultural personnel at zone and sub-zone levels.

5.1 Agricultural production and household food security

In the context of subsistence households, food security refers to the ability to establish access to productive resources such as land, livestock, agricultural inputs and family labour, to produce food (Diriba 1995). Consistent with this, Bonnard (1999) points out that, with respect to the three components of food security, agriculture constitutes the most important factor in availability - a primary factor in access where livelihoods are agriculture-based, and a complementary factor regarding food quality and processing.

In the previous chapter, it was indicated that the level of agricultural production was extremely low, not only in the study area, but also in Gash-Barka zone. Considering that agriculture - primarily crop production - is the main source of livelihood in the study area, productivity per unit area of major crops was very low. Various reasons could be given as to why agricultural production was low and failed to meet even the minimum annual food requirements at household level in the largely agriculture based livelihood system of Dasse Administrative Area.

The result of the household survey revealed that farmers in the study area had access to food from three sources: home (own) production (43%), purchases from market (37%), and relief aid (20%) (see Appendix C). Crop production was cereal based and total available food from own harvests was on average 55kg/capita/annum or 4.6kg/capita/month. Compared with Eritrea's cereal requirements of 140kg/capita/annum or 11.6kg/capita/month (FAO/WFP 2004), the study area's average cereal production represents only 39 per cent of the requirements. This means that self-sufficiency in grain obtained from own production was only sufficient for about four months per year. This was consistent with the findings of the survey made by the Norwegian People's Aid Development Fund (NPADF 1996) in Gash-Barka zone in 1995. The NPADF survey found that the average self-sufficiency (enough grain for 12 months) was 39 per cent and ranged between 12 and 60 per cent.

The food deficit that occurred due to inadequate domestic production was being covered by food aid obtained from international donor communities and, to a lesser extent, by the government. Between 2000 and 2003, most households in the study area were receiving free food aid. Though in less frequent form and smaller ration size than the previous years, it continued in 2004 and 2005 (FEWS NET 2004). The frequency of distribution varied from once in a month to once in every three months, depending on availability of food in stocks (see Appendix D).

Cross tabulation was used to explore the correlation between availability of food from domestic production and demographic characteristics of households. Table 5.1 shows that household size and the age of household head were positively related to the availability of food from domestic production. Female-headed households fell in the low to very low level food availability categories, while male-headed households were in the high to medium level availability categories (Table 5.1). This revealed that female-headed households obtained less food from domestic harvests than male-headed households. There was also a positive relationship between food availability from domestic harvest and educational status of household heads. This may be attributed to the increased exposure of educated heads to modern production techniques. No clear pattern of variation was established between food availability and the age dependency ratio.

Table 5.1: Demographic information of surveyed households in Dasse Administrative Area broken down by availability of food from domestic production, November 2005 (n = 101)

Available food from own harvest per household per annum (in kg)	Classification	Average household size	Percentage of female-headed households	Percentage of male-headed households	Age of household head	Age dependency ratio (DR)	Percentage of household heads with primary level education
0-150	Very low	4	63	37	38	0.54	9
151 – 300	Low	5	84	16	46	0.52	66
301 – 450	Medium	5	26	74	49	0.52	39
451 – 600	High	6	33	67	58	0.48	67
>600	Very high	7	0	100	52	0.66	100

Farmers' productive assets ownership affected the quantity and quality of food available for consumption. It is likely that this was because the levels of agricultural outputs were determined by the adequate and timely availability of productive resources such as land, labour and farm implements. Livelihoods are secure when households have secure ownership of or/and access to resources and income earning activities (Legesse 1999). It is therefore of paramount importance to examine the availability of food in relation to differences in access to major production resources, specifically land, livestock and farm implements.

As indicated in Table 5.2 and as was expected, there was a positive relationship between asset ownership and food availability levels, with the highest proportion of households in the highest food availability levels having better asset bases than households in the lower levels. The relationship between asset ownership and food availability was most visible through the strong positive relationship between food availability from domestic harvests and land holding size. Although the relationships were not as strong as with land holding size, positive relations were also found between food availability and availability of farm implements. Unexpectedly, the relationship between food availability from domestic harvests and availability of labour was negative. This implies that other factors had a stronger influence than labour in determining availability of food from domestic harvest, including the effect of drought on production.

Table 5.2: Productive asset ownership and food security situation in relation to availability of food from own harvest, November 2005 (n=101)

Percentage of household available food from own harvest (in kg)	Average land holding size per household (hectare)	Average livestock holding per household (large and small ruminants)	Percentage of households with adequate farm implements	Percentage of households without severe labour shortage
0 – 150	1	1.1	37	73 (N)
151 – 300	1	0.9	50	62
301 – 450	2	1.2	71	87
451 – 600	2	1.2	67	67
>600	4	1.3	67	33

In summary; household size, age of the household head and educational level of the household head were found to be important demographic factors that determine food availability from domestic harvests. Land ownership and holding size were found to be important asset-base factors determining physical availability of food at the household level.

5.2 Seasonality of food shortages

Seasonal food shortages are partly explained by the seasonality of agricultural operations. Under normal circumstances, harvest and immediate post-harvest periods are generally times when food supply is adequate. On the other hand, planting and pre-harvest times are seasons of food shortage. *Kremti* is the main rainy season in Eritrea, which occurs between June and September, and although there are two other minor rainy seasons in Eritrea, *Azmera* (March-May) and *Bahri* (October – February), the study area only benefits from the main (*Kremti*) rain. Reliance on a single harvest of the *Kremti* season greatly contributed to households' food deficits.

As demonstrated in Figure 5.1, more than 65 per cent of households encountered severe food shortages during June, July, and August. July appeared to be the worst month with 93 per cent of respondents reporting a period of severe food shortages during this month. Food availability was relatively better after the start of the harvest in September, and continued through April (Figure 5.2). October, November and December were identified as good months when 82, 78 and 72 per cent of the respondent households respectively reported that they do not face food shortages (see Figure 5.2).

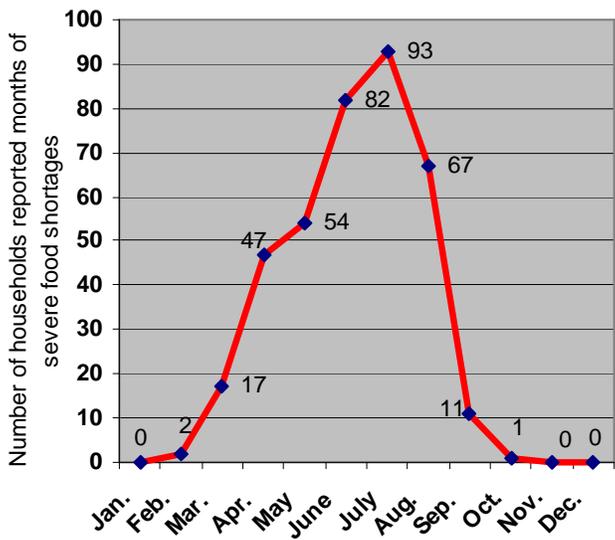


Figure 5.1. Months of severe shortages as perceived by farm households in Dasse Administrative Area, November 2005 (n = 101).

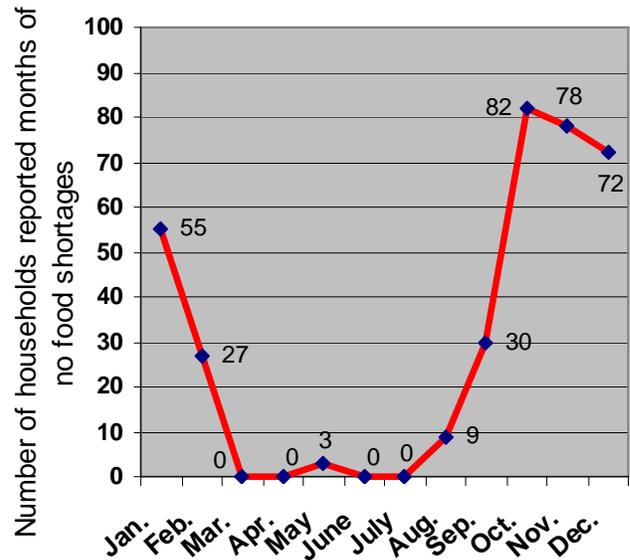


Figure 5.2. Months of no food shortages as perceived by farm households in Dasse Administrative Area, November 2005 (n =101)

As illustrated in Table 5.3, the price of sorghum, which is the main staple food in the study area and its surroundings, was higher during the last few months before the harvest (pre-harvest time) and was cheaper during the first few months after the harvest (post-harvest). This trend reflects more or less the same as the households' perceptions of seasonal variations on food access that have been indicated in Figure 5.1 and 5.2 above. For example, the 1998 -2005 average prices of sorghum in July in Barentu market, a market place on which households in the study area heavily depend, were by 46 and 34 per cents higher than the price in December and January respectively. There are two things to consider here. Firstly, stocks diminish during the late stages of post-harvest months and farmers become more dependent on market supply for purchasing food requirements at this time. Secondly, during the late stage of pre-harvest months, food supplies to market diminish while demand increases because of stock depletion, which eventually triggers higher prices.

