

**ENHANCING LIVELIHOOD STRATEGIES OF RURAL COMMUNITIES  
PRONE TO CLIMATE RISK IN THE CAPRIVI REGION OF NAMIBIA**

by

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## DECLARATION

I Jacob Mulele Nyambe declare that the thesis submitted to the University of Limpopo for the Doctor of Philosophy in Agricultural Economics, is a presentation of my own original work and has not previously been submitted by me for the degree at this or any other university. Where external supportive material was used, recognition of such was carefully done by means of referencing.

Signed 

Date: 10/05/2013

## DEDICATION

This thesis is dedicated to my wife, all my children, and my siblings. God gives, but one has to explore that latent potential which God has bestowed. My own father was outspoken for his intelligence and I chose to experiment abstractly, whether or not I have the same trait. The results seem to confirm this. You too can do it but when you do it, let it be done prayerfully. *Tu wondise muzi muhya* (let us work to sustain our new settlement).

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My greatest appreciation goes to Almighty God who safeguarded my life and provided me with the needed resources during the survey and beyond. *Basikale baba kutemba Ireza nibati 'Shandandulwa mukulwana hazana bati impumpu'* (All glory and praise may be to God our Father).

## **ABSTRACT**

*Declining rural livelihood and coping strategies in the Caprivi region have for some time been blamed on climate risk factors alone. Prominent climate risk factors are drought and floods. While the indignation of many speculators about the devastating effects of climate risk factors on annual harvests may be valid, the truth is that there are now new constraints on the livelihoods of rural households. Multi-stage cluster and stratified random sampling were used in identifying respondents. Data was collected by means of face-to-face interviews with a structured questionnaire that was applied on a sample of 253 respondents. The respondents resided in three constituencies, namely Kabbe, Katima Rural and Linyanti, which are classified as floodplains. With regards to the analytical framework, the thesis used descriptive statistics, factor analysis, a logistics regression model, as well as an unconstrained multivariate regression model. The objective of the thesis is to suggest mitigating strategic policy prescriptions that will enhance the livelihoods of rural communities in the Caprivi region.*

*The results revealed that albeit agriculture is the main livelihood strategy, it is on a declining path in the context of livestock numbers (cattle, goats and chickens) and crop harvest (maize, millet and sorghum). Of the respondents, a substantial number (31%) of rural households are headed by people who are  $\geq 56$  years of age. Notwithstanding the damage caused to crop fields by other factors, the main causative factor to the poor harvest in 2007 was wild animals. The biannual harvesting approach has been abandoned for a single approach owing to climate risk factors and changes in the natural environment attributed to climate change and destruction of crop field by wild animals. The average annual rainfall at Katima Mulilo is 653 mm, but volatility in annual rainfall often results in drought or floods.*

*Malaria, Human Immunodeficiency Virus and Acquired Immune Deficiency Syndrome are to blame for reduced availability of labour to maintain livelihood activities that sustain rural households. The results further show that five factor components make rural households eligible for receiving food aid. The first is the capacity to farm, the second is climate risk awareness, the third is household*

*economic status, the fourth is past economic opportunities, and the last factor is household labour fitness. Salient to a rural farming household's decision to farm are three variables, namely food cost, age of the head of the household and the value of food aid. Using income as a proxy to the de facto inadvertent climate risk occurrences and damage to crops by wild animals, pension in the hands of heads of rural households, the value of livestock owned by rural households and, the value of food aid provided to rural households proved to have a significant relationship with rural household income.*

*In order to enhance rural livelihoods in the study area, the government and development partners should work towards establishing a repository for indigenous knowledge which rural communities have employed in the past. This knowledge should be improved on in order to use it in tackling related challenges in future. There is a need to invest more in agricultural infrastructure such as water-catchment facilities and irrigation infrastructure to assist communities to embark on irrigated vegetable farming in dry seasons; establish health facilities close to rural communities that are remote; address the lack of access to finance in the study area; and as an illustration of the lack of government projects in the study area, the green scheme should be rolled out in the area. The opening up of conservancies in areas where rural communities eke out their living from the agricultural livelihood strategy has caused unintended consequences for farming rural households. Thus the policy interface gap between the opening up of community conservancies and the agricultural policy affecting the agricultural livelihood strategy need to be addressed.*

## ABBREVIATIONS

AIDS	Acquired Immune Deficiency Syndrome
CBNRM	Community-Based Natural Resource Management
CWB	Composite Measure of Economic Well-being
FA	Factor Analysis
HDI	Human Development Index
HIV	Human Immunodeficiency Virus
HPI	Human Population Index
FA	Factor analysis
FAC	Food Aid Convention
FMD	Foot-and-Mouth Disease
GTC	Grains Trade Convention
ICT	Information and Communication Technology
IGC	International Grains Council
MDG	Millennium Development Goals
MLE	Maximum Likelihood Estimators
NDP	National Development Plans
N\$	Namibian dollars
OLS	Ordinary Least Squares
SADC	Southern African Development Community
VCF	Veterinary Cordon Fence



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## CHAPTER 1: INTRODUCTION

### 1.1 Preliminary considerations

It is generally expected that if a rural household is to continue to exist, it should be in a position to meet its daily needs. The ability of a household to fend for itself is underpinned by having access to a functional livelihood system. Thus, when livelihoods are not sustainable<sup>1</sup>, the affected household becomes endangered as a result of vulnerability to shocks which might be in the form of food insecurity, income, health and other poverty-related causes. An ideal situation would require that when hardship arises, a rural household should have the capacity to recover from the shocks that threaten its existence.

In developing countries, rural economies are usually underdeveloped. The state of underdevelopment of rural economies weakens the general livelihoods of rural households. In this study, the word 'livelihood' is frequently used and thus defining it is necessary. According to Lont and Hospes (2004) livelihood is a collective concept that includes issues such as social capital, trust, agency, institutions, reciprocity, vulnerability, social configurations and structural processes. This definition goes beyond economic and financial analysis (Lont and Hospes, 2004). The term livelihood also refers to assets (natural, physical, human, financial and social capital), the activities, and access to these assets as provided for by institutions, social relations

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<sup>1</sup> To say livelihoods are sustainable means that people have the capabilities to search for ways that can help them to generate, maintain and enhance their well-being together with the well-being of the future generation subject to availability and accessibility of options, which may be ecologically, politically, socio-culturally and economically inclined, but which are predicted on equity, ownership of resources and participatory decision-making (Singh and Titi, 1994 as cited by Singh, 1996; Agobia, 1999; Long, 2004a).

and organisations, which together set the benefits of the household (Ellis, 2000). Therefore, the desire to live free from poverty should be considered a socio-economic right<sup>2</sup> of every rural household. This is in accordance with United Nations General Assembly resolution 2200A (XXI) of 16 December 1966 on the International Convention of Economic, Social and Cultural Rights, Part III, Article 11 (United Nations, 1966). This universal view suggests a need to pursue a study of on why and how rural livelihoods of rural communities prone to climate risk<sup>3</sup> in the Caprivi region of Namibia are not sustainable.

## **1.2 Contextual issues**

### **1.2.1 General problems of every society**

Economic theory posits three fundamental problems that every society faces. These problems cut across every economic society. The three problems pivot on the aspect of economic scarcity. Samuelson (1964) presents the three problems; the first is what products should be produced and in which quantities? Products in this context could include goods such as food, agricultural tools and artefacts. Products could also be in the form of services that could be rendered. Timing of producing is also essential, because the need for products may vary from time to time. Therefore, economic scarcity dictates the timing and quantification of the production process.

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<sup>2</sup> Socio-economic rights are rights that imply some entitlements that are essential in the improvement of human welfare. Such rights include, among others, rights to basic needs and include rights to services and health but preclude rights such as those of freedom of speech (Brand, 2005).

<sup>3</sup> The term risk means a potential adversity, which is often expressed by random variation (Barry, Ellinger, Hopkin and Baker, 1995).



Samuelson (1964) defines economic scarcity as “the basic fact of life that there exists only a finite amount of human and nonhuman resources, which the best technical knowledge is capable of using to produce only a limited maximum amount of each and every good”. This definition reflects that the supply of resources is limited and therefore, a reasonable allocation is required in order to satisfy human needs. The second problem, which every society faces, is of how to produce goods. This question goes further to enquire into the extent of technological know-how that should be induced in the production of desired products. In this context, the ‘how to produce’ part of the question also implies the aspect of who will produce the products. This is a living reality in rural communities, given the bounded rationality constraint<sup>4</sup>. The third problem is who the end user of the products is. This question is important because economic resources committed to produce an output should be managed in such a way that a benefit is achieved. In other words, the target population should be the beneficiaries of the final output. This requires careful planning and consideration to avoid wasteful use of economic resources that are already scarce. The answers to these problems are found in the richness of having reputable public policies.

### **1.2.2 Public policy**

Public policy is an imperative tool for addressing problems of economic scarcity in society. In most cases, unbalanced public policy or policy that is deliberately formulated to favour a certain target group of society might only threaten national economic development. Policies with such implications were common decades ago in colonial times in many developing countries,

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<sup>4</sup> Bounded rationality has to do with the cognitive limitations that human beings encounter in analysing the interdependencies of a problem they are faced with (Marengo, 2003).

including the former South West Africa, which is now Namibia. Most of these policies were unfriendly to especially small-scale agriculture. These policies provided unequal distribution of land, incentives and technology that were mostly directed at encouraging large-scale agriculture and capital-intensive projects. In the process, rural areas remained on the periphery with regard to infrastructure development and development of small-scale agriculture in general (Lipton, 1996).

Many studies blame such public policies for having contributed to poverty in some developing countries. Csaki (2001) estimates that about 900 million poor people reside in rural areas where small-scale agriculture forms the dominant economic activity. It is very unlikely that this figure has now changed. The rural area is associated with agricultural production while the urban area is associated with manufacturing services. So, it is in rural areas where the production of staple food is seen as a primary source of livelihood for many impoverished rural households (Neto, 2004; Dorward, Omamo and Vink, 2005; Csaki, 2001; Issah, Khan and Sasaki, 2005).

In order to survive the hardships of poverty that are also embedded in historical policies, many rural communities in developing countries are exploring various livelihoods and coping strategies. Among such strategies are off-farm economic activities (Giles, 2006; Csaki, 2001). Off-farm economic activities are a reflection of the degree of diversification of a rural economy. There are several reasons why rural households choose to diversify their livelihoods, namely, the individual's voluntary exchange of assets, the individual's allocation of assets among various activities in order to achieve an optimal balance between expected returns and risks and a mechanism to survive, as well as the possibility of desperation that emanates from poverty, lack

of assets, vulnerability and disaster (Barret, Reardon and Webb, 2001; Hart, 1994 as cited by Ellis, 1998).

Barrett *et al* (2001) point out two major factors that compel people to diversify their livelihoods, namely, push and pull factors<sup>5</sup>. With push factors, diversification is influenced by a weakness in the risk-bearing capacity that exists in a weak financial system. Such a situation creates an incentive to choose a portfolio of activities for the sake of stabilising income flows and household consumption. Further, diversification that arises reflects some existing limitations in the labour and land markets, as well as uncertainty regarding climate. With regard to pull factors, the influence of local economic activities such as agriculture is important proximity to an urban area is another pull factor that compels rural communities to create opportunities for income diversification (Barrett *et al*, 2001).

Notwithstanding how diverse a livelihood system may be, the issue of sustaining livelihoods is imperative. What makes rural livelihoods unsustainable is a variety of factors including climate risk<sup>6</sup>, income risk, harvest failures, diseases and death of livestock and general economic failure (Dercon, 2002). A livelihood is sustainable if it is able to cope with and recover from various shocks and continues to maintain its capabilities while maintaining the environmental balance (Chambers and Conway, 1992 as cited by Scoones, 1998). The way in which drought and

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<sup>5</sup> Push factors are factors geared towards risk reduction, response to diminishing factor returns (for example, family labour supply, mobility between rural and urban area to fend for a living, reaction to a crisis and high transaction costs).

Pull factors are a result of the realisation of strategic complementarities among economic activities such as crop and livestock integration, specialisation due to comparative advantage resulting from technological innovations, skills and endowments (Porter, Blaufuss and Acheampong, 2007; Barrett *et al.*, 2001).

<sup>6</sup> Climate risk in this study refers to rainfall-related issues such as droughts and floods, which have a direct effect on agricultural outputs.

floods, which are climate risk factors, influence household food security<sup>7</sup> always varies from one household to another, depending on that particular household's economic power. In the case of drought, for example, a household that engages in crop farming may suffer reduced harvests, implying that such a household may till a smaller piece of land than usual, earn less income from cash crops than in a good season and have an increased need to buy food (Devereux, Rimmer, LeBeau and Pendleton, 1993).

It is against this backdrop that Arndt and Bacou (2000) believe that reliable rainfall prediction is essential to rural communities. They studied agricultural yield in Southern Africa as affected by El Niño and the Southern Oscillation events in the Equatorial Pacific. El Niño is an element of climate change that can bring along erratic rains to cause serious drought. They also argue that not only is it as damaging to experience predictable droughts as unpredictable droughts, but also that predictable favourable climate is more beneficial than unpredictable favourable climate. Therefore, they foresee an advantage in having reliable climatic information for increasing the value of the African land resource base.