Table 5.3: Price of sorghum in Barentu market 1998 -2005 average (FEWS NET 2005, MOA 2006)

Year	Price (ERN* /100 kg)											
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
1998	180	228	220	275	275	284	260	233	169	173	173	135
1999	153	162	158	180	170	180	190	200	131	244	236	240
2000	180	180	207	225	240	250	275	275	195	188	169	173
2001	250	275	300	310	325	325	312	300	225	237	236	313
2002	280	315	405	550	550	565	400	410	315	319	413	375
2003	450	450	495	625	630	625	600	550	413	375	461	465
2004	495	495	720	433	500	525	800	800	600	600	600	NA
2005	630	630	720	810	815	800	780	800	533	510	488	488
Average	338	351	418	443	438	444	452	446	323	331	347	313

*ERN = Eritrean Nacfa, 1 US \$ = 15 ERN

5.3 Perceived causes of household food insecurity

One of the research problems was identification of the perceived causes of food insecurity typically encountered by farm households. This section presents farmers' viewpoints of why they encounter persistent food shortages. Data input for this purpose were generated in different ways.

First, the researcher carried out field observations and held informal interviews with local officials in the study area. During the same phase of fieldwork, discussions were held with local government officials and agricultural officers at zone and sub-zone level. All these have contributed to identifying multiple factors that were assumed to constrain farmers' agricultural production, and thus induce food deficits among the farmers. Therefore, the designing of the main instrument for the inquiry on why farm households were unable to produce adequate food at home was largely based on those preliminary assessments and consultations of secondary data sources.

Constraints were grouped into agro-ecological, socio-economic and infrastructural constraints based on the nature of their occurrence. Not all factors have equal magnitude of influence on each household. Hence, in order to identify the impact of the main perceived causes of household food shortages, sampled farmers were asked to respond to each constraint by giving it a rating in relation to its impact on food supply (adapted from Tollosa 2002). The survey data were analysed through point score analysis (an approach adapted from Tollosa 2002).

5.3.1 Agro-ecological constraints to household food security

The farm households rated drought and erratic rainfall patterns as the most influential of all agro-ecological factors and other variables under consideration (Table 5.4). The farm households in the study area had several experiences of crop failure and resultant severe seasonal food shortages. The dependency on only one rainy season and a single annual harvest affects production in the study area. The National Food Security Strategy Paper of 2004 explains that water is the most crucial factor in shaping Eritrea's agricultural outputs, which shows wide fluctuations in staple and cash crop production and supply (GSE 2004: pp 15).

The farmers felt that insect pests and weeds negatively affected agricultural production and were rated as the second and third most important problems respectively, following drought and erratic rainfall (see Table 5.4). Insect pests and weeds were perceived as major causes of household food security because they lowered the productive potential of domestic production.

Land degradation was also perceived as a problem, as explained by 69 per cent of the interviewed farmers. During focus group discussions and meetings with the agricultural experts of the Ministry of Agriculture, it was indicated that land degradation was a production constraint and a major threat to production in the study area and other parts of the country. Land degradation, therefore, was perceived as a major factor affecting household food security through depressing productivity per unit area and availability of food from domestic harvests.

Table 5.4: Farmers' perceptions of agro-ecological constraints causing food shortage in Dasse Administrative Area, November 2005 (n = 101)

Problems	Number of respondents			Score and rank of perceived problems		
	Nil	Moderate	Severe	Score	Rank	Per cent of applicability
Drought	5	36	60	156	1	96
Erratic rain	5	56	40	136	2	96
Insect pest	29	50	22	94	4	72
Weed infestation	20	64	17	98	3	81
Land degradation	36	64	1	69	6	65
Dependence on single harvest	22	61	18	87	5	79

5.3.2 Socio-economic constraints to household food security

Among the socio-economic variables presented to the farmers, 91 per cent of households indicated that the shortage of draught animals was the main bottleneck against promoting food security through constraining agricultural production (Table 5.5). Lack of draught animals greatly affects livelihoods. Farmers with no draught animals cannot prepare their farmlands in a proper or timely fashion. They had either to rent out their land to other farmers with adequate draught power or rent draught animals. This means, in both circumstances, farmers lose some of their produce through shares or income, which directly affects household food security

Shortage of labour was indicated as a second major socio-economic constraint affecting agricultural production and food security (Table 5.5). Continued mobilisation of large numbers of farmers into the national army, due to the 1998-2000 border war with Ethiopia, has created a serious shortage of labour. Communal labour exchange arrangements have been widely employed as an alternate source of labour in response to the crisis. The most applied type of communal labour in the study area is known as *kowa*. It is a sort of communal labour arrangement whereby shortage of farm labour in a family is solved. This is done during the peak labour seasons, such as ploughing, weeding, harvesting and threshing. *Kowa* is normally organised by the owner of the field, and the wife has to prepare food and drink (local beer called *ifa*) for those who participate in the work.

The sampled farmers are purely subsistence cultivators, with no reported surplus production. The opportunities to diversify cash income through employment in off-farm or non-farm activities appear very limited, and as many as 70 per cent of the farmers mentioned the absence of such opportunities (Table 5.5). The lack of cash impacts not only on farmers' livelihoods, but also directly reflects a lack of capacity to modernize agricultural systems, which in turn impact negatively on household food security. The lack of cash among farmers results in the inability to purchase farm inputs and a limited scope to innovate outdated and overused farm implements. Consequently, both labour and land productivity was extremely low. Seventy-five and 76 per cent of the households attributed poor productivity and food shortages to the inability to purchase and properly apply modern farm inputs, and to unproductive traditional practices, respectively (Table 5.5).

Crop production system in the study area have not employed modern production technologies and productivity was very low. This has been true in all phases of production activities, from planting to harvesting. Farmers do not use commercial fertilisers; instead, they use traditional organic fertiliser (compost and manure). Use of herbicides was a very uncommon practice. Labour intensive hand weeding and farming tools were used to control weeds.

Table 5.5: Perceived socio-economic constraints causing food shortages to households in Dasse Administrative Area, November 2005 (n = 101)

Problems	Number of respondents			Score and rank of perceived problems		
	Nil	Moderate	Severe	Score	Rank	Per cent of applicability
Lack of cash income	16	63	22	107	3	70
Absence of off-farm income	19	71	11	93	5	73
Shortage of labour	22	49	30	109	2	79
Shortage of draught animals	10	53	38	129	1	91
Shortage of farming implements	24	63	13	89	6	76
Low modern input and traditional farming practice	26	65	10	102	4	75

5.3.3 Infrastructural constraints

Access to farm credit could compensate for small farmers' cash deficiencies. However, over 85 per cent of the surveyed households indicated that no such support was provided by government or development partners (Table 5.6). Agricultural extension services were weak due to low resources and poor commitment by the Ministry of Agriculture towards strengthening the extension service. Seventy two per cent of farmers agreed with this comment and complained about the inadequate extension services offered by the Ministry of Agriculture (Table 5.6). Extension staff were few and only located at the sub-zone level, with weak logistical support and poor working conditions. According to the FAO/WFP's (2004) Crop and Food Supply Assessment Mission report, an extension presence in Gash-Barka zone was spread too thinly with a maximum of five staff per sub-zone.

Post-harvest grain losses due to poor storage structures were indicated as one of the major constraints to household food security. Over half of the surveyed farmers reported post-harvest crop losses due to poor and traditional storage practices (Table 5.6). Considering the already low production, the poor post-harvest handling further affected household food security through diminishing the amount of available food from domestic production.

Health problems were perceived as an important social problem constraining agricultural production. Malaria was identified as the main disease affecting production in the study area (Table 5.6). Malaria's direct effect on household food security was through loss of labour for farm operations. The outbreak of an epidemic during critical agricultural operations, such as cultivation, weeding and harvesting, adversely affected agricultural productivity.

Considering that farmers in the study area are agro-pastoralists, adequate veterinary services are crucially important. However, 64 per cent of the farmers complained about the lack of veterinary services. This affects household food security both directly and indirectly (Table 5.6).

Table 5.6: Infrastructural constraints to agricultural production as perceived by farmers in Dasse Administrative Area, November 2005 (n = 101)

Problems	Number of respondents			Score and rank of perceived problems		
	Nil	Moderate	Severe	Score	Rank	Per cent of applicability
Inadequate farmers' advisory service (extension)	27	70	2	74	3	72
Lack of farm credit	15	73	13	99	1	86
Inadequate irrigation practices	44	54	3	60	6	57
Post harvest losses	43	47	11	69	4	58
Health problems (malaria)	29	62	10	82	2	72
Lack of veterinary services	37	60	4	68	5	64

In sum, households perceived drought, erratic rainfall patterns and weed infestation as the first three major agro-ecological constraints that hindered self-sufficiency in food production. Shortage of farm implements and labour, and lack of monetary and off-farm income were perceived as the most important and top ranked (1st -3rd) agro-ecological constraints. Among the infrastructural constraints, lack of farm credit, health (malaria) problems and lack of farmers' advisory services respectively, were perceived as the top three constraints most affecting household food security through impending agricultural production.

5.4 Household coping strategies

Coping strategies are response actions to the effects of food shortages. People adopt coping strategies in response to different risks and shocks. The range of coping and adaptive strategies

employed by people is copious, and they differ according to prevailing conditions. Investigating what coping mechanisms households employ during times of food shortages was one of the research problems identified at the outset of the study, as the coping strategy index measures perceived food insecurity. This section describes how people in the study area viewed the situation.

5.4.1 Frequency of application of coping strategies

As was described in the previous sections, 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 inter or intra-annual food shortages.

Attempts were made to identify the most often employed coping strategies through household surveys and focus group discussion, and by employing the Coping Strategy Index (see section 3.3.3 for methodological details). As illustrated in Table 5.7, the coping strategies identified as most often occurring in the study area were: relying on less preferred foods; gathering wild foods; limiting portion sizes at meal times; reducing the number of meals eaten per day; restricting consumption of adults in order to let small children eat, and consumption of seeds held for the next season. More than 70 per cent of the sampled households indicated that they had employed these coping strategies as short-term measures during times of food shortages. With the exception of consumption of seeds held for next season, most of these coping strategies cause no lasting damage to livelihoods and are usually reversible.

The vast majority (98 per cent) of households relied on less preferred food and gathering of wild foods respectively, during the time of food shortage. While 56 per cent of these households were relying on less preferred foods once or twice a week, about 36 per cent of them were applying these strategies 3-6 days a week. With regard to gathering of wild foods, the majority of the households (62 per cent) were relying on this strategy for about 3-6 days a week (see Table 5.7).

Table 5.7 shows that the second most important coping strategies that were applied often by the majority of households were limiting meal portions; reducing the number of meals eaten in a

day; and consumption of seed stock held for next season. In all cases, 86 per cent of households relied on these strategies to ensure constant availability of food. About 56 per cent of the households who relied on limiting the portion sizes of meals applied this strategy once or twice a week. About 45 per cent of the households who relied on reducing the number of meals eaten a day applied this coping strategy once or twice a week. About 75 percent of households who relied on consumption of seeds held for next season apply this strategy seldom, once or twice a week.

Restricting consumption of adults in order for small children to eat was also another important coping strategy that was employed by 74 per cent of the households as a short-term mechanism to avert a food crisis. Most households (61 per cent) reported that they employed this strategy once or twice a week. About 35 per cent employed this strategy often (3-6 days a week).

Table 5.7: Frequency of coping strategies by households using coping strategies in Dasse Administrative Area, November 2005 (n =101) (Adapted from CARE/WFP 2004)

Coping strategies	Total percentage of households using the coping strategies	Relative frequency by percentage of households using coping strategy (n= 101)				Average severity index by coping strategies
		Never (0 days/week)	Once in a while (1-2 days/week)	Pretty often (3-6 days /week)	All the time (7 days /week)	
1. Rely on less preferred food	98	2	58	36	4	5.5
2. Borrow food, or rely on help from a friend or relatives	25	75	22	2	1	1.4
3. Purchase food on credit	4	96	2	2	0	0.2
4. Gather wild food	98	2	34	62	2	3.5
5. Consume seed stock held for next planting season	86	16	75	10	1	6.5
6. Send household members to other family members or eat elsewhere	18	82	13	4	1	1.8
7. Limit portion size at meal times	86	15	55	28	2	4.5
8. Restrict consumption of adults in order for small children to eat	74	16	61	12	1	10.0
9. Reduce the number of meals eaten in a day	86	14	45	35	6	7.8
10. Skip an entire day without eating	21	88	18	4	0	1.8
11. Sell farm implements to purchase food	11	89	9	2	0	1.5

Borrowing food or relying on help from a friend or relatives was not a common coping strategy. This was employed only by about 25 per cent of households. Most of these households relied on

this strategy only once or twice a week. Available data also indicated that 98 percent of households in the study area received food aid (see Appendix D). Skipping entire days without eating, and selling off farm implements to purchase food, were reported as most infrequent coping strategies, represented by 12 and 11 per cent of households respectively. This coping strategy was a most uncommon practice, as was purchasing food on credit. Purchasing food on credit was employed only by 4 per cent of the households.

In sum, with the exception of consuming seed stocks held for next season, most coping strategies employed by farm households in Dasse Administrative Area would not cause long-term damage to food and livelihood security. The selling off of farm implements was uncommon. Similarly, as large livestock holdings were already low, selling of animals was an uncommon strategy to cope with food shortages. Skipping entire days without eating was also rare. Other strategies that were not commonly practiced included purchasing food on credit and sending household members to live elsewhere with family or friends.

5.4.2 Severity index of coping strategies

The CSI provides a quantitative food security score for each household. This score is a cumulative measure of the level of coping practices and severity of these practices. In brief, the higher the numeric score on the CSI, the more coping strategies employed by a household and the more food insecure it is. A lower numeric score means fewer coping strategies are employed and the household is more food secure (see section 3.3 for a detailed methodological note).

As illustrated in Table 5.8, the majority (86 per cent) of households recorded a CSI score of 21 – 49 percent of which recorded CSI scores of more than 40. After conducting a country-wide rural livelihood survey in 2003, an understanding was reached by WFP, CARE, and ERREC that in Eritrea, food security in terms of CSI score could be explained with a CSI score of 0, 0.1-40, and >40 as indicators of high, moderate, and severe food insecurity, respectively (Ministry of Health (MOH) 2005). Almost half of the interviewed households (49%) recorded CSI scores of above 40, thus they were severely food insecure. The CSI scores among female-headed households and male-headed households differed. While 52 per cent of female-headed households recorded CSI

scores of more than 40, only 46 per cent of male-headed households recorded CSI scores of more than 40.

Table 5.8 Coping Strategy Index (CSI) in Dasse Administrative Area, November 2005 (n. = 101)

CSI	Male-headed households		Female-headed households		Total	
	No.	%	No.	%	No.	%
0 – 20	5	12	9	15	14	14
21 – 40	18	42	19	33	37	37
41 – 60	17	39	25	43	42	41
61 – 80	3	7	5	9	8	8
Total	43	100	58	100	101	100

5.4.3 Level of severity of coping strategies

The eleven coping strategies employed by households were categorised into different levels of severity during the focus group discussions. Investigations sought to identify the proportion of households experiencing various levels of severity.