This literature has succinctly provided insight on numerous developmental challenges which developing countries face. Such challenges include inappropriate development policies, population pressure on natural resources, lack of diversity of opportunities in rural areas, starvation, lack of infrastructure and investments in small-scale agriculture, and climate risk factors. All rural communities are faced with these challenges in one way or another. In fact, these challenges have a greater impact on rural areas compared to urban areas owing to

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<sup>7</sup> Food security refers to a state of having enough and sustainable access to sufficient food needed for an active and healthy life (Maxwell and Wiebe, 1999).

development bias, which is usually towards urban areas. The next topic introduces the study area.

### **1.3 Problem statement**

It is increasingly evident that rural livelihoods in the Caprivi region are becoming unsustainable, as reflected by the supply of emergency food aid becoming the norm. This goes to show that the usual conventional and traditional coping strategies of rural households have become less efficient. Although climate risk is a serious reality for rural communities in the Caprivi region, real causes which render economic activities<sup>8</sup> and livelihoods unsustainable are not known. Thus this uncertainty presents a major research gap, which has to be investigated.

### **1.4 Motivation for the study**

Namibia aspires, in its blueprint called Vision 2030, to become a developed country (National Planning Commission, 2005). This vision suggests a strong need for new knowledge that would enlighten policy makers on how to deal with some of the development challenges affecting rural communities. At the same time this visionary policy roadmap requires a research-guided path on the role rural economies should play in complementing urban economies in the fight against poverty.

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<sup>8</sup> Economic activities are, in this context, rural activities that can generate income, create goods, services and food required by the rural household for its survival and sustenance.

This desire to find better solutions to problems in developing countries has led to more debates, including work conducted by Arndt and Bacou (2000), Campbell (2004), CGAP (2005), Dercon (2002), Famine Early Warning System Network (2004), Just (2001), Mahul (2001), Mapp Jr, Hardin, Walker and Persaud (1979), Morduch (2001), Skees, Hazell and Miranda (1999), Wilhite (2000) and the World Bank (2006). It is in the same context that Barkley (1998) argues that in rural areas, communities face serious economic problems that are as challenging as those in urban areas. Based on this notion, it shows that rural areas also require research consideration that gives impetus to policy in order to address difficulties faced by rural communities. Csaki (2001) goes further to recommend improving social well-being, managing risks and reducing vulnerability<sup>9</sup> as necessary precursors to improving the quality of life of rural communities.

In Namibia, few studies have been conducted on rural livelihoods. Current scholarship by Ashley and LaFranchi (1997), Mosimane (2003) and Shapi (2003) has concentrated on the natural resource sector, especially on the role of the community-based natural resource management (CBNRM) concept, which has initiated the establishment of community conservancies as a livelihood strategy all over the Caprivi. With this concept attracting most of the attention, other relevant areas, such as agriculture, and rural retail shops are left out. Though the CBNRM is a useful strategy, it is but one livelihood strategy among other possible rural livelihood strategies, which is less vital than agriculture to the food security needs of rural households. The CBNRM alone will not solve livelihood concerns in the Caprivi and so looking at other strategies may be more useful. Overall, one can say that livelihood particularities in the Caprivi region are

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<sup>9</sup> Vulnerability has to do with the challenges of life that people may experience, such as weather-related challenges, health issues (HIV/AIDS, malaria, tuberculosis etc), pests and predators, as well as economic hardships (Long, 2004a).

understudied. Furthermore, the literature is silent on the details of sustainability of rural livelihoods, especially on the manner in which this thesis-work is guided by the research questions that follow later.

Still in the Caprivi region, the current trend of maintaining unsustainable livelihoods exposes rural communities to the possibility of developing dependence on food aid. Even more serious would be a probable stoppage of the supply of food aid, which will threaten their existence, as they may gravitate into impoverishment and probably even succumb to starvation and other poverty-related complexities. Thus this study is innovative in the following ways in which it brings together results that make an important contribution to the subject literature and also to policy:

- a) This study makes an attempt to understand the causes of unsustainable rural livelihoods. In doing so, knowledge is gained and disseminated in the form of a thesis. Knowledge gained and packaged in the form of a thesis would in some way stimulate policy debate in the context of rural economic development. In addition, the same knowledge would assist practitioners in crafting their policy interventions to rescue rural communities from possible long-term vulnerability.
- b) Since rural communities in the Caprivi region have been subjected to continuous provision of food aid, the concern is whether or not continuous provision encourages recipients of food aid to participate actively in agricultural food production. In relation to this concern, the results of this study can be useful in policy debates that seeks to support

economic efforts of rural communities but also in assisting rural households from relying on food aid.

- c) In view of uncertainty in the occurrence of climate risk and financial resource constraints, the government of the Republic of Namibia certainly requires scientific evidence on which to launch its future support processes with regard to advancing livelihoods in the Caprivi region. In light of this challenge, this study supports the need for realigning government resources to priority areas that blend with its long-term and inevitable strategy on poverty alleviation, *ceteris paribus*. This is in line with the view of Colebatch (1998) that says scientific knowledge is the basis for policy. Therefore, it is important to take into cognisance that without scientific evidence, policies could remain static and lack much needed dynamism in addressing livelihood challenges faced by rural communities.
  
- d) In contributing to the growing body of literature, the study uses the Caprivi region as a case study and also for developing and applying relevant econometric models that capture identified relationships. These models are then tied to the extent of their influence on rural livelihoods.
  
- e) Finally, policy recommendations that follow in the last chapter reveal prospects of widening opportunities for rural dwellers to participate in organised markets. The same recommendations are critical to enhancing rural livelihoods in the Caprivi region which will ultimately contribute to the development of a theory of coping strategies, which



currently do not exist. Furthermore, these recommendations are palatable for use by donor agencies and the government in the need to redesign and modernise rural development policy and strategy.

## **1.5 Research questions**

Rural communities in the Caprivi region have existed in the area since time immemorial and they have survived in various ways. Intuitively one discerns that something must have gone wrong in recent years for such communities to have to rely on food aid. The following research questions constitute an important scope of work in guiding the work of this thesis:

- a) What changed in the exogenous or endogenous environment to render the strategies of rural communities less efficient?
- b) How can a socio-economic rights approach assist in devising workable solutions that enhance livelihood strategies?
- c) What are the communities doing now and in what way do they react that fail to internalise and accommodate changes?
- d) How does the provision of food aid affect the agricultural production aspirations of the recipients of this aid?
- e) How does climate risk affect rural households?

## **1.6 Research objectives**

### **1.6.1 General objective**

The general objective of this study is to suggest policy direction that would augment livelihood strategies of rural communities in the study area. This comes with the expectation of ensuring that rural livelihoods should become sustainable amid various challenges faced by the affected rural communities.

### **1.6.2 Specific objectives**

- a) To explore historical and current economic activities and coping strategies to determine their influence on the lives of rural households and how coping strategies, and economic activities changed over time.
- b) To study the role of socio-economic rights in striving to enhance livelihoods.
- c) To analyse how the provision of food aid affects agricultural production in rural areas.
- d) To study economic effects of drought and floods on the agricultural livelihood strategy of rural households.
- e) To suggest strategic risk mitigation policy recommendations and survival climate risk management approaches to sustain livelihoods in the rural economy.

## **1.7 Hypotheses**

The following hypotheses were tested:

- 1.8.1 Current rural households' coping strategies are no longer helpful to sustain livelihoods, since these have been replaced by food aid.

1.8.2 Food aid provided over a period of time has no effect on agricultural production commitments of recipients of this aid.

1.8.3 Climate risk in the form of drought and flood has no effect on the livelihoods of rural communities in the Caprivi region.

## **1.8 Delimitations**

The thesis did not predict weather changes as influenced by climate changes but assumed climate change as a long-term element that increases the chances of climate risk.

## **1.9 Organisation of the thesis**

This thesis is structured by means of chapters. Chapter 1 provides a background, states the problem for the thesis and motivates its relevance. Chapter 2 explains livelihoods in developing countries and sheds light on a broader livelihood spectrum. This chapter is strictly based on a literature review. Chapter 3 explains socio-economic rights and their role in the livelihood precinct. Chapter 4 focuses on methodological conscripts which the thesis employs. Chapter 5 pronounces on the biographical and socio-economic features of the households that were surveyed. Chapter 6 analyses past and present livelihood and coping strategies. Chapter 7 provides an empirical analysis of the determinants to receiving food aid and what influences the decision to plough the field by the rural household recipients of food aid. Chapter 8 investigates empirically how climate risk affects incomes of the surveyed households. Chapter 9 concludes the thesis and makes recommendations for policy formulation and for future research.

## **CHAPTER 2: A PROGNOSIS OF RURAL LIVELIHOODS IN DEVELOPING COUNTRIES**

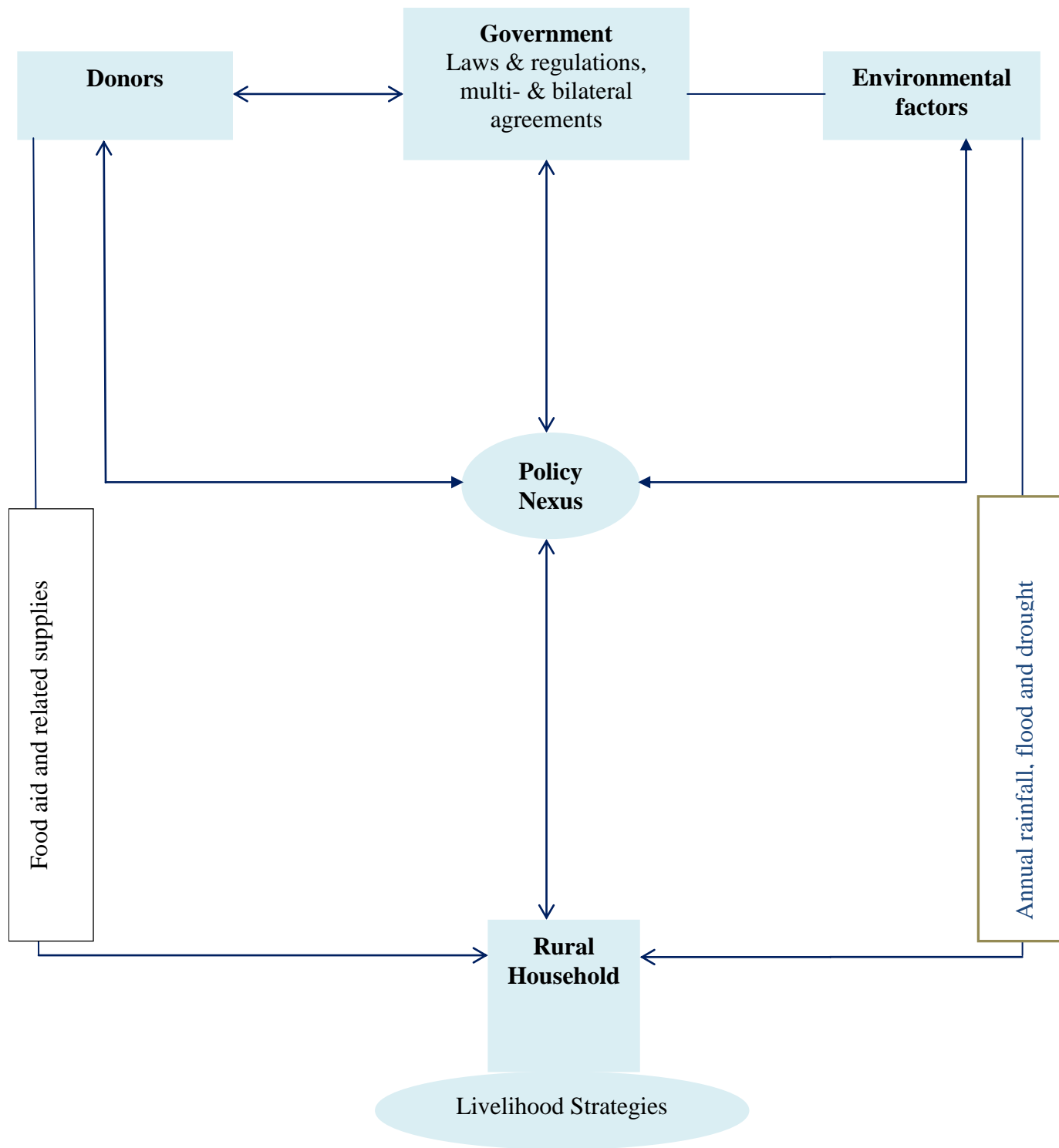
### **2.1 Introduction**

Globally, people in rural areas are regarded as the poorest, regardless of the criteria used for one to be classified as poor. The situation is worse in developing countries because rural areas continue to receive meagre budgets from national governments for rural services. The absence of social support structures also contribute to a high incidence of poverty, especially income poverty, in developing countries. In general, rural livelihoods are threatened by a variety of factors, which include absence of proper policy, country-wide economic meltdown, low income levels and climate as well as health risks. Though often neglected, rural people can serve as potential electorates for governing parties and thus they require undivided attention.