Gathering wild food was classified as the least severe coping strategy and was employed by the majority of interviewed households (98 per cent). Relying on less preferred and less expensive foods, purchasing food on credit and limiting portion sizes at meal times were considered as moderately severe strategies. These moderately severe coping strategies, with the exception of purchasing food on credit, were found to be employed by more than 80 per cent of interviewed households (see Table 5.9)

Borrowing food or relying on help from friends or relatives, restricting consumption of adults so children can eat, reducing the number of meals eaten in a day, and selling of farm implements to purchase food were identified as severe coping strategies. These strategies were employed by a small number of households (see Table 5.9).

Skipping entire days without eating, consuming seed stock held for next season, and sending household members to live elsewhere were identified as most severe coping strategies. In terms of frequency of application, consumption of seed stocks held for next season was found to be the

most often applied strategy (86 per cent) while the rest were employed less often, (20-30 per cent) as a mechanism to tackle food insecurity problems.

Table 5.9: Severity level and frequency of application of coping strategies in Dasse Administrative Area, November 2005, (n=101)

Coping strategies severity level (As calculated from the focus group discussion)	Percentage of households using the strategy
Least severe	
Gather wild food	98
Moderately severe	
Rely on less preferred and less expensive foods	98
Purchase food on credit	4
Limit portion sizes at mealtimes	86
Severe	
Borrow food, or rely on help from friends or relatives	25
Restrict consumption of adults so children can eat	74
Reduced the number of meals eaten in a day	86
Selling of farm implements to purchase food	11
Most severe	
Skip entire days without eating	12
Consume seed stock held for next season	86
Send household members to live elsewhere	18

Generally, with rare exceptions, the coping strategies classified as severe were applied by fewer households than the least and moderately severe coping strategies. The least and moderately severe strategies were employed by more than 80 percent of households. Most households (98 per cent) applied least severe and moderately severe coping strategies. This implies that the coping strategies applied by the sample households indicated widespread food insecurity, but the coping strategies applied did not infer that coping strategy responses were severe.

5.4.4 Erosive and non-erosive coping strategies

Coping strategies are categorised into erosive and non-erosive coping strategies. Erosive coping strategies are detrimental to the future food security of households and non-erosive coping strategies are not detrimental to the future food security of households.

As indicated in Table 5.10, most strategies employed by households fell under non-erosive coping strategies. Selling farm implements and consumption of seeds held for next season were

commonly considered the most severe strategy, as these could have an effect on the next season's food production and lead to food shortages and therefore food insecurity, though these were employed by less than 40 percent of the households. In terms of the theory presented in the literature review, these households demonstrated a fair level of resilience to food insecurity and that the coping strategies applied did not undermine future food security.

Table 5.10 : Coping strategy categories commonly applied in Dasse Administrative Area, November 2005 (n=101)

Coping categories	Type of strategies	Households using the strategy (percentage)
Non- erosive	Rely on less preferred food	98
	Gather wild food	98
	Limit portion size at meal times	86
	Restrict consumption of adults in order for small children to eat	74
	Reduce the number of meals eaten in a day	86
	Skip an entire day without eating	12
	Purchase food on credit	4
	Send household members to other family members or eat elsewhere	18
	Borrow food, or rely on help from a friend or relatives	25
Erosive	Consume seed stock held for next planting season	34
	Sell farm implements to purchase food	11

5.4.5 Gender and household coping strategies

The gender dimension of food security was investigated in terms of coping strategies employed during food shortage. The analysis of the CSI score revealed that female-headed households had slightly lower CSI scores than male-headed households (see Table 5.11). The interpretation of the scores indicates that male-headed households were slightly more food secure than female-headed households. However, the differences in the CSI score were not significant, meaning that there were no significant differences in the food security status between male-headed and female-headed households.

Table 5.11: Coping strategy index by gender of household head in Dasse Administrative Area, November 2005, (n=101)

Coping strategies	Per cent of households			Average Severity index per coping strategy		
	Female headed households	Male headed households	Total	Female headed households	Male headed households	Total
Rely on less preferred food	97	98	98	5.3	5.7	5.5
Borrow food, or rely on help from a friend or relatives	22	33	28	1	1.9	1.5
Purchase food on credit	3	5	4	0.3	0.1	0.2
Gather wild food	97	98	98	3.5	3.4	3.5
Consume seed stock held for next planting season	88	86	87	6.5	6.6	6.5
Send household members to other family members or eat elsewhere	17	18	18	1.4	2.2	1.8
Limit portion size at meal times	84	86	85	5	3.8	4.4
Restrict consumption of adults in order for small children to eat	74	72	73	10.1	9.7	9.9
Reduce the number of meals eaten in a day	84	86	85	8.5	7	7.8
Skip an entire day without eating	22	19	21	1.9	1.7	1.8
Sell farming implements to purchase food	10	12	11	1.4	1.6	1.5

5.4.6 Correlation of coping strategies with cumulative CSI

Spearman's correlation revealed that most of the individual coping strategies were significantly correlated to the cumulative CSI scores of households. Relying on less preferred food; gathering wild food; sending household members to other family members; limiting portion size at meal time; reducing the number of meals eaten in a day; restricting consumption of adults in order for small children to eat; skipping entire days without eating and selling of farm implements to purchase food were the coping strategies that were strongly correlated with the cumulative CSI score. Apparently, these were the strategies that were influential in increasing the CSI scores.

According to the result indicated in section 5.4.3 above, relying on less preferred foods and gathering wild foods were identified as the least and moderately severe coping strategies respectively. The strong correlations ($r = 0.2436$, $p = < 0.05$; $r = 0.03578$, $p = < 0.01$ respectively) with the CSI therefore, were mainly due to the high (98 per cent) frequency of application, as CSI is the function of severity and frequency of application.

Sending household members to other family members or to eat elsewhere were also positively correlated to the CSI ($r = 0.3562$, $p < 0.01$). This strategy was described in section 5.4.3 as the most severe strategy and as being applied less frequently (18 per cent). Thus, the strong correlation with the CSI was mainly due to its high severity level. The strong relationship ($r = 0.6428$, $p < 0.01$) between limiting portion sizes at meal times and the cumulative CSI scale was mainly due to the high frequency (86 per cent) of application of the strategy, as its severity level was moderate.

Reducing the number of meals eaten a day was identified as a severe coping strategy. The strong correlation with the CSI ($r = 0.7588$, $p < 0.01$) therefore, was because of both the high frequency of application (86 per cent) and the high level of severity. Restricting consumption by adults in order for small children to eat was categorised at the severe coping strategies level. As was mentioned in the previous section, this strategy was applied very often. The strong correlation it had with cumulative CSI, therefore, was as a result of both the severity level and high frequency of application (74 per cent).

Skipping an entire day without eating and selling of farm implements to purchase food were strongly correlated with the CSI score ($r = 0.321$, $p < 0.01$; $r = 0.4168$, $p < 0.01$ respectively). As described in section 5.4.3, these strategies were applied less often (11 and 12 percent respectively) and the severity level was moderately severe and severe. The strong correlation with the CSI score, therefore, was mainly due to the high severity levels.

As indicated on Table 5.12, consuming seed stocks held for next season was weakly correlated with CSI ($r = 0.0855$, $p < 0.05$) although it was the most frequently applied strategy (86 per cent of households). Consuming seeds stocks held for the next season was classified as a severe coping strategy, and the weak correlation with the cumulative CSI score was not expected.

Table 5.12: Spearman’s correlation coefficient for individual coping strategies and cumulative CSI in Dasse Administrative area, November 2005 (n=101)

Coping strategies	Spearman’s correlation coefficient
Rely on less preferred food	0.2436*
Borrow food or rely on help from a friend or relatives	0.0623
Purchase food on credit	0.052
Gather wild food	0.3578*
Consume seed stock held for next planting season	0.0855**
Send household members to other family members or eat elsewhere	0.3562*
Limit portion size at meal times	0.6428*
Restrict consumption of adults in order for small children to eat	0.7299
Reduce the number of meals eaten in a day	0.7588*
Skip an entire day without eating	0.321*
Sell farm implements to purchase food	0.4168*

**Significant at $P < 0.05$ (two tailed)

* Significance at $P < 0.01$ (two tailed)

5.4.7 Correlation of the CSI score with household characteristics

Table 5.13 describes correlation coefficients for the household characteristics (see chapter 4 for detail) with the CSI. These results indicate that the CSI scores were positively correlated with household size, age of household head, dependency ratio, land holding and food aid.

A positive correlation existed between the CSI and age of household head interpreted as the older the household head, the higher the CSI, and the more food insecure than those households headed by relatively younger people. The dependency ratio was positively correlated with the CSI, i.e. the higher the dependency ratio the higher the CSI scores and therefore the more severe the food insecurity situation was. It indicated that the more dependent members in the household, the more food insecure the household is. The educational status of the household head was positively correlated with the CSI and was interpreted as the more educated the household heads, the less food secure they are. It contrasted with the usual assumption that households headed by educated members are more productive, with better income earning opportunity, and were thus more food secure than non-educated ones.

A positive correlation was found between the CSI and land holding size. This means that the bigger the land holding size of the household, the higher the CSI and the more food insecure they are. Those who had smaller land size recorded lower CSI. This finding is unusual and most

unexpected, and may need further investigation to identify other influencing factors. It may be related to more agricultural livelihoods and the impact of drought on agricultural livelihoods.

Table 5.13: Correlations between CSI and household characteristics in Dasse Administrative area, November 2005 (n =101)

Household characteristics	Spearman correlation coefficient
Household size	0.2148**
Dependency ratio	0.2687*
Age of household head	0.1786**
Food intake in kilojoules per capita	-0.0538
Livestock holdings per household	0.0662
Available food from own harvest	0.1447
Available food from purchase	0.1225
Productivity per hectare	0.0143
Education level	0.1946**
Land holding	0.2237*
Food aid	0.168**

**Significant at $P < 0.05$ (one tailed)

* Significance at $P < 0.01$ (one tailed)

5.4.8 Coping strategies and perceived causes of household food insecurity

The relationship between coping strategies and perceived causes of household food insecurity was investigated in view of CSI score and the severity of the perceived problems as discussed in section 5.3. The CSI scores were compared with the perceived causes of household security as categorised under agro-ecological, socio-economic and infrastructural constraints. Spearman's correlation coefficient was employed to identify these relationships in terms of strength of the linkages and statistical significances (Table 5.14).

Figure 5.3 shows that the CSI scores were found to be higher among households who reported the perceived agro-ecological constraints as severe, compared with households who reported these causes as non-existent (nil) or somewhat existent. This was particularly true among households who perceived drought, erratic rain, land degradation, and insect pests as severe constraints. As indicated in Table 5.14, the relationship was statistically significant with

perceived drought and land degradation ($r = 0.178$, $p < 0.05$ and $r = 0.235$, $p < 0.05$ respectively) as perceived causes of household food insecurity. This implies that the more severe the problems of drought and land degradation were perceived to be, the higher the CSI, and the higher the perceived food insecurity situation.

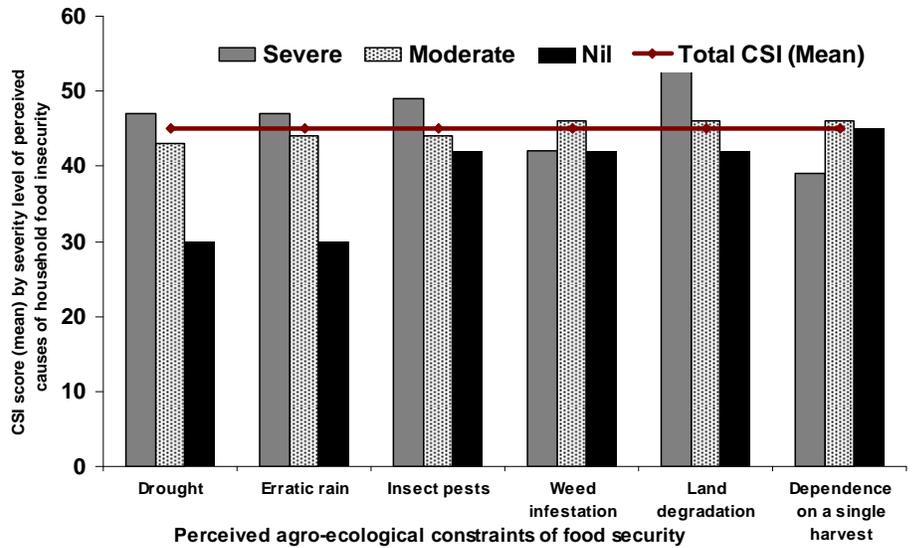


Figure 5.3: CSI score by perceived agro-ecological causes of household food Insecurity in Dasse Administrative Area, November 2005 (n = 101).

Figure 5.4 shows that the relationships between coping strategies and perceived socio-economic constraints of household food security were investigated in terms of the CSI score and the severity of the problems as discussed in section 5.3. The CSI scores were found to be higher among households who reported the perceived causes as severe and moderate, compared with the households who reported these causes as non-existent (nil). The CSI was higher for households who reported lack of income, shortage of labour, shortage of draught animals and traditional farming implements and practices as severe constraints to household food security. However, a

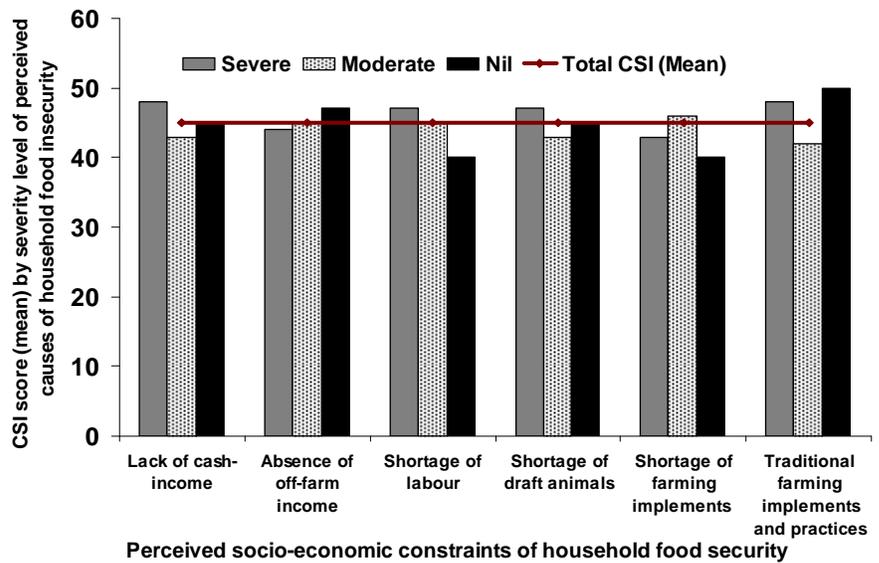


Figure 5.4: CSI score by perceived socio-economic constraints of household food insecurity in Dasse Administrative Area, November 2005 (n = 101).

positive and statistically significant relationship was established only between the CSI and shortage of farm implements ($r = 0.223$, $p < 0.05$). It implies that the more severe the shortage of farm implements was perceived to be, the higher the CSI and the higher the food insecurity situation, implying that shortage of farm implements is critical to determining severity of the household food insecurity situation in the study area.