With this conception, it is evident that the recent prominence of livelihood studies shows how concerned scholars are about economic hardships that rural people continue to face. The aims of this chapter are twofold, namely to review the literature on livelihoods and also to attempt to answer one research question, which comes from Section 1.6 of Chapter 1. The research question is whether or not providing food aid over an extended period of time is an incentive to participate actively in agricultural production. In order to achieve the aims of this chapter and to answer the research question, this chapter begins by presenting a conceptual framework. Later the chapter discusses rural livelihoods in thematic context of the following: rurality; poverty, how poverty

can be measured, and vulnerability; information technology; health risk; climate change and climate risk; food aid and food security; investing in agriculture; development finance; the role of cooperatives; and rural and urban migration. A summary follows at the end of this chapter.

Below is a conceptual framework in which livelihood strategies can be nested.



**Figure 2.1: Conceptual livelihood framework for rural households**

In Figure 2.1, a conceptual framework applicable to the rural household scenario and the environment in which such households operate is shown. The government body is an influential institution in terms of formulating, implementing and monitoring economic, financial, political and environmental policies. Economic policy includes among others agricultural policies, commercial fishery policies, investment policies, rural development policies and mineral policies. There are other policies, such as the poverty-reduction strategy, which are pertinent to the lives of the poor and that should be given special attention. The policies which have been listed here are all present in Namibia. The donor sector is exogenously controlled and its role is to support government efforts in the strife against poverty. Not only the donor sector is exogenous, but environmental factors are too. Rural households are beneficiaries of what donors provide. When disaster strikes, the donor sector comes to the assistance of rural households, as has been demonstrated on several occasions in Namibia and elsewhere. The donor sector not only provides in the material needs of rural communities, but in certain circumstances it provides needed advice both to the government and the affected rural communities. In the Figure 2.1, a component of environmental factors appears. This is the subject of natural events such as rainfall, floods, drought and heat waves. It is assumed that environmental factors that are destructive, such as floods and drought, are mainly a result of climate change and are thus exogenous.

As regards environmental factors, the government can only deal attempt to deal with them through policy intervention. These interventions need to be coordinated at the regional and multilateral level. Unfortunately there is no permanent solution to environmental factors, given that they are elements of climate change. However, environmental factors can be managed

through adopting workable solution. The government, the donor sector and the affected communities complement each other in the policy space. These three role players shape policies for the betterment of the lives of rural communities. In particular these policies are targeted at *inter alia* emancipation of the poor and rural households. The core area that is affected most by both endogenous and exogenous factors is the livelihood of a rural household. The intervention by donors in providing food aid is but a temporary solution aimed at mitigating against the crisis occurring at that particular moment. Food aid, including medicine, should be seen as necessities supplied in response to an emergency. The impact of food aid on a rural household will be dealt with in the subsequent chapter.

The rural household is not only a recipient of aid and policy intervention, but also a role player in shaping policy and providing feedback to the government and the donor organ. Without a stable, visionary and political will in place, the role of rural households in the policy framework will not be realised. Other authors on the livelihood framework, such as Maxwell and Wiebe (1999) and Fouracre (2001), have all touched on the capital and human assets integral to the livelihood framework. This study assumes these assets as implicit in this livelihood conceptual framework.

In Namibia, the time before independence in 1990 was characterised by economic development policies that originated from the colonial masters, namely apartheid South Africa. Namibia was treated as one of the provinces of apartheid South Africa. Therefore, economic, political and environmental policies that were in place could be related to the colonial master's own making. These policies did not seek to develop Namibia, but to fragment it and weaken the economic base of both rural and urban blacks. Usually, livelihood strategies are less dynamic in a country



where economic, political and environmental policies are unstable. Instead, it is the coping strategies that are variable during short-term periods in order to respond to crises and pressing needs of communities. Coping strategies can shape livelihood strategies over time.

## **1.2 Thematic perspectives**

### **2.2.1 Rurality**

There are variations to the definition of a rural area or a rural settlement in the general literature. These variations stem from the fact that there is no one-size-fits-all definition and that what causes a particular settlement to be classified as an urban or rural settlement varies. The variations are mainly influenced by the state or level of development of a particular settlement. For this study, the definition of a rural area used is one by Waldorf (2007), which combines common and important features, arriving at rurality as something that has to do with settlements found outside a declared urban area, which lack advanced technological infrastructure in the form of industrial, commercial, street establishments and which have few inhabitants.

Intuition dictates that poverty and underdevelopment go hand in hand. This implies that highly developed areas have low levels of poverty and vice versa. In fact, poverty is common in rural areas in developing countries. It will not be fulfilling to have said something on rurality without divulging more on poverty. So, the next issue to be discussed is poverty.

### **2.2.2 Poverty, how to measure poverty, and vulnerability**

Some researchers have concentrated their work on poverty and on how to measure it. Poverty and vulnerability are two distinct words which carry different meanings. However, the two are closely related. Poverty is a result of deprivation, whereas vulnerability is a function of risk factors, including those that are external (Streeten, 1994 as cited by Woolard and Leibbrandt, 1999).

In the late nineties, research work began to make serious inroads into the livelihood domain. This shift recognises the livelihood approach as a promising vehicle to address widespread poverty. However, researchers continue to experience difficulties with regard to using the livelihood approach in addressing poverty. The reason for such difficulty is found in the tortuousness of poverty, given its multi-faceted dimensions. More specifically, the dilemma centres on five complexities. The first is the fact that there is no ‘one-size-fits-all’ solution to poverty in various countries. Secondly, there is wide variation in the nature of livelihood strategies of rural communities across developing countries, although some may be common.

Thirdly, there is no theory of livelihood and coping strategies, nor is there another widely accepted minimum poverty line compared to the generally known poverty line of US \$1 or US \$2. This universal poverty line has also not been well received on account of the fact that developing countries are all at different economic levels and so to apply one criterion may be unrealistic, unless other fundamental constraints can be considered. Fourthly, the common universal poverty line benchmarked at a US dollar currency is complicated by the failure to arrive at a convincing poverty line that is consistent with the dynamics of exchange rates of all

countries. Lastly, the set poverty line does not seem to cater for intra-household consumption patterns and is silent on consumption of public goods (Deaton, 2001; Heltberg, 2009; Adams Jr and Page, 2003).

Despite the complexities raised, it is still important to measure poverty. There are three approaches which can be used to measure poverty, but each has limitations in handling the dimensions of poverty. Firstly, poverty could be measured in monetary terms. Secondly, poverty can be measured in consumption terms. Thirdly, one promising way is that poverty can be measured using a combination of the two stated approaches known as ‘comprehensive measure of economic well-being’. Pragmatically, the three approaches to measuring poverty can be enforced by means of applying other analytical tools. The list may not be exhaustive enough but some of these tools include:

### **Anthropometric model**

$$HAZ_i = \frac{MHCSA_i}{\sigma^2 HCSA_i}$$

where HAZ is the height for age with a Z-score,  $MHCSA_i$  is the median height of a child of a particular age, and  $\sigma^2 HCSA_i$  denotes the standard deviation of the height of a child and sex. All these structures assume the child is of the same sex. In essence, the anthropometric model seeks to determine the nourishment level of children. This model proved to be useful when used by Osberg *et al* (2009). Food security and nutritional concerns are all important issues to researchers who devote their time studying poverty.

## **Gini Coefficient**

As touched on in Chapter 1, the Gini Coefficient is a method of measuring income inequality. This is a popular approach in most social policy studies and is quite useful. The Gini Coefficient can be presented well on the Lorenz Curve. According to Litchfield (1999), the Gini Coefficient can be written mathematically as follows:

$$G_i = \frac{1}{2n^2 y} \sum_{i=1}^n \sum_{j=1}^n |y_i - y_j|$$

## **Poverty Severity Index**

This method measures how severe the state of poverty is and it does so by applying some weights to the poverty gap and averages the squares of the poverty gaps in relation to the poverty line. It is one of the Foster, Greer and Thorbecke poverty measures and can be presented as follows:

$$P_\alpha = \frac{1}{N} \sum_{i=1}^M \left( \frac{z - y_i}{z} \right)^\alpha$$

where N is the sample size, z is the poverty line, y is the average real spending of the household member, and  $\alpha$  is a parameter. The guiding principle is that the larger the  $\alpha$ , the more the weight on the position of those who are regarded to be poor (Cambodia Ministry of Planning, 2004).

## Sen-Shorrocks-Thon Index

This index is more useful in that it is a composite measure that yields the headcount index, the poverty gap index and the Gini Coefficient simultaneously. It can be written as follows:

$$T_i = P_o P_1 (1 + \hat{G}^p)$$

This is a product of the headcount index, the poverty index and the Gini element (represented by the G. The Thorn Index decomposes poverty into three areas in question form: Are there more poor people? Are the poor poorer? And finally, is there higher inequality among the poor (Gini element)? The headcount component, if considered as a stand-alone index, has the weakness of not taking the intensity of poverty into consideration (Myles and Picot, 2000).

## Ricardian model

As demonstrated by Deressa and Hassan (2009), the Ricardian model can be used to capture the effects of climate change and farm net revenue. In the context of this model, farm revenues could be treated as a proxy for income (Kurukulasuriya *et al*, 2006). Thus this model can be used to determine climate change and its effects on income poverty, especially for those whose livelihoods are centred on agriculture. Adopting the transformed version used by Deressa and Hassan (2009), the model can be written as follows:

$$Y = \sum P_i Q_i(B, C, D, E) - \sum P_c C$$

where Y is net revenue per hectare,  $P_i$  is market price of the crop,  $Q_i$  is quantity of the yield, B and C is vectors of inputs that were bought and climate variables respectively. D and E are sets

of economic variables and soil variables respectively.  $P_c$  is a vector of input prices. This model is a profit maximisation one and subject to constraints B, C, D and E.

### **2.2.3 Information and communication technology**

Technological advancement has proven to be useful in bettering the lives of people. In developing countries, rural areas continue to suffer from lack of investments in supportive but critical areas, such as information technology. Rural areas also require such technological connections to improve the lives of people. In this thesis, information technology is discussed in relation to communication modes of fixed telephones and mobile telephones, which are common in developing countries, especially in Sub-Saharan Africa.

Information and communication technology (ICT) that hinges on a country's development policies is vital to poverty alleviation. As indicated earlier, rural access to ICT is vital to improving the livelihoods of the poor. Allen (2003) found that in the Southern African Development Community (SADC), teledensity has been lagging behind mobile telephony. Allen also found that mobile telephony was expensive compared to fixed-line telephony.

**Table 2.1: Mobile phones in selected African states**

Country	Total	All	Rural	Urban	Share of prepaid users
Benin	1 365 831	30.20%	15.80%	53.20%	95.96%
Botswana	654 737	59.50%	51.50%	65.20%	99.28%
Burkina Faso	1 844 701	27.20%	19.70%	55.90%	96.69%
Cameroon	2 979 597	36.50%	17.90%	53.90%	88.04%
Cote d'Ivoire	5 042 524	41.80%	21.50%	63.50%	91.77%
Ethiopia	1 387 910	3.20%	0.70%	15.80%	88.31%
Ghana	7 491 378	59.80%	48.20%	74.70%	99.83%
Kenya	10 772 696	52.00%	51.70%	53.00%	98.89%
Mozambique	4 865 758	25.70%	17.30%	53.60%	98.89%
Namibia	625 707	49.30%	38.20%	71.90%	89.95%
Nigeria	63 101 014	77.30%	76.10%	82.00%	99.33%
Rwanda	520 259	9.90%	6.50%	25.80%	94.77%
Senegal	2 502 300	39.80%	26.10%	53.80%	99.70%
South Africa	20 185 135	62.10%	48.90%	70.60%	78.64%
Tanzania	4 138 338	21.50%	15.90%	37.70%	96.95%
Uganda	2 924 095	20.70%	17.70%	42.70%	97.84%
Zambia	2 459 961	45.50%	31.50%	72.40%	99.70%

Source: Gillwald and Stork (2008)

Most rural areas still suffer from backwardness in mobile connectivity. Compared to rural areas, urban areas usually enjoy attention in terms of mobile technological advancement and this view is confirmed in Table 1. Table 1 is not inclusive of all the African countries, excluded are

Mauritius and Seychelles, which are also known for their advancement in mobile connectivity. Looking at Table 1, from a rural mobile connectivity setting, Nigeria tops all countries in the table and is followed by Kenya and Botswana; South Africa is in the fourth position. Nigeria leads again in comparison of urban mobile connectivity and is followed by Ghana, Zambia and Namibia in the fourth position. Besides communication gadgets that are essential to economic advancement through improved ways of sharing information across the residential divide, the health of people is also important and is the next topic that will be dealt with.

#### **2.2.4 Health risk**

Health systems in developing countries are composed of traditional, modern pharmacological and spiritual ways of treating patients. All forms have been held as successful by those who apply them. Modernisation has come with its own demands on how health systems should be governed for efficiency and effectiveness. The fundamental pressure on improving governance has to do with the need to provide health services that are reputable in nature with minimum cost implications.

Rural communities need health services but they often rely on unconventional dispensing offered by traditional and spiritual healers. In rural areas, the distance to the nearest health centre and the absence of such facilities continue to deny rural dwellers access to health services. This situation is worsened by inadequate health facilities, lack of human capital, long distances to urban centres and lack of transport infrastructure. While access to better health services is important, lack of



access could translate into low participation of people in economic activities. The opposite would be that the healthier the person is, the better that person can be involved in work activities.