Figure 5.5 illustrates the relationship between the CSI score and perceived infrastructural constraints to household food security. The CSI scores were found to be higher among households who reported the perceived causes of household food insecurity as severe or non-existent. The CSI scores were high for those households that perceived lack of agricultural credit services, inadequate irrigation, and

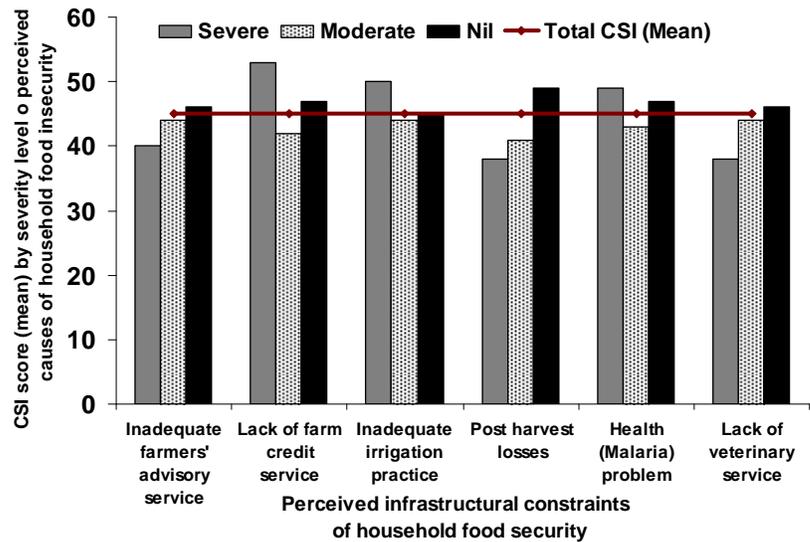


Figure 5.5: CSI score by perceived infrastructural causes of Household Food insecurity in Dasse Administrative Area, November 2005 (n = 101).

health problem as severe constraints of household food security. However, a positive and statistically significant relationship was established with lack of agricultural credit service ($r = 0.293$, $p < 0.01$). It implies that the more severe the lack of agricultural credit was perceived to be, the higher the CSI and the higher the food insecurity situation, implying that lack of credit services are critical in determining the severity of the household food insecurity situation in the study area. .

Table 5.14: Correlations between CSI and perceived causes of household food insecurity in Dasse Administrative area, November 2005 (n =101)

Perceived causes of household insecurity	Spearman correlation coefficient
Agro-ecological constraints	
Drought	0.1784**
Erratic rain	0.008949
Insect pests	0.1556
Weed infestation	0.182
Land degradation	0.2351**
Dependence on single harvest	0.04004
Socio economic constraints	
Lack of cash-income	0.0798
Absence of off-farm income	0.07312
Shortage of labour	0.1043
Shortage of draught animals	0.07812
Shortage of farm implements	0.2207**
Traditional farm implements and farm practices	0.007426
Infrastructural constraints	
Inadequate farmers advisory service	0.1531
Lack of agricultural credit service	0.2925*
Inadequate irrigation practice	0.1057
post harvest losses	-0.1229
Health (malaria) problem	0.09348
Lack of veterinary service	0.04901

**Significant at $P < 0.05$ (one tailed),

* Significance at $P < 0.01$ (one tailed)

5.4.9 Summary

Among the agro-ecological factors that were assumed to affect household food insecurity, in sum, drought and erratic rain were perceived as most affecting household food insecurity. Similarly, shortage of farm implements, shortage of labour and lack of monetary and off-farm income were among the perceived socio-economic constraints identified as most affecting household food security. Lack of farm credit, health (malaria) problem, and lack of farmers' advisory service were perceived as constraints that affected household food security the most among the infrastructural constraints.

Apart from consumption of seeds held for next season, as a means of managing food shortfalls and sustaining livelihoods, the coping strategies applied by the studied households were largely consumption-based and non-erosive, i.e. they were largely not damaging to livelihoods in the long term and could tide households over for a period.

CHAPTER 6: CONCLUSIONS AND RECOMMENDATIONS

The aim of this study is to examine farmers' perceptions of the impact of agro-ecological, socio-economic and infrastructural constraints on food insecurity and the coping strategies employed by farm households, in order to understand how coping strategies applied by the households increase vulnerability or mitigate the effect of food shortages in the Dasse Administrative Area of Gash-Barka zone.

Male-headed and female-headed households were selected to participate in the household survey. Various sources were used to generate the necessary data from both primary and secondary sources. The main methods of acquiring the primary data included household sample surveys, focus group discussions, and field observations. Production data from the Ministry of Agriculture, rural survey reports and documents contributed the sources for the secondary data. Qualitative and quantitative analysis techniques were employed. Spearman's rank correlation (for examining the relationship of coping strategies and other variables) and point score analysis (for identifying the main perceived agro-ecological, socio-economic, and infrastructural causes of food shortage) were applied. The following two sub-problems were explored:

- How do households perceive the impact of each of agro-ecological, socio-economic and infrastructural constraints to the problem of household food insecurity?
- What coping strategies do households employ and how do the coping strategies applied by the households increase vulnerability or mitigate the effect of food shortages in the Dasse Administrative Area of Gash-Barka zone?

Households in the study area are agro-pastoralists and rely almost entirely on growing a small range of crops and keeping livestock. In other words, they are dependent on a narrow livelihood base that renders them vulnerable to external shocks. The agricultural system is rain-fed which gives few options for diversification. Without irrigation, farmers find it hard to switch to other crops and, since they lack education, they have few opportunities to branch out into other forms of employment.

Food production was inadequate and did not meet the year-round food requirements of households. Low income meant that households were not able to purchase food to fill the food gap between harvests and were forced to apply consumption smoothing coping strategies. There were seasonal fluctuations in terms of availability of food annually. Seasonal food shortages were partly explained by the seasonality of agricultural operations and partly by farmers' income levels from on and off-farm activities. The harvest and immediate post-harvest periods were times when food supply was adequate, but shortages were experienced during planting and pre-harvest times.

Household inability to produce adequate food has been explained in terms of the interplay between agro-ecological, socio-economic, and infrastructural factors. Households perceived drought, erratic rainfall patterns, livestock and crop pests, and their dependency on a single harvest per year as the major agro-ecological constraints that hindered self-sufficiency in food production. Lack of monetary and off-farm income; labour shortages; lack of draught animals and farm implements; lack of modern agricultural technologies and use of traditional farming practices were some of the socio-economic constraints that affected production and household food security. The study also found that health problems, especially malaria, adversely affected household food security.

With the exception of consumption of seeds held for next season, the copings strategies applied by the studied households were largely consumption-based and non-erosive, i.e. they were not damaging to livelihoods in the long-term and could tide households over for a period, indicating that households were relatively resilient to food security shocks. If continually practised, these strategies could push households into employing erosive coping strategies.

6.1 Conclusions

Agro-ecological factors that included drought and erratic rains coupled with entrenched socio-economic and infra-structural impediments were among the formidable constraints perceived as most detrimental to household food security by sampled households because they hinder domestic production. This shows that food security interventions need to be built around mitigating these perceived causes.

Households were found to rely largely on consumption-based coping strategies when faced with food shortages. These included relying on less preferred food, gathering wild foods, limiting portion sizes at meal times, and reducing the number of meals eaten in a day. These strategies are detrimental to the nutritional status of household members and proper nutrition is critical for active and productive life. Consumption of seeds held for next season was employed very often and could cause lasting damage to long-term food security. Food security interventions need to support livelihoods in ways that protect and buffer the natural resilience of households, providing direct assistance when erosive coping strategies are employed to ensure that households remain resilient to the fragile and variable situations in which they exist.

6.2 Recommendations for improving household food insecurity

Increasing food availability is crucial to ensure adequate food supply and smooth seasonal fluctuations. However, this has been affected by various agro-ecological, socio-economic and infrastructural constraints. This shows that food security interventions need to be built around these constraints. As a primary measure to address availability of food among households in the study area, sustainable production systems should be promoted at household level. In view of this, the following issues need to be considered by the Ministry of Agriculture and development partners to address the food availability problem in the study area: introduction of adaptive and high yielding production technologies and input support interventions; strengthening agricultural extension services; supporting the small-scale livestock production system through pasture rehabilitation and restocking programmes and supporting natural resource conservation measures that include promotion of soil and water conservation practices.

As a strategically important method of minimising risks, the agro-pastoral production system needs to be diversified. Diversification helps to reduce risks, especially those related to seasonality in rain-fed agriculture. In view of this, apiculture, poultry, and micro-irrigation at household level are potentially promising areas to diversify the production systems and therefore strengthen livelihood support options. Moreover, subsistence agriculture is unsustainable and households' survival depends on adopting more viable livelihood options.