In countries where the private sector is at the forefront in providing health services, the poor will in most cases be left out as a result of high unit costs associated with providing health services. Historically, governments were the main providers to satisfy basic needs, but their inefficiency has led to entry by the private sector. It is a market failure in the provision of health services in developing countries, which left a vacuum that attracted private operators. Governments' failure has helped the private sector to identify the niche and invest in the sector by making the required facilities available, despite high per capita cost implications associated with the health market. This translates into high unit costs charged by the private sector. Private health service providers are catalysts for accessing health insurance and for opening new private clinics and placing emphasis on living healthy lives.

Managing health services remains challenging, though. The emergence of the Human Immunodeficiency Virus (HIV), which causes Acquired Immune Deficiency Syndrome (AIDS), has sparked the need for new research on methods to treat this stubborn disease. The emergence of HIV has led to high budgetary expectations to finance modern and advanced equipment and associated utilities. Other diseases that are common, especially in Africa, are malaria, tuberculosis, meningitis and various strains of highly contagious influenza. Infected workers divert labour hours from productive use as a result of sickness. The difficulty in preventing some of the prevalent diseases, especially on the African continent, is exacerbated by low levels of awareness and also the complexity of the pathogens that breed these illnesses when matched to

local health facilities. Managing health systems requires keeping up with new challenges. New challenges include the need to retain skilled manpower and the need to maintain global linkages with other medical research institutions (Sama and Nguyen, 2008).

### **2.2.5 Climate change and climate risk**

Climate change has been blamed for high temperatures that are experienced. Erratic rainfall and abnormal rainfall times that have been witnessed in various parts of the world have also been blamed on climate change. Frequent droughts and floods are also said to be results of climate change. The 2011 floods which devastated Australia, China, Thailand and the United States of America are among the examples of the visible consequences of climate change. Despite these internationally held views, there is limited evidence to support these claims. Moreover, African scholars in the field of economics were previously not particularly enthusiastic to research the subject of climate change. It is only in the late 20<sup>th</sup> century that serious work began on the economic effects of climate change on the global economy.

In one of the pioneer studies undertaken to investigate the effects of climate change on the Western Cape in South Africa, human influence was found to be critical in the controversy about climate change. In the same study, the complexity of atmospheric chemistry, which gives rise to rainfall, suggested that predicting changes in atmospheric temperature could be more rewarding than predicting hydrological developments (Erasmus, Van Jaarsveld, Van Zyl and Vink, 2000).

Another study conducted in several African countries revealed that crops and livestock are becoming more sensitive to changes in temperature. It is held that a high flow of water contributes to better revenue for farmers that practise irrigation farming. Since most African farmers practise dry-land farming, high annual rainfall could only benefit irrigated forms of agriculture. With a high concentration of African agriculture on dry-land farming, farmers are highly exposed to climate risks. In Africa, inability to get reliable early warning can be worsened by lack of investment in advanced meteorological equipment. Such equipment could better predict atmospheric changes and the volatility of climatic occurrences. As a consequence, dry-land farmers in Africa are increasingly becoming vulnerable owing to climate change that pushes up temperatures (Kurukulasuriya *et al*, 2006).

The issue of poor predictions of climate changes or simply changes in temperature is not an end in itself. Instead, there is a need to invest heavily or to collaborate strongly with other governments rather than only relying on external support to register atmospheric changes. Besides investing in early warning systems, there is also a need to invest and retain human capital in critical areas in the meteorological discipline. Over time, climate risk factors have devastated economic fabrics of rural communities with no or poor early warning systems. Failure to have a skilled workforce active in early warning systems could expose rural communities that rely heavily on subsistence agriculture to serious repercussions of a climate risk nature.

It is also claimed that farm revenue from African dry-land farming will decline as climate change continues to raise temperatures. When climate change triggers precipitation, farm revenues from irrigated farming are likely to increase more than revenues from dry-land farming

(Kurukulasuriya *et al*, 2006). However, this notion needs to be qualified further. The reason is that when high rainfall results in flooding, crop farmers in low-lying areas would always become vulnerable. Therefore, the type of crop planted, the landscape and the amount of rainfall received are all crucial factors that influence returns to farmers.

Kurukulasuriya *et al* (2006) advise that diversification from agriculture to other forms of economic activities may strengthen the gross domestic product (GDP) position of a country that relies heavily on agriculture to drive the economy. This should be viewed from a climate risk-averse perspective in fear of climate change continuing to cripple the agricultural economy.

#### **2.2.6 Food aid and food security**

It is often argued that the world's stock of food is sufficient to feed everybody. Nonetheless, people continue to be food insecure and others even die of hunger. The most vulnerable are women and children and they are usually the first casualties. The truth is that people are not only insecure in terms of food shortages but are because more so they are malnourished. There are two main factors that make people suffer from food insecurity, namely insufficient availability of food stock at a national level and lack of access to food for households (Smith, Obeid and Jensen, 2000).

Availability of food at a global level is determined by the aggregate stock of food produced. On a national level, availability of food is determined annually as a function of the quantity produced, the opening stock balance from the previous year, net imports of food (less exports), and food

aid. Households can access food in three ways, namely through production or any collection, buying with cash at hand, and access from in-kind transfers either in the form of contributions from relatives or in the form of food aid. With regard to indicators of food and nutrition insecurity, three indicators are used: the daily per capita dietary energy, which measures availability of food at a national level; income-based measurement of less than US \$1 per day; and child malnutrition, which measures nutrition security (Smith *et al*, 2000).

The degree to which poverty confronts a particular household can be perceived as a threat that also affects access to food. Therefore, although poverty is the main cause of food insecurity, it also has an impact on the ability of the affected to secure food for their households. There are also other secondary causes of poverty such as natural causes (drought and flood disasters), locust infestation, high food prices and political instability (Nwonwu, 2009).

Having identified triggers of food insecurity and malnutrition, the focus now shifts to how the shortage of food in developing countries can be ameliorated. Globally, food aid is provided under the auspices of the Food Aid Convention (FAC) and the Grains Trade Convention (GTC). Both the FAC and GTC are components of the International Grains Agreement, which is an instrument that falls under the mandate of the International Grains Council (IGC). The IGC has its offices in London, the United Kingdom. The IGC is a construct of various governments and thus it is not governed by the United Nations (Hoddinott and Cohen, 2007). Whether or not there are advantages of shifting governance of the IGC from the multiple governance approach to that of falling under the UN, it will depend on weaknesses that exist in the current approach.

The IGC serves as a forum for sharing information on the grain trade; it monitors markets of grain products; monitors freight rates and provides briefings on stock volumes, prices of grains and global production and consumption of grains. Though the IGC plays a vital role in global food security concerns, it also faces three distinct criticisms on how it operates. The first criticism is that information which the IGC gathers is only made available to its signatories. Secondly, the representation at the IGC excludes the recipient countries. Lastly, commitments by IGC signatories and donors are expressed in volume rather than in monetary terms, while it is the prices that finally influence how much is procured. Besides signatories to the FAC, there are other key role players in global food provision, such as the World Trade Organisation, the World Food Programme, Organisation for Economic Cooperation and Development, Food and Agricultural Organisation of the United Nations, Development Assistance Committee and non-governmental organisations (Hoddinott and Cohen, 2007).

In studying the link between growth and food subsidies in China, health was identified as an important direct determinant of well-being. Child height, which is an indicator of underlying health status, was considered a key dependent variable. In the Chinese study an anthropometric model was used to arrive at reliable results. Not only the Chinese study, but also the model has been widely used across countries to measure child health. The observation from the Chinese study shows that food prices determine the availability of food to those in need, especially the poor. However, in China a departure from rationing food has yielded a way for income to become an important variable in obtaining food by the poor (Osberg *et al*, 2009).

In the general literature there are positive links between economic growth and poverty alleviation. For example, one of the most common forms of poverty, which has been referred to in Section 2.2.2 and which can be measured in pecuniary terms, is income poverty. Income poverty can be reduced when there is sustained and robust economic growth. Economic growth alone is less effective for meaningful poverty alleviation unless it is accompanied by empowerment efforts. In this context, empowerment efforts could take the form of putting in place ways and means of reducing income inequality, improving access to health services, providing equitable access to basic education and providing access to capital (Narayan, 2002).

Sometimes it may happen that a country continues to register a high GDP but such growth fails to pull many people out of income poverty and food insecurity. In the Chinese case, a high GDP registered after the year 2000 catapulted the lives of poor people into becoming food secure. China was once a country with high income inequality but the income gap has been narrowing gradually owing to high GDP and government policies that are pro-poor (Osberg *et al*, 2009).

Since poverty is the most common cause of food insecurity, natural disasters can only serve as catalysts to food insecurity. Usually, food aid is provided for fear of hunger that may ravage those in need. Earlier on, in Chapter 1, a research question was raised on the consequence of food aid. It appears that intentions to supply food aid are distinct from the impacts. There is little in the literature that points to a proven impact or unintended consequences.

The after-effect of continuous provision of food aid can manifest in dependency that arises. Dependency can yield both positive and negative results. The positive angle occurs when a

household that has no physical and economic abilities tends to rely on food parcels. The negative result comes about when recipients choose to abandon their own means of survival and abusively rely on hand-outs. This would be negative because despite the effectiveness of the means to survive, the choice to fold one's hands and depend on hand-outs over a long time could have serious consequences (Barret, 2006). A more vivid consequence is that relying on hand-outs could alter the ability to cope, thus changing human behaviour towards external reliance. Furthermore, in the long run this form of reliance could cause the long-term beneficiaries to become vulnerable to hunger when the food supply programmes are halted.

Although food aid can serve as a social net, the provision can also produce some effects such as crowding coping strategies that are already established. Consequently, this may weaken the survivability of the household. The issue of moral hazard would then surface, given the household's expectation to receive aid, which might then result in the recipient households taking more risks. Still on a micro-level, food aid may trigger an imbalance in the market forces. For instance, increases in supply of the grain commodity can put pressure on demand for that commodity, reducing it to a low level. This has a price-lowering effect on the affected commodity on the local market. When cash is offered to households to purchase food they need, the aftermath would most likely be a high price response in order for the market to clear (Barret, 2006; Maunder, 2006; Shaw and Singer, 1988).

In addition, recipients of food aid may abandon their productive assets such as land and then rely on hand-outs (Barret, 2006). When this happens, the well-being of the recipients is tampered with negatively and the shift to receiving rather than producing would then put their lives at risk



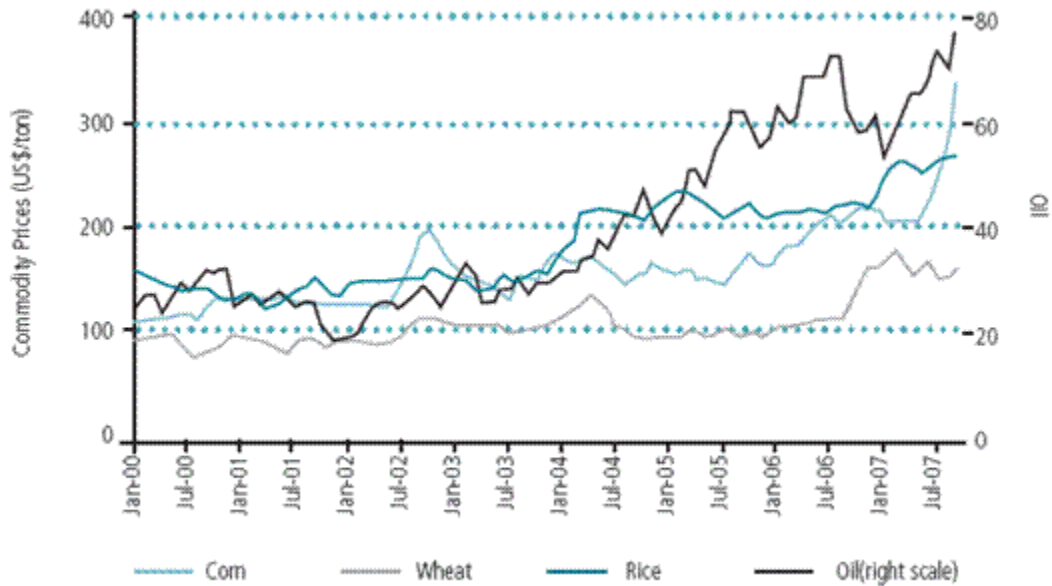
in the wake of donors stopping this provision. Leaving lands fallow due to food aid farmers receive, will lead to a systematic process of mulching, which will then improve the quality and fertility of the soil. Soil scientists would agree that when monoculture is practised for several consecutive years, it is detrimental to the soil and thus when it is followed by fallowing it should bring some joy to a conservation agriculturalist. However, in the case where a deliberate shift from practising farming to resorting to hand-outs has been made, the benefits of fallowing the land will not be realised.

Barret (2006) and Maunder (2006) purport that food aid can sometimes be provided for the purpose of improving marketing channels of food commodities. In this connection, food aid is channelled through small village-based processors instead of the well-known commercial suppliers. The Indian experience of 1970 to 1995 is a classic example of this practice and it saw the establishment of milk producers' cooperatives that introduced modern technology. This shows that food aid can also be associated with deliberate intentions to stimulate market dynamics.

Maunder (2006) protests against linking production disincentives to the provision of food aid. Maunder claims that such a disincentive is a result of mismanagement of food aid. The timing of the rollout of the provision and lack of a means test are possible reasons for the recorded weakness. Maunder acknowledges, though, that some problems of production disincentives in relation to food aid provision could occur. This happened in Malawi in 2002 and in Lesotho in 2004, but Maunder cautions that such evidence is rare in the literature. Possible ways of reducing production disincentives are doing away with the cash-linked project for food aid, making use of

a cash transfer system, scaling up local and regional procurement of food aid and improving targeting of recipients. It can also be argued that uncoordinated provision of food aid may tamper with market dynamics as a result of the sudden influx of commodities on the local market (Barret, 2006; Maunder, 2006). In Southern Africa, the provision of food aid has been changing.

The receipts of food aid were high in the period 2001 to 2003. The reasons are that during that period, there was a high need for food due to droughts and floods, as well as changes in the policies of donor countries. Deliveries of food aid to Sub-Saharan Africa in 2004 were almost half of the world's food aid supply. Lesotho received more than other countries. Mozambique is the only country that received programme food aid. Programme food aid is on the decline while project food aid is on the increase. The United States of America dominated the supply of food aid for a while. Underlying the increased supply of food aid to Sub-Saharan Africa is a reduction in the global stock of cereal crops (Mano, Isaacson and Darder, 2003; WFP, 2003). Figure 2.2 below sheds more light on the type of food aid and the pattern of provision to mostly SADC member states and globally (Maunder, 2006). In 2006, the global stock of cereal production fell by 2.4% compared to the previous year. In late 2007 to early 2008, the world experienced an upsurge in food prices, which was triggered by among others, a high oil price, substituting crop land for bio-fuel plantations rather than the usual production of cereal crops, political crisis and war in some countries, lack of proper planning at institutional level and policy failures on the side of governments (Nwonwu, 2009; Von Braun, 2008).



Source: Von Braun (2008)

**Figure 2.2: The behaviour of the global price for cereal crops and that of crude oil measured in barrels**

As reflected in Figure 2.2, global prices of corn, wheat, rice and of crude oil were generally high in July 2007. Globally, corn, wheat and rice are the highly consumed agricultural products. The general increase in global prices appears to have been increasing as from January 2004. The price of wheat stabilised in the period 2004 to 2006. The oil price surged sharply between 2007 and 2008, causing general price hikes on many fronts (Von Braun, 2008). There are both advantages and disadvantages to maintaining high food prices. However, the disadvantages outweigh the advantages. On the advantage side, high food prices benefit producers. Regarding disadvantages, high food prices reduce the value of disposable income in the hands of consumers. Again, with high food prices, poor people, especially those in rural areas, could become worse off if they depend on sourcing their basic food commodities from urban markets. The disadvantage of combined high food and oil prices is that it can negatively affect the

quantity of food aid that has to be procured for distribution in countries that are in need. Thus high food prices can affect the livelihoods of net food buyers in both rural and urban areas.

### **2.2.7 Investing in agriculture**

In many countries, agriculture is regarded as a key sector that creates employment and income opportunities for many rural dwellers. The role that agriculture plays is evident in the way rural poor communities thrive from it. However, the general literature fails to document enough evidence on the role agriculture has played in recent times owing to the fact that most of the success stories are recorded at micro-level. The multiplier effect that bridges the interface between the agricultural sector and other sectors of the economy, such as manufacturing and services, is vital for every rural development strategy. In light of this, infrastructure development should be considered as an enabler for various sector linkages. Such infrastructure should include road networks. Developing and improving a country's infrastructure can entice the private sector to establish more labour-absorbing entrepreneurs in rural areas, resulting in job creation and income benefits for those who are employed (Schejtman, Berdegue and Modrego, 2006; Mwaniki, 2006).

In recognition of the role that agricultural development plays, in 2005 the African Union made the Maputo Declaration in Maputo, Mozambique. The declaration resolved that African states should increase their annual budgets for the agricultural sector to 10%. Unfortunately, in the SADC region disappointing results were recorded during the 2007 assessment. With the exception of Malawi, the SADC member states fell below this target. This lack of political will

to invest more in the agricultural sector is blamed for unrelenting food insecurity in Southern Africa. Elsewhere on the African continent, with the exception of Cape Verde, Chad, Ethiopia, Mali and Niger, other African countries failed to meet the 2007 target of having 10% of the national budget allocated to the agricultural sector (IFPRI, 2008).

### **2.2.8 Development finance**

Access to finance is imperative for every entrepreneurial activity. In their study of rural financial markets, Spio and Groenewald (1997) suggest that rural financial markets should be viewed as a combination of formal and informal finance providers. They indicate that rural finance ranges from finance provided to commercial farmers by government banks such as the Land Bank or Agricultural Banks as they are known in other parts of the world, to other, professional moneylenders, as well as money that is circulated in stokvels, money that relatives and friends lend to others subject to no interest, money from self-help organisations, savings cooperatives and credit associations. The issue of concern is whether finance that is available is also affordable to poor small-scale farmers. The determining factor with regard to affordability is the return to capital that is accumulated to lenders.

The role of financial markets is increasingly becoming important. These markets play the following roles: financial markets provide financial services such as borrowing, deposit and exchanges facilities; financial markets transfer financial resources from areas where they are sub-optimally used to where they can be optimally used and financial markets ensure that finance is available at the time when it is needed, reduces transaction costs and safeguards the returns to

capital by imposing an interest rate that can encourage depositors (Gonzalez-Vega, 1989 as cited by Spio and Groenewald, 1997).

Thus the need for financial resources is cross-cutting. This means that those in both the urban and rural areas have ways in which they would want to use financial resources at their disposal optimally. Quite often, entrepreneurs take the lead in establishing businesses, which without borrowed capital may not easily be viable. Thus credit facilities are required to maintain the enterprises working and to enable the enterprises to advance their business activities. However, in rural areas, compared to urban areas, transaction costs can be a hindrance to those intending to operate small enterprises.

In Namibia, the National Agricultural Policy provides a platform for financial service providers to serve farmers and other related agribusinesses. The need for credit is seen as primary but other interventions are also required. The concern of any other financial service provider in any country is on the level of payment defaults (Gesellschaft Für Agrarprojekte, 1999). Often, financial service providers require collateral but rural communities are usually unable to provide it and as a result they remain excluded from formal financial provisions. In a study seeking to assess the performance of cooperatives in South Africa, the issue of collateral deficiency emerged as one of the issues that bar financial provision by formal financial institutions to workers' cooperatives. This form of exclusion has delayed progress in these forms of business entities (Nyambe, 2010).

Access to finance is important to both urban and rural people. Many rural small enterprises have continued to benefit from financial services provided by microfinance entrepreneurs. It is not only credit that rural people require, but insurance and other financial resources for incidental expenses such as burials. It is in the context of these financial needs that microfinance has proven to be useful and hence popular in rural areas in some developing countries (Human Sciences Research Council, 2002).

### **2.2.9 Role of cooperatives**

A cooperative is “an autonomous association of persons united voluntarily to meet their common economic, social and cultural needs and aspirations through a jointly owned and democratically controlled enterprise” (International Cooperative Alliance, 1995). Cooperatives are regarded as institutions that bridge gaps that arise from market failures. Cooperatives could be either workers’ cooperatives or service cooperatives. A workers’ cooperative is a business entity which provides its owners with jobs. Contrary to a workers’ cooperative, a service cooperative is an entity which provides a service to its owners but its management is outsourced. Examples of service cooperatives include agricultural cooperatives and some baking cooperatives whose employees are also the owners. Workers’ cooperatives are sometimes referred to as industrial cooperatives, producer cooperatives, workshop cooperatives, consumer cooperatives, credit unions and agricultural marketing cooperatives (Nyambe, 2010; Philip, 2007; Harper, 1996).

Cooperatives can create employment opportunities and offer services to those in need, especially in rural areas. However, cooperatives have failed to deliver the much needed services in some

other countries. The reasons for the failure of cooperatives vary. In South Africa, workers' cooperatives seem to be struggling. They face enormous challenges that relate to access to finance and management issues. However, cooperatives can also be successful if the cooperative concept is well understood and the owners have the necessary cooperative and management skills (Nyambe, 2010).

### **2.2.10 Livelihood strategies and coping to survive: case studies**

#### *Himalayan case study*

It is understood that livelihood strategies of rural people should offer livelihood security. In a study conducted in Western Himalaya, Sinclair and Ham (2000) report that agriculture is the most dominant source of livelihood, with 8% of the people in Kullu Valley relying heavily on it. Forestry, crop production and animal husbandry are their main activities. Livelihood strategies of the people in that area are reported to have been changing. Evidence of this change can be traced from traditional agriculture with opium and tobacco serving as the mainstay, to apple orchards which have now become common across several farms.

Among those involved in agriculture, about 94% of the women are reported to have surveyed their own land. Their daily farm management activities include planting, weeding, collecting fodder, firewood, fertilizer and also ensuring that their livestock is in good shape. A clear distinction of their livelihood strategies shows their concentration on consumption of their crops, marketing of some of the crops to earn an income, engagement in wage labour, such as informal



village jobs, tourism jobs and other government jobs. It was also found that women participate in reciprocal labour and commodity workmanship relations. This means that women work in turns in one another's fields for some time. The same applies to borrowing commodities, which are needed at certain times during the planting season, from one another. One will lend to the other, who will then at a particular time return the commodity (Sinclair and Ham, 2000).

Policy insights from the case study indicate that the views of rural people faced with poverty should be considered in order to shape future policy proposals. Understanding the tortuousness, stratification and heterogeneity of the livelihoods of villagers can help in formulating a clear policy that may address the challenges that rural people face. Furthermore, it is expected that any policy formulation will take into account the uniqueness of the natural ecosystem and the residents. The interrelatedness of livelihood strategies and their impact should also be considered in any policy proposal (Sinclair and Ham, 2000).

### ***Malawian case study***

Traditionally, rural people were excluded from mainstream financial support. This culture left a gap in bridging financial needs of rural communities. Reasons for exclusion include risk aversion of the lender and misdirection of financial institutions to government-favoured priorities. The vacuum in much-needed financial support to rural people created a niche for the supply of rural finance and the recent popular microfinance. In Malawi, for instance, the issue which left many financially un-serviced loans was that the creditors' conditional offer was based on the issuance of collateral by the debtor.

There has also been a perception that micro-loans are meant for the educated. This perception led many women to be reluctant to access loans, consequently leaving them languishing in poverty. Another reason why women in Malawi failed to access micro-loans is the exorbitant interest rates that lenders charged (Masanjala, 2002). Despite the deep-seated constraints associated with financing the poor, some micro-lenders continue to benefit. However, the rate at which rural and poor people are entering the financial realm is a matter of concern to policy practitioners. It is against this background that Masanjala (2002) suggests that extending financial provision to women without collateral should go with a tailored-support mechanism that ensure that these women receive training meant for debtors, attend regular repayment meetings, are offered small loans and are subject to strict monitoring.

### *Kerala State of India case study*

Rural communities in the Kerala State of India engage in bamboo weaving as a livelihood strategy. They also make baskets and winnowers. Bamboo is a natural resource. Bamboo that the people use is harvested from the forest by those who reside near the forest or from their own gardens. Gardens are often on land they inherited from their parents but others received land title deeds from the government scheme. It is reported that men are the ones who handle the culms. Scarcity of bamboo prevents rural people from engaging in sustainable strategies. Sustainability of this form of livelihood is also reduced by a high demand for bamboo in the scaffolding and construction sectors (Krishnankutty, 2000).

The people of Kerala are poor and at times they fail to purchase the whole clamp of bamboo for weaving because they cannot afford it. Weaved products can earn them enough income when they sell the final products. Failure to buy the necessary resources is a result of financial constraints. What also worsens their situation is that there is no organised market for their products. Instead, they rely on following customers on foot and adopting a door-to-door marketing approach. This form of marketing contributes to low incomes the sellers receive. The final price for the product is thus reduced as a result of serious negotiations in which buyers have the upper hand. As a result of the seller's desperate need for cash, a buyer can use his/her economic power to compel the seller to offer the product at a very low price (Krishnankutty, 2000). As a result, sellers settle for very low prices which turns is driven by desperation. The resultant consequence is that the seller may become worse-off in terms of his/her livelihood.

Since the people of Kerala also supply retailers and wholesalers, a better price offer for finished products is usually expected from these bulk buyers. However, the difficulty with such bulk buyers is that they only buy after they have placed orders. It is unpredictable when orders will be placed and in the meantime before the products are ordered, rural sellers suffer from income poverty. There is also competition in the market for bamboo products due to the entry of substitute products made of plastic (Krishnankutty, 2000). Although competition is acceptable in economic circles, it is painful when those without economic power in the rural settlements get extremely stretched to experience plummeting of the incomes which should have boosted their livelihoods.

### *Vietnamese case study*

In Vietnam, land cultivation is characterised by the system of land fragmentation. This system entails that a farmer would have several small plots that are demarcated from the farmer's total land portion. It is a novel practice to find that a farmer in the north of Vietnam has an average of seven plots, while a farmer in the northern mountains of Vietnam has an average of between 10 and 20 plots. The system of demarcating land draws its strength from local legislation called 'Resolution 10', which provides land owners with title deeds, freedom to exchange, lease and also to inherit land. In this way, farmers who own land can access production loans and can also participate in agricultural markets (Van Hung, MacAulay and Marsh, 2007).

From a theoretical perspective, the system of demarcating land is influenced by market forces but some cultural issues also play a role. From the demand perspective, demarcating land can be influenced by associated market exchange benefits, assumed efficient utilisation of seasonal labour, risk aversion strategies in which more plots with diverse crops stand a better chance of withstanding pest infestation and climate risk factors. Supply factors that drive demarcation of land include patterns of inheritance and increasing population pressure, inadequate legislation and high transaction costs (Van Hung *et al*, 2007). On access to land and the ability to exchange it, Deininger (2003) advises that policies should make provision for people to access land and for them to be able to sell it when necessary. Since land is a valuable property and one that plays a vital role in poverty reduction, strategies are needed that will assist the poor to emerge from poverty. Therefore, access to land is important.

Going back to the system of land demarcation, it is argued that there are negative externalities that arise from this system. Such externalities include high costs that go with crop production and labour costs, some portions of land being lost or unutilised because of many boundaries, potential disputes between neighbours and raised transaction costs pushed up by increased transport costs. Despite the fact that rural communities in developing countries are known to practise crop farming on small-sized farms, the system of demarcation into small plots for each farmer is not particularly popular, especially in Africa (Van Hung *et al*, 2007).

The system of demarcating land is not as good as one would expect it to be. In Vietnam, this system serves as an experiment and efforts to aggregate various plots or to reduce the number of plots per farmer are being made. It is claimed that demarcating land into various plots reduces crop productivity, raises production costs and places greater demands on family labour. It is argued that benefits associated with demarcating land into various plots can only be realised when opportunity costs of farm labour exist (Van Hung *et al*, 2007). This explains that there should be alternative job opportunities for the same labour elsewhere in the economy in order for the argument to be tested properly. Therefore, in the absence of opportunity costs in the labour market, the benefits of demarcation may only be speculative or can be treated as a second-best opportunity.

Aggregation of plots is in line with recent findings in the Sri Lankan tea plantations. The government in that country favours small-scale agriculture whereby peasants operate on small farms rather than the traditional way of operating big commercial farms. The move to reduce farm size and have many small farms is seen as a measure that seeks to achieve equitable

distribution of land. A desire to advance economies of scale with advanced technological expertise would favour bigger farms. Needless to say, the average costs are reduced when advanced technology is used in large commercial agriculture. Agricultural product prices have also been cited as influential in the determination of the size of the farm. This has to do with some pedological qualities and the value of the crop that suits the farm area. As in the Vietnamese case study, the finding in the Sri-Lankan tea plantation also points to the fact that in developing countries, small-scale agriculture is preferred as a means of reversing historical skewness in land ownership. This key expectation imposes the need to reverse the trend by de-fragmenting large commercial farms into small-scale farms (Herath and Weersink, 2007).

#### **2.2.11 Rural to urban migration**

Studies of migration from rural to urban areas are important in any livelihood enquiry. The imperatives lie in the impact of rural-to-urban migration on the rural labour market and the rural economy at large. In their study on migration of young adults, Mills and Hazarika (2001) argue that expected earnings based on schooling induce young adults who are graduates to migrate to urban areas. The variables for their model include a strong local economic situation as a predetermining factor of rural-to-urban migration of young adults. A strong business environment and a retention effort are stimulants that increase the demand for labour and employment creation in a rural economy. Furthermore, a greater investment in telecommunication infrastructure with a general improvement in general appearance and better wages are all necessary for returning skilled workers to rural areas (Mills and Hazarika, 2001; Wojan, 2000).

Establishing industries in rural areas is one of the attractions thought to have an influence on returning rural labour. However, this notion can be questioned in terms of whether or not job opportunities that are created as a result of the new industries that locate to rural areas would be sustainable (Wojan, 2000). In the same vein, Wojan argues that the industrial development of the 1980s did not seek specialised labour in certain areas. Like any other worker, skilled workers have an opportunity to move to areas where they find their chances of survival to be as better than before.

Economic governance is also vital to resource mobilisation and thus has a direct impact on the lives of the citizenry. It is strongly argued that mobility of both labour and capital could be constrained by the system of governance in place. Rural labour often migrates to urban areas for better economic offers. The driving force behind this migration is economic incentives that the urban economic structure proffers. Migration from rural to urban areas is a complex process, which is influenced by personal traits and the economic, social, demographic, psychological and political environment (Barkley and McMillan, 1992).

Rural-to-urban migration occurs because of the attractiveness of urban dwelling. Although income levels remain an attractive force, the stock of infrastructure<sup>10</sup> is also pertinent in this influence. In some African countries, it was found that electricity, which is part of the stock of infrastructure, is accessed more often in the urban than in the rural areas. Even though the benefits of migration of people are rare in the general literature, a trend exists that there is some

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<sup>10</sup> Stock of infrastructure refers to government investment in the areas of electricity, water roads, sanitation, health facilities and education.

occurrence of some sort, which could include *inter alia*, a rapid increase in the urban population, which would contribute to growth. Negative externalities of rural-to-urban migration would include rising urban unemployment, population congestion and pressure on urban service utilities (Issah *et al.*, 2005).

There are some other enticers to migrants from rural to urban areas. Firstly, there is shaping of development policies by urbanites with the resultant placing of more emphasis on urban areas. Secondly, in some cases, urban people tend to prefer to import cereals rather than using those from rural farms, which entails consuming high-quality food products. Thirdly, establishing micro-lending schemes in the urban areas is advocated, with little or nothing at all for the rural areas. Lastly, economic growth of the urban areas also lures migrants from rural to urban areas (Goldsmith, Gunjal and Ndarishikanye, 2004).

Mobility of people between rural and urban areas is an issue that cannot be based on only economic factors, but also on health reasons. In Ghana and Nigeria, youths frequent urban areas to sell marketable goods. However, lack of transport, which is one of the key aspects in the success of selling items, is considered a disincentive. A study on youth mobility in Ghana and Nigeria indicates that youths are actively involved in rural-to-urban mobility in attempting to secure income from urban people. In this context, girls tend to carry commodities on their heads from rural to urban areas. Distance between rural and urban areas is a stumbling block to their livelihood-focused endeavours. However, distance can be addressed with better transport between rural and urban areas. Boys are involved in operating transport modes between the two areas. Since youths are known globally to form the majority of the unemployed, their dominance



in rural-to-urban mobility is a result of high unemployment, especially in the youth age category of 15 to 24 (Porter *et al*, 2007).

### **2.3 Summary**

Rural areas remain neglected and development policies have for a long time favoured urban areas. Rural livelihoods are a subject of development of a particular area and a rural community. Therefore, rural people are under more pressure to fight to survive because of both the policy bias and the threatening health, climate and food insecurity situations. Poverty in rural areas remains common and will not be addressed easily with policies that are more impressive in the direction of welfare provision, such as income grants, and are less inclusive of the well-being of rural people. While country-specific poverty lines seem to be more useful, a combination of both approaches should be used for robustness. Poverty strategies that some rural dwellers have embarked on require the support of pro-poor policies in order to give impetus to the attempts of rural people to survive the hardships of poverty. Starvation will also remain a serious concern owing to climate risk factors that impose frustrating circumstances on the rural poor.

Climate change is blamed for frequent climate risk factors. The suffering that arises from climate risks can be squarely blamed on climate change and also on weak coping strategies that are in place. However, rural communities are the most vulnerable members of a country's population and they need to be assisted by means of diversifying their economic activities or livelihood strategies. Diversifying rural livelihoods means that fewer risk alternatives should be considered. Rural development policies and economic policies in general should be tailor-made to address the concerns and needs of rural communities.

Without proper economic reforms, rural communities may to a large extent, continue to rely on food aid. Food aid is necessary for those who are really in need of it. When food aid is provided to advance market fundamentals, it loses its traditional meaning of meeting the dietary needs of those who are vulnerable. Cash provision has a market setback of triggering inflationary pressure. However, it stands as one of the most useful and powerful ways of satisfying the food needs of those who are in difficult circumstances. Although there is not much in the literature to point to unintended consequences of food aid, it remains to be seen how much this thesis will reveal on this matter in subsequent chapters.

Rural and agricultural finance opportunities should also be extended to rural communities. In this connection, access to finance can enable rural communities to take the lead in setting up non-farm enterprises and also to strengthen their farm-based means of survival. In areas where cooperatives have not been tested, introducing them may have a positive impact on the livelihoods of rural communities. However, the right type of cooperative should be considered. On migration, the rural-to-urban trend creates some externalities on the urban economy but migrants also assist their rural families through remittances from the incomes they earn while they are in the urban area. Higher levels of migration may not bode well for the rural economy's labour demand. Rural areas will continue to crave for development in order to improve the lives of people and also to build on existing livelihood strategies.

## **CHAPTER 3: SOCIO-ECONOMIC RIGHTS AND RURAL LIVELIHOODS**

### **3.1 Introduction**

This chapter discusses the issue of positive liberty, which is enshrined under socio-economic rights jurisprudence. The chapter attempts to explain socio-economic rights as vital to enhancing livelihoods. It also explores the applicability of socio-economic rights to those who are vulnerable and especially those in remote rural areas. The challenge associated with enforcing these legal instruments in the judicial arena is also discussed in the context of other legal instruments competing for the same legal platform. The question that this chapter seeks to address is: How can socio-economic rights assist in improving the livelihoods of rural people?

### **3.2 Socio-economic rights**

Namibia ratified the International Covenant on Economic and Social Rights on 25 February 1995. The implication of marshalling this covenant is that Namibia agreed to uphold the rights of its citizens in line with expected provisions. However, socio-economic rights are in general not binding compared to other civil rights. These are rights which despite being litigable, remain far from being made binding in many countries. Butt (2008), referring to Chief Justice Langa of South Africa, argues that in South Africa, courts find themselves presiding over socio-economic rights on a daily basis. Furthermore, Butt advises that the traditional way of dealing with human rights should be reconsidered to include modern legal challenges that cover socio-economic rights.

### **3.3 Wealth and gender dissimilitude**

The advocacy of gender balance in economic engagements is recent in academic literature. History has revealed that past centuries saw women being at the receiving end of inequalities. Household responsibilities have always kept women busy, but their occupations have not carried a price tag to reflect the value of their work and the contributions women make to the aggregate income of the household. Women's work in the household is undoubtedly valuable but would require more studies, which include how to cost it. The question that should be asked is how the distribution of wealth could have a great impact on women's economic well-being.

Modern literature posits that women are largely excluded from mainstream economic activities. It entails that women earn low salaries compared to their male counterparts and that their prosperity is held back by tradition and customary set-ups, such as the fact that they remain backward in economic emancipation. The most vulnerable and unfortunate are rural women whose work is concentrated in an informal and subsistence ambience (Fleshman, 2009).

Women remain the majority of the poor in developing countries. In Africa, 67% of women practise agriculture. In the urban settings, Rwanda and South Africa lead in having more women at parliamentary level. Other countries are also making progress in the area of addressing women's economic woes. Furthermore, in citing the World Bank, Fleshman (2009) argues that women are preferred in labour-intensive jobs in developing countries and this could be due to employers' perception of women as soft targets. This view emanates from the understanding that women's approach to bargaining for better working conditions would not be assertive compared to when the employee force is largely dominated by men.

About 50 countries in the world, including some African countries, have introduced gender budgeting that seeks to improve the livelihoods of women. On the African continent, Morocco is one of the few countries that have a gender budgeting policy. Gender budgeting is a socio-economic right. It has been argued that delaying to assist women to break out of the historical poverty dispensation makes countries lose potential contributions to GDP which women would have contributed, had they been given the necessary economic opportunities. Aid programmes are also taking serious steps to invest more in women's economic concerns. However, most of the financial aid meant for such empowerment programmes seems to go to social services, resulting in a very limited impact on the economic well-being of women (Fleshman, 2009).

In a study conducted on Ecuador's cut-flower industry, Newman (2002) found that the age of women had a diminishing effect on housework. Though age of a woman was seen to have positive and diminishing effects, education did not have any and the reason could be the fact that the nature of work which women were doing did not require specialised skills. In the same study it was found that a woman works less outside the household if her husband is more educated than she is, but at the same time a woman who is younger than her husband spends fewer hours of labour outside her home. Having more women in a household reduces the share of household work.

Any form of discrimination against women which can be found either in the legal framework of a country or in customary ways of living would certainly diminish the chances of women to participate in active economic engagements. Such forms of discrimination might even delay

efforts to alleviate poverty and thus reduce and delay better outcomes. To have women participate at a local level can help them to access basic services and influence their lives (Narayan, 2002).

### **3.4 The role of rights in poverty alleviation**

Various countries have some form of social nets or grants that target particular individuals, depending on the level of vulnerability of the population mix. In most developing countries, most of the social grants are not given through a means test. They come as a blanket policy that applies to all those in a target category.

Etzioni and Platt (2008) observe that guaranteed income<sup>11</sup>, which is one of the social nets, when administered on its own without other policy programmes, especially one that provides the needy with title deeds to land ownership, will be less effective. This should not be viewed to suggest diminishing the relevance of guaranteed income. The essence of providing guaranteed income is to leverage the lives of the poor but more is required to meet the communal differential<sup>12</sup> obligation of those in high authority.