Households in the study area were found to employ non-erosive and consumption-based coping strategies. To protect households from using damaging strategies in prolonged food shortage contexts, short-term humanitarian assistance such as cash/food transfer programmes are appropriate, and should be applied along with long-term development interventions such as agricultural production improvement and natural resource conservation measures. It is also important that the government establish operational food buffer stock and public food grain distribution systems that would ensure consumption smoothing, and would eventually help households from employing damaging coping strategies involving the selling of productive assets.

Considering the diversity of behavioural arrangements and coping strategies employed in the study area to compensate for food shortages, policy instruments designed to help households need to recognise their diversity to support the natural resiliency of households. In order to better monitor the changes in coping behaviour over time and their impact on household food security, the relevant government ministries, such as Ministry of Agriculture and international development partners, should work to strengthen food security information systems. Moreover, policy priorities should be given to providing households with choices that contribute to self-determination and autonomy in livelihood strategies.

6.3 Recommendations for further research

This study was conducted in the area where agro-pastoralism is the dominant livelihood system. The pastoral livelihood systems, which represent the majority of the livelihood systems in Gash-Barka zone, need special focus in future research related to food security. Research should focus on the diversity of the pastoral system and the broader changes that have taken place within pastoral communities due to natural resource degradation, and war and conflict-induced limitations of seasonal movements. Investigation into the ways in which farmers have adapted to changing external conditions and the specific coping mechanisms employed to deal with the different situations is required to understand better the coping strategies and to design appropriate support programmes. Moreover, the current food security policies and strategies at national and sub-national levels need to be researched to investigate whether policies have

adequately addressed pastoralists, and the impact these could have in enhancing food and livelihood security of pastoral livelihood systems.

The study did not investigate the impact of coping strategies on the nutritional situations of households. Further systematic research is urgently required to find out how the largely consumption-based coping strategies this study revealed could affect the nutritional well-being of farm households in Dasse Administrative Area and other parts of Gash-Barka zone.

Due to the difficulties in obtaining detailed livestock information, the study focused more on crops to investigate the household level food availability. More comprehensive research studies, with adequate time allocation and adequate considerations of both crop and livestock-based food sources are required for a better understanding of the household security situation in the whole of Gash-Barka zone in the future.

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Appendix A: Household food security survey questionnaire

The following questions were asked to each household head included in the sample. Training was given to enumerators before the survey on the content of the questionnaires and how they should approach and be respectful to correspondents. Respect also includes developing an understanding of the cultural norms of the participating group and treating people as equal participants in the data collection process.

A. Marital and educational status of Household Members

Marital status of household head (Tick the response in each corresponding box)			
Single <input type="checkbox"/>	Married <input type="checkbox"/>	Divorced <input type="checkbox"/>	Widowed <input type="checkbox"/>
Total number of HH members (not including migrants), (write their number in the box)	Female	Male	Total
	<input type="text"/>	<input type="text"/>	<input type="text"/>
Number of household members below 15 and above 65 years old (write their number in the box)	Below 15 (children)	above 65 (adults)	Total
	<input type="text"/>	<input type="text"/>	<input type="text"/>
Educational status of the HH members (write their number in the box)	Illiterate	Grade 1-5	6-11
	<input type="text"/>	<input type="text"/>	<input type="text"/>
		Above grade 11	<input type="text"/>

B. Agriculture

Circle the number corresponding to the response

SN	QUESTIONS	ANSWERS
C1	Do you cultivate any land?	Yes 1 No 2
C2	How big is the size of your land (in Tsmdi)	_____ Tsmdi (0.25 hectare)

SN	QUESTIONS	ANSWERS
C4	How much land do you cultivate during the rainy season?	Tsmdi <input style="width: 50px;" type="text"/>
C5	How much land do you cultivate with irrigation?	Tsmdi <input style="width: 50px;" type="text"/>

Please tell me the cultivated land for each crop specified below last year.

Major crops	C7	C8	C9	C10
	Area (Tsimdi)	Production (kgs)	Sold (kgs)	Price kg/Nakfa
Sorghum				
Pearl millet				
Millet				

SN	QUESTION	ANSWER
C12	Do you grow any vegetables?	Yes, for home consumption1 Yes, for sale only2 Yes, for consumption and sale3 No4

Describe the vegetable production for the last season.

Vegetables grown	C13	C14	C15
	Area (Tsmdi)	Production (kg)	Quantity sold (kg)

C. Livestock

Please specify the types and number of animals.

	D 1	D2	D3	D4
	Number	Number sold in past 6 months	Value of animals sold (Nakfa)	Number that died in previous six months
Cow				
Ox				
Sheep				
Goats				
Donkeys				
Camels				
Chicken				
Beehives				

D. Major Sources of Cash Income (all HH members combined)

SN	Sources	(Yes= 1, No = 2)
E1	Cash crop sales	
E2	Agriculture labour	
E3	Non-agriculture: wage labour	
E5	Occupational work (shoemaking, tailoring, ironwork, etc.)	
E6	Petty business / street vending	
E7	Business (e.g. - shop keeping)	
E8	Micro enterprise/ Handicrafts	
E9	Livestock (livestock, milk, meat, etc.)	
E10	Poultry	
E11	Beekeeping	
E12	Remittances from within Eritrea	
E13	Remittances from outside Eritrea	
E14	Fire wood collection and selling	
E15	Seed selling (cereals, vegetables, herbs)	
E16	Other specify (specify) _____	

E. Loans

Sources	F1	F2	F3
	Have you borrowed money in the past 12 months	Purpose of loan (see codes below)	Number of loans
	Yes or No	-	-
a) Money lender	-		
b) NGOs	-		
c) Friends/relatives	-		
d) Bank	-		
e) Cooperatives	-		
f) Community Based Orgs. /Groups	-		
g) Others (specify):	-		

Purpose of loan codes: Farming --- 1, Off-farm Income Generating Activity (IGA)/ micro enterprise --- 2, Health --- 3, Marriage --- 4, Housing --- 5, Foreign employment --- 6, Education --- 7, Consumption --- 8, others --- 9

F. Food Security

SN	QUESTIONS	ANSWERS			
G1	Was your crop (sorghum, pearl millet) production last year....:	Normal?..... 1 Above normal? 2 Below normal? 3			
G2	How many months did you have food from your own production to meet household needs last year?	Months <input type="text"/>			
G3	If production was not sufficient year-round, please specify the main reason by severity levels as nil, moderate and severe. Put in the box the severity level as 0 for nil, 1 for moderate, and 2 for severe	Drought	<input type="checkbox"/>	Weed infestation	<input type="checkbox"/>
		Shortage of labour	<input type="checkbox"/>	Land degradation	<input type="checkbox"/>
		Shortage of draught animals	<input type="checkbox"/>	Dependence on single harvest	<input type="checkbox"/>
		Shortage of farming implements	<input type="checkbox"/>	Lack of cash income	<input type="checkbox"/>
		Inadequate farmers' advisory service	<input type="checkbox"/>	Absence off-farm income	<input type="checkbox"/>
		Lack of agricultural credit	<input type="checkbox"/>	Post harvest losses	<input type="checkbox"/>
		Inadequate irrigation practice	<input type="checkbox"/>	Health (malaria) problem	<input type="checkbox"/>
		Pest damage	<input type="checkbox"/>	Lack of veterinary service	<input type="checkbox"/>
G4	How much does your household normally spend on food per month?	Nakfa <input type="text"/>			
G5	Has your household ever benefited from food aid?	Yes..... 1 No..... 2			
G6	How frequently did you receive food aid in the past six months	Every week	Monthly	Quarterly	
		<input type="text"/>	<input type="text"/>	<input type="text"/>	
G7	How much was the monthly distribution rate?	Cereals (kgs) <input type="text"/>	Pulses <input type="text"/>	Oil(litres) <input type="text"/>	Salt (kgs) <input type="text"/>
G8	Did you share the food aid with others	Yes.....1 No.....2			

G. Coping Strategies Responses (CSI)

In the past 30 days, if there have been times when you don't have enough food or money to buy food, how often has your household had to:							
SN	Coping Option	Times per week					
		Every day	3-6 times/ week	1-2 times/ week	Less than 1	Never	N/A
H1	Rely on less preferred and less expensive foods						
H2	Borrow food, or rely on help from friends or relatives						
H3	Purchase food on credit						
H4	Gather wild food						
H5	Consume seed stock held for next season						
H6	Send household members to live elsewhere						
H7	Limit portion sizes at mealtimes						
H8	Restrict consumption of adults so children can eat						
H9	Reduce the number of meals eaten in a day						
H10	Skip entire days without eating						
H11	Sell jewellery or household items to purchase food						
H12	Sell farm implements to purchase food						