Property rights as socio-economic rights are pertinent legal instruments in the struggle to alleviate poverty. Swallow and Kamara (2000) list models of property rights and explain how land usage changes over time. The models are the demand-driven model, the Bromley model,

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<sup>11</sup> Guaranteed income refers to pension money that the government provides to aged (pensioned) members of society, which is calculated uniformly, rolled out to all those who have reached that age and paid regularly.

<sup>12</sup> Communal differential refers to multiple responsibilities that society owes to communities and in this study those multiple responsibilities should be fulfilled to better the lives of communities.

the supply model and North's model. When there are limitations to property rights, such as on land, the benefits that go with it may not be fully internalised (Ortman, 2000).

a) The demand-driven model of property rights

In the demand-driven model, society drives the realisation of the rights when the benefits of enforcing rights outweigh the costs associated with those rights. Benefits associated with property rights include the transfer of resources to useful alternatives and increasing investments in those resources, as well as having land serve as collateral. These benefits increase with advancement in market dynamics and with population growth. When viewed from an African experience, the demand-driven model is not very useful because of some of its weaknesses, such as the element of considering the private sector as the only institutional arrangement that can assist in accommodating unexpected outcomes when in fact in Africa the private sector has not been particularly helpful, transaction costs to enforce the rights being ignored, the model's failure to recognise circumstances in which common property could be helpful compared to private property, and the model's reliance on the assumption that property rights are a manifestation of aggregate social welfare (Bromley, 1989; Swallow and Kamara, 2000).

b) The Bromley model of property rights

This model identifies four types of property rights, namely individual property rights, common property rights, state property and open access. Among these rights, private property rights are considered to be geared towards profit-making by the motives of the owners and they thus attract

high transaction costs compared to the other rights mentioned here. Common property rights follow private property rights in terms of high economic rent and transaction costs, with open access being the least of them all. The Bromley model reveals that population growth is associated with more commercialisation of properties. Therefore land, which is one of the valuable properties, would change the ownership trajectory from open access up until it finally falls in the hands of private owners and thus becomes governed by private property rights (Bromley, 1991 as cited by Swallows and Kamara, 2000).

#### c) The supply model of property rights

This model points out that property right institutions are influenced by the changes in benefits and costs. As uncertainty regarding the future value of a property increases, the push to move to the next available option of benefits will be all the greater. In the same context, Hayami and Ruttan (1984), as cited by Swallow and Kamara (2000), state that institutions of property rights tend to ossify, since the interests of the political governance may be different from those that embed economic aspirations and disparities exist between the aspirations of those in government compared to the aspirations of society at large.

#### d) North's model of rights and institutions

In North's model, formal political processes come from the interaction between rent seekers and some organisations, and the rule-making organs influence formal institutions to change. Informal institutions are the norms and conventions and they usually change owing to changes in



preferences. In this model, the state can be classified into two, namely the rule-making arm, which is the parliament, and the rule enforcers, which are the judiciary. North goes further to say that political institutions influence how the rule-makers and the rule-enforcers behave. North likens this pattern of behaviour to how mental modes shape individual behaviour (Swallow and Kamara, 2000).

### **3.5 Summary**

Rights are legal instruments that aid the lives of people. A country's judiciary system may or may not apply socio-economic rights, depending on the level of development of its legal fraternity. People will continue to desire to live without poverty regardless of the advancement of the judiciary system. When people know their rights they will help to stimulate the interest of legal researchers to advance the course of legal pronouncements.

Though poverty may result from a variety of issues, including those that are *Vis Major*<sup>13</sup>, the way in which the economy is managed could also have a bearing on the lives of the poor. In other words, poor governance and infringement on people's rights, including disrespect for human and civil rights, such as property rights, could entrench people in poverty.

Socio-economic rights need to be developed further and even though these rights are complicated to litigate, their adjudication will improve the lives of people, including those in rural areas. Through legal awareness, people can benefit from the communal differential obligation. Basic human needs and basic human rights are important and should be met and respected for humanity to begin to appreciate their existence. By recognising the socio-economic

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<sup>13</sup> Vis Major refers to an act of God, for example drought and flood.

rights of rural communities, governments of developing countries may proceed to ensure that rural communities are given title deeds to the land they occupy so that their land may be used as collateral and improve their participation in organised markets.

Together with preceding chapters, this chapter has set a background on which subsequent chapters can be built. Henceforth, there is ample space to reflect on the methodological choices that follow in the next chapter.

## **CHAPTER 4: BACKGROUND OF THE STUDY AREA AND RESEARCH METHODOLOGY**

### **4.1 Introduction**

This chapter begins by describing the region in which the study was undertaken. It also gives information on the mechanical operatives that set the course for subsequent chapters. It provides the details of sampling activities, methods of data collection, data type and analytical techniques. For a start, it is acknowledged that there are various sampling methods and analytical tools that exist on academic shelves. What influences the choice of a particular sampling method and analytical technique is the type of study, and the nature and type of data available to the investigator. This thesis is not an exception to this logical pattern of searching for appropriate techniques. This chapter employs research tools in an orderly way in shaping the thesis trajectory in a structured manner.

Contextually, this thesis is a product of a survey that was conducted in the Caprivi region of Namibia. Caprivi is a region situated in the north-eastern part of Namibia. Of the 13 regions of Namibia, the Caprivi region is the most flood-prone one. Of late, regions such as Kavango, Omusati and Oshana have also been affected by floods. The geographic landscape, characterised by the flatness of the Caprivi region and the many rivers around it, makes it a unique place in terms of flood-proneness. Droughts do occur as well as part of climate change.

### **4.2 The study area**

#### **4.2.1 A general overview**

The Caprivi region is one of the 13 regions of Namibia. The region lies in the north-eastern part of Namibia. This region shares borders with Angola, Botswana, Zambia and Zimbabwe. The region has a landmass of about 20 009 km<sup>2</sup> (Long, 2004b). The only regions of Namibia that receive high and enough rainfall to sustain extensive farming are Caprivi, Kavango, Oshana, Ohangwena, Oshikoto and Otjozondjupa - which is to the south of the Veterinary Cordon Fence (VCF). All these regions except Otjozondjupa are situated north of the VCF. Among these regions, the Caprivi region receives the highest rainfall (Vigne and Whiteside, 1997; Long, 2004b). In the Namibian Household and Expenditure Survey of 2003/2004, the Caprivi region was reported to have a human population of 86 437. Of this population size, 28% resided in urban areas while 72% dwelled in rural areas. Some parts of the region are sensitive to flooding and therefore become inundated during the rainy season. A large part of the region is characterised by widespread swamps (Central Bureau of Statistics, 2006).

Climatologically, there are three fundamental rainfall scenarios that are common in the Caprivi region which are crucial to this study. Firstly, rainfall may be the average amount expected in the region. Secondly, rainfall may be high and trigger floods. An exogenous weather aspect compounds this situation and is difficult to predict. The exogenous weather aspect happens when rainfall is just above the average during the rainy season, but high rainfall is received in south-eastern Angola and in the south-western part of Zambia. This may trigger floods in the Caprivi due to streams that pour into the Zambezi River from those countries. Thirdly, rainfall may be below average and result in droughts.

These vagaries of weather have a greater influence on the outputs of several economic activities, including those that are agriculturally oriented. The fact that rural communities rely on economic activities that are based on natural resources easily subjects them to vulnerability arising from climate risks. Thus, with an increase in the frequency of climate risks there may be serious consequences for rural households. When this happens, rural communities become worse off, suffer from starvation, and often outside aid in the form of supplies of food aid<sup>14</sup> has to be called in to support them until the next harvest season.

From a social economic policy angle, the Caprivi region was assessed on the basis of the Gini Coefficient, the Human Population Index (HPI) and the Human Development Index (HDI). As is known, the Gini Coefficient measures the degree of inequality with regard to income distribution in a given society. It provides a measure of how wealth is widely distributed among a given population. The Gini Coefficient is a number between zero and one, where one corresponds to perfect inequality and zero shows perfect equality. With regard to the HDI, it takes into account three main factors, namely commodities or resources such as goods, services and also transfers in kind; achievements of individuals (meaning, what they are and what they make of the resources at their disposal), which is also a reflection of their life styles; and capabilities, which is a concept that incorporates issues of opportunity that an individual has and the freedom to command a certain type of life (Bèrenger and Verdier-Chouchane, 2006).

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<sup>14</sup> Food aid refers to aid provided in the form of the commodity with the aim of supporting food assistance actions, and to fund development, which may happen through provision of balance of payment support instead of importing bulk consignments or it can take the form of budgetary support by means of funds generated from sales of commodities (ODI as cited by Maunder, 2006).

It is worth pointing out that Namibia's income distribution is very unequal when considering its reported Gini Coefficient of about 0.63 in 2008 (Central Bureau of Statistics, 2008). Unreliable statistics have been released by the National Planning Commission's Central Bureau of Statistics. In the first instance, it was reported that in 1993/94 the Gini Coefficient of Namibia was 0.7 and in the 2003/4 National Household Income and Expenditure Survey (NHIES), the Gini Coefficient stood at 0.6. About five years down the line, in the revised NHIES of 2008, the Gini Coefficient is reported at 0.63 (Central Bureau of Statistics, 2006a; Central Bureau of Statistics, 2008). Similarly, Vigne and Whiteside (1997) reported the Gini Coefficient in 1997 to have been 0.67. This proves that the Gini Coefficient reported in 2006 by the Central Bureau of Statistics should have been slightly higher than the reported 0.6.

It should be taken into consideration that the 2003/4 report, which was released in 2006, was a preliminary one, and also that common logic dictates that the inequality gap was narrowing rather than otherwise. Despite the identified inconsistencies in statistical data, a small fraction of the Namibian population has a high income, while the majority of the people are poor. When applying these indices to the Caprivi region, it appears that in the 2006 data, the Caprivi region had a Gini Coefficient of 0.55 and in 2008 it stood at 0.47 and was one of the lowest scores for the whole of Namibia. In 2006, the HPI of Namibia as a whole stood at 24.7 %, while that of the Caprivi region is 36%. It is the highest HPI compared to those of the other 13 regions. With regard to the HDI, in the year 2000, the Caprivi region recorded the lowest HDI of 0.517, down from 0.541 in 1999. This means that the Caprivi region is the least well off and least developed

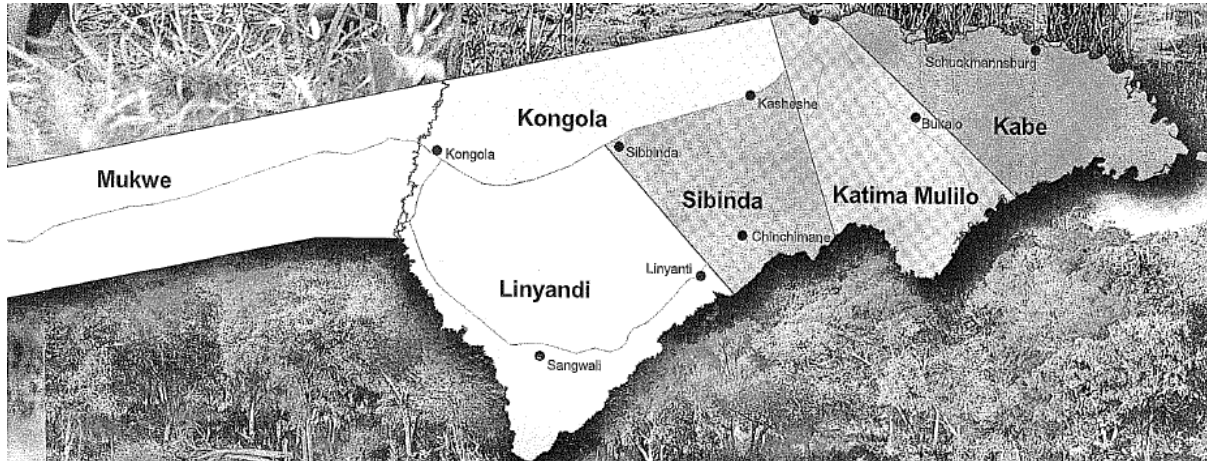
region of Namibia (Long, 2004b; Central Bureau of Statistics, 2006b). Against this background, it is now necessary to state the problem that has prompted this investigation.

#### **4.2.2 The Caprivi region and its constituencies**

As indicated earlier, the study took place in the Caprivi region of Namibia. The name ‘Caprivi’ is derived from a German chancellor, Leo von Caprivi, born in 1890. The naming of Caprivi came at the time when Germany successfully annexed Caprivi from its former coloniser the United Kingdom. Caprivi and the rest of Namibia were transferred to the administration of the apartheid regime of South Africa. Since then Caprivi has been an integral part of Namibia. After independence in 1990, Namibia was demarcated into regions and within regions are constituencies. With regard to this thesis project, the actual survey took place in the Kabbe constituency, Katima Rural constituency and the Linyanti constituency. These constituencies are located in the flood plains where some people are annually relocated to geographically higher areas. Although some villages may not require people to be relocated, their crop fields could be inundated with water, triggering poor yields. The number of households that relocate varies with the magnitude of annual flood water. Although the constituencies of Katima Urban, Kongola and Sibbinda in the Caprivi are not included in this study, they are worth mentioning.

Kabbe, Katima Rural and Linyanti constituencies are also known for freshwater fishing activities. Fish sold at the urban market at Katima Mulilo usually comes from the three constituencies, although a large proportion comes from Kabbe and Katima Rural constituencies. There are natural forests from which rural communities draw their livelihoods. Below is a map

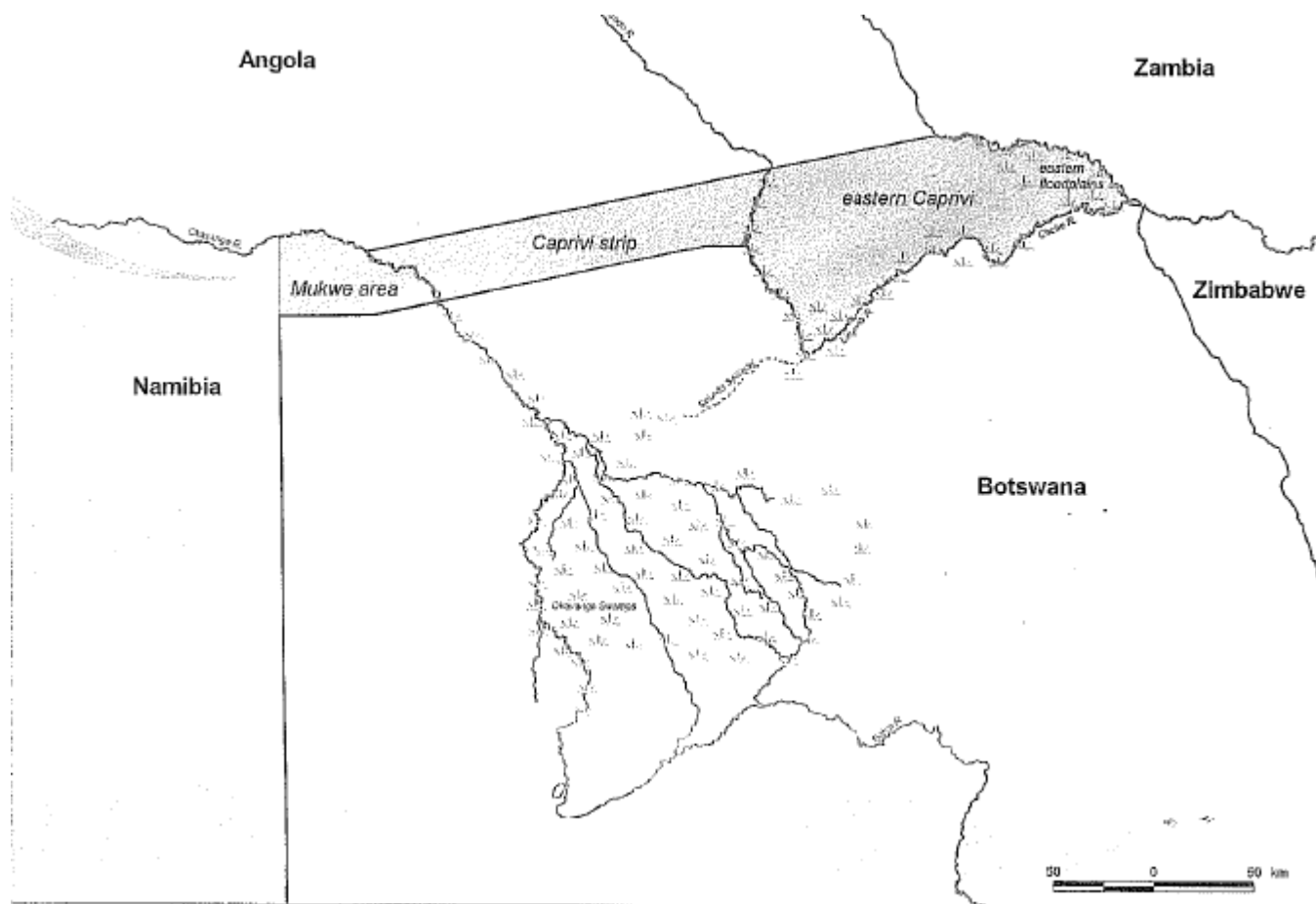
of the Caprivi region. It shows constituencies that house villages from which sampled households were drawn.



Source: Mandelson and Roberts (1997)

**MAP 4.1: The Caprivi region with its six constituencies.**



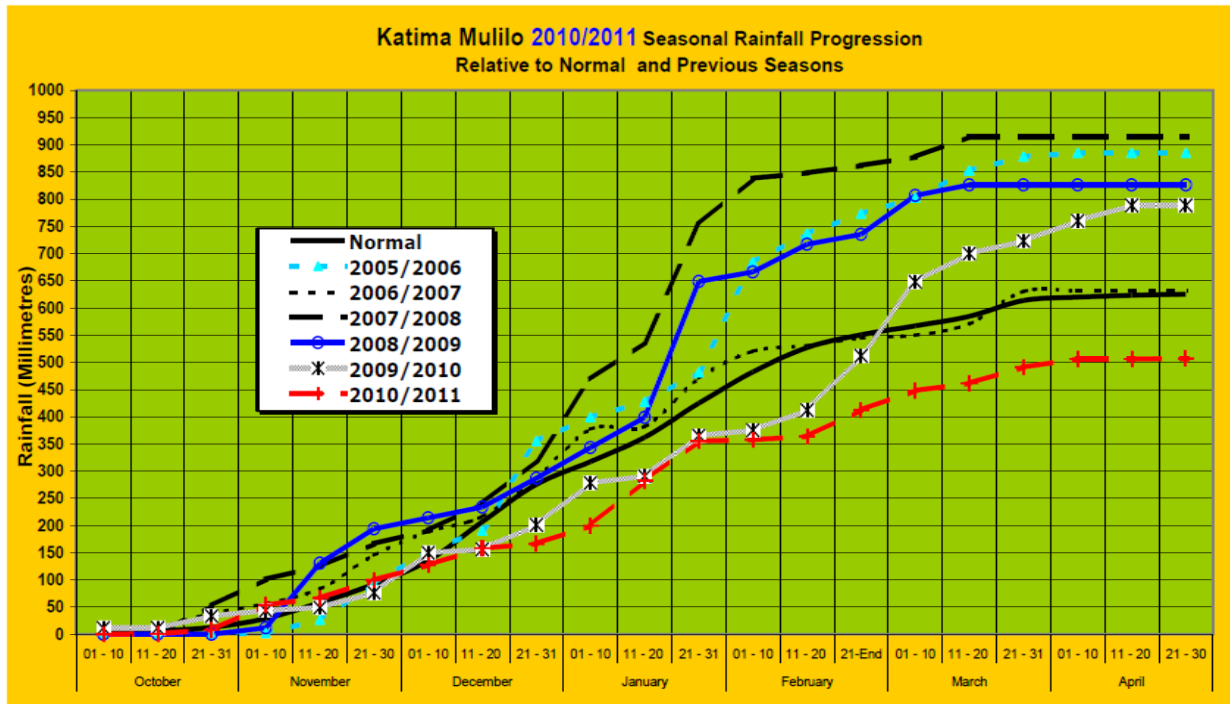


Source: Mandelson and Roberts (1997)

**Map 4.2: Caprivi region bordered by Angola, Botswana, Zambia and Zimbabwe**

### **4.2.3 Annual rainfall patterns in the Caprivi region**

Rainfall is a critical component of the crop production endeavour of rural households, considering that no irrigation practices exists for rural farmers in the Caprivi region. The picture of rainfall records shows considerable variations in annual rainfall measured at Katima Mulilo, which is the regional capital of the Caprivi region. The average annual rainfall for Caprivi is 653 mm (Samsamwater, 2011). More detail on rainfall data is presented in Figure 4.1.



Source: Ministry of Works and Transport (2011)

**Figure 4.1: Rainfall in the Caprivi between 2005 and 2011.**

As presented in Figure 4.1, in the 2005/2006 rainfall season the Caprivi region registered rainfall of about 880 mm, which is high when compared to the subsequent season (2006/2007), when annual rainfall reached the average. In the 2007/2008 rainfall season, over 900 mm of rain was recorded in Caprivi, while in 2008/2009 about 750 mm was recorded compared to 780 mm of rainfall for 2009/10. As for 2010/11, annual rainfall was 510 mm. This shows how volatile annual rainfall can be in the Caprivi region. For this study, the 2006/7 ploughing season is considered a normal year. Thus the ploughing and rainfall season of 2006/7 was used as a better year benchmark during the interviews and when recall questions were asked, reference was also made to the period 2002/3, which was treated as a poor period in that there was drought and a

year later in 2003/4 there were devastating floods. The scope of understanding that has been developed in the process will assist when presenting and testing the hypotheses, which will follow in subsequent chapters.

#### **4.2.4 Agriculture in the Caprivi region**

In 2006, statistics on the agricultural sector showed that the Caprivi region had about 156 379 cattle, 92 000 goats and a few pigs (Ministry of Agriculture, Water and Forestry, 2006). Experimentation with sugar cane continues at Kalimbeza, outside Katima Mulilo. Kalimbeza is in the Kabbe constituency. At Kalimbeza there is a joint rice project between the Ministry of Agriculture, Water and Forestry and the University of Namibia. The region also has a potential tourism sector with many attractive tourist locations. Despite good agricultural potential in the Caprivi region, the people in that region are generally poor. Those considered poor make up 28.6% of the population, while those who are severely poor make up 12.5% (Central Bureau of Statistics, 2008).

Land cultivation is controlled. An occupant of communal land has the individual right of occupation allocated by tribal authorities. Tribal authorities serve as custodians of land use and allocation. This arrangement entails that grazing of animals, harvesting and the use of natural resources are subject to a communal land tenure system<sup>15</sup>. Therefore, all residents of the particular area have the right to graze animals and harvest natural resources in the shared environment (Owolabi, 2004, 2000; The Republic of South Africa, 1964).

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<sup>15</sup> Land tenure is one of the systems of rights and institutions in which access to and use of land and resources, among others natural resources, are governed (Maxwell and Wiebe, 1999).

With regard to marketing of livestock at formal markets, the process requires that livestock in the region first be quarantined for no less than three weeks before they are slaughtered. The main buyer of cattle in the region is the Meat Corporation (Meatco). Beef is not allowed to move across the VCF to the southern parts of Namibia without a permit because of sporadic outbreaks of diseases. However, quarantine facilities are scarce and in some cases they are located far away from where rural farmers reside. The VCF exists to counter frequent outbreaks of foot-and-mouth disease, lung sickness and anthrax, which are transmitted through the cross-border movement of wild animals, mainly buffaloes and elephants that frequent and uncontrollably cross the borders of Angola and Botswana into Namibia. For two decades, residents in the regions north of the VCF have urged the government to remove the VCF because of its inhibitive effect on the success of livestock farming in the northern communal areas.

Climate, a very important factor in the survival of many households that subsist on agriculture, has continued to disappoint many rural households. The complexity of predicting both drought and floods and the inability to do so with reasonable accuracy pose a serious threat to the sustainability of rural livelihoods. In spite of the challenges that beset the rural communities in the Caprivi region, that region's rural economy remains an important one in sustaining the majority of the population of the region.

In addressing the frequent food insecurity challenges of rural households arising from drought and floods, the government of the Republic of Namibia and organisations such as the European Union, the Red Cross and the Institute of Development and Empowerment for Africa have been

directly or indirectly playing an instrumental role in overcoming some of the risks faced by rural communities. It is through some of these organisations that drought relief, flood food parcels, food parcels for orphans and food aid meant for widows have been distributed when the situation necessitated it.

#### **4.2.5 Off-farm economic activities in rural Caprivi**

Rural households in the Caprivi region continue to benefit from off-farm<sup>16</sup> sources of income to supplement their income deficits. Such off-farm activities include brewing traditional beer, cutting reeds and grass, selling fish, basket weaving, clay pottery, selling water, vegetables and firewood. Many of these off-farm income sources also depend on rainfall. Even decades ago, fish constituted an important resource as both food and as a marketable commodity in the Caprivi region (Purvis, 2002; Republic of South Africa, 1964).

Purvis (2002) confirms the diversity of livelihood strategies in the Caprivi region by indicating that inland fishery is not the only source of income even to well-known fishermen. Instead, freshwater fishing is a component of a variety of provisions in the livelihood system (Long, 2004b). The fish supply chain<sup>17</sup> is vital to the success or failure of inland fishing businesses. Spoilage of fish could possibly occur in the supply chain. Usually, spoilage occurs as a result of the poor state of infrastructure development in the rural economy. Purvis (2002) also found that

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<sup>16</sup> Off-farm economic activities are rural economic activities that contribute to the livelihoods of rural communities either as food or goods that can be sold to earn an income for the rural household. These are activities that are not agricultural in nature but may also rely on the natural resource base.

<sup>17</sup> The fish supply chain is a process that involves the time when the fish is caught, the processes of handling, transportation, processing, refrigeration and drying up until it reach the final consumer.

among the participants in the floodplains<sup>18</sup>, wholesalers from Botswana and Zambia trade goods from their home countries for fish.

Other off-farm sources of income include wood carving, herbs, honey and mushrooms. Trophy hunting is increasingly becoming an important source of income for rural communities. Trophy hunting takes place at conservancies owned by rural communities (Murphy and Mulonga, 