I. Physical Infrastructure

SN	QUESTIONS	ANSWERS
I1	What is your main drinking water source?	Personal piped water1 Community piped water.....2 Spring.....3 Tanker truck.....4 Well5 River/stream.....6 Other7
I2	How far are the water sources from your home? (walking distance)	Minutes <input type="text"/> Hours <input type="text"/> Days <input type="text"/>
I3	How far are the health facilities from your home ?(walking distances)	Minutes <input type="text"/> Hours <input type="text"/> Days <input type="text"/>
I4	How far are schools from your home? (walking distance)	Minutes <input type="text"/> Hours <input type="text"/> Days <input type="text"/>

Appendix B: Check lists for focus group (FG) discussions

The following are issues discussed during the focus group discussions:

1. Agricultural production

- 1.1. Major crops grown in the area.
- 1.2. Prioritization in terms of their importance as food crop and cash source.
- 1.3. Production constraints.
- 1.4. Productivity of major crops (kg per hectare or any other local measurement).
- 1.5. Months that own harvest could cover food need (one month, two months, all year round etc.) in good and bad years.
- 1.6. Any year in the past that households were able to cover all their food and cash needs.
- 1.7. Farmer's perception of the last crop season (2005) (good or bad), and level of production.
- 1.8. Frequency (cycle) that drought attacked the area (every two, three, five, ten years).
- 1.9. Wealth categorization (rich, medium, poor) and the criteria used to come up with this categorization.
- 1.10. Livestock productivity (litre of milk/goat, litre of milk/camel, litre of milk/camel, etc.).
- 1.11. Livestock migration pattern.
- 1.12. Adequacy of veterinary services.
- 1.13. Pasture and water availability.

2. Relief aid

- 2.1. Food aid ration size (average rate) kg/month/individual (for cereals, pulses, oil).
- 2.2. Frequency of distribution (half-monthly, monthly, quarterly, etc.).
- 2.3. Length of time they have been receiving food aid continuously in the past few years.
- 2.4. Any Food-for-Work (FFW) or Cash-for-Work (CFW) programmes before and present.
- 2.5. Farmer's preference for FFW and CFW programmes (which one is more appropriate and satisfies their need more, and why?).
- 2.6. Decision making in selecting beneficiaries (village elderly committee, government, etc.) and the criteria employed for selecting.
- 2.7. Food aid sharing with neighbours and relatives.

3. Income Sources

- 3.1. Major source of income for covering household basic needs (food and non-food need).

- 3.2. Traditional credit and saving practices.
- 3.3. Existence of small micro-finance activities supported by the government and/or NGOs.

4. Coping strategies

- 4.1. Coping strategies farm households employ in time of food shortage (according to their severity).
 - Rely on less preferred and less expensive foods
 - Borrow food, or rely on help from friends or relatives
 - Purchase food on credit
 - Gather wild food
 - Consume seed stock held for next season
 - Send household members to live elsewhere
 - Limit portion sizes at mealtimes
 - Restrict consumption of adults so children can eat
 - Reduced the number of meals eaten in a day
 - Skip entire days without eating
 - Sold farm implements to purchase food

5. Access to market

- 5.1. Major trading commodities (food grains, livestock, etc.).
- 5.2. Location (Dasse or other places and distance from the villages).
- 5.3. Seasonality (seasonal or throughout the year).
- 5.4. Adequacy in terms of satisfying basic needs.

6. Social service

- 6.1. Drinking water sources and distance from home (both for livestock and human use).
- 6.2. Health facilities (proximity and adequacy, number of clinics and health personnel).
- 6.3. Source of fuel (fire wood collection and distance form home, who is responsible, frequency of fetching firewood in a week/month).

Appendix C: Source of food and income

Table C. 1: Availability of food by source in Dasse Administrative Area, November 2005 (n = 101)

Source of food	Female-headed households		Male-headed households	
	Kilograms per month per household	Per cent of total available food	Kilograms per month per household produced	Per cent of total available food
Production	20	39	28	46
Purchase	20	39	22	36
Food aid	11	22	11	18
Total	51	100	61	100

Table C.2: Income sources in Dasse Administrative Area, November 2005 (n = 101)

Income resources	Number of Respondents answer "yes"	Percentage	Rank
Agricultural labour	55	54	1
Livestock	45	45	2
Crop harvest	34	34	3
Non-agricultural labour	31	31	4
Fuel wood	28	28	5
Remittances from inside Eritrea	20	20	6
Hand craft products	18	18	7
Poultry	15	15	8
Beekeeping	2	2	9
Petty business	0	0	10
Remittances from abroad	0	0	0

Table C.4: Source of loan in Dasse Administrative Area, November 2005 (n-101)

Loan from	Number of respondents	Percentage
Money lenders	0	0
NGOs	1	1
Friends/relatives	23	23
Bank	0	0
Cooperatives	0	0
CBOs	0	0
Others	0	0

Appendix D: Food aid distribution

Table D. 1: Frequency of food aid distribution in Dasse Administrative Area, November 2005 (n=101)

Did you receive food aid in the past few months	Number of respondents	Frequency of distribution			Food aid sharing
		Weekly	Monthly	Quarterly	
Yes	98	0	97	1	8
No	3	-	-	-	90
Total	101				

Table D. 2: General food aid distributions rate in Dasse Administrative Area, November 2005 (n=101)

Villages	Food aid average distributions rate (Kg/household/month)			
	Cereals	Pulses	Oil	Salt
Aburna	23	4	1.5	1.0
Berbere	27.5	3.4	2.1	1.0
Darettale	33.3	2.3	1	1
Dasse	34.5	4.4	1.8	1.0
Shigilliti	40.6	6.6	2.4	1.1
Ugaro	15.9	3.4	1.5	1.0
Average				

Table D.3: Food aid distribution by gender of household head in Dasse Administrative Area, November 2005 (n=101)

Household heads	Number of food aid recipients	Average ration rate (Kg/household/month)			
		Cereals	Pulses	Oil	Salt
Male headed households	43	28.0	4.2	1.0	1.0
Female headed households	55	29.9	4.0	1.7	1.0
Total	98	28.95	4.10	1.40	1.0

Table D.4: Food aid distribution rate Administrative Area, November 2005 (n=101)

Food item	Distribution rate (kg/household/month)	Remarks
Cereals	29.1	More than 90 percent of it is wheat
Pulses	4.1	
Oil	1.8	
Salt	1.0	

Appendix E: Severity of coping strategies

Box 1. Severity of coping strategies

Coping strategies	Severity of coping strategies as identified during focus group discussions FG = member of Focus Group							
	FG 1	FG2	FG3	F4	F5	F6	Average	Rank
Rely on less preferred and less expensive foods	1	1	2	2	2	1	1.5	2
Borrow food, or rely on help from friends or relatives	2	3	3	2	2	3	1.5	3
Purchase food on credit	2	3	2	2	2	3	2.3	2
Gather wild food	2	1	1	1	1	2	1.3	1
Consume seed stock held for next season	4	3	4	4	4	4	3.8	4
Send household members to live elsewhere	4	4	3	4	4	4	3.8	4
Limit portion sizes at mealtimes	3	3	3	2	2	1	2.3	2
Restrict consumption by adults so children can eat	2	2	3	3	2	3	2.5	3
Reduced the number of meals eaten in a day	2	2	3	2	3	2	2.3	3
Skip entire days without eating	4	4	4	4	4	4	4	4
Sell farm implements to purchase food	3	3	3	4	3	4	3.3	3

Box 2. Assigning numeric values to relative frequency (Adapted from Maxwell *et al.* 2003)

The relative frequency categories				
All the time? Every day	Pretty often? 3-6 */week	Once in a while? 1-2 */week	Hardly at all? <1 */ week	Never 0*/week
The relative frequency categories scored according to the mid-point value of the range of each category:				
7	4.5	1.5	0.5	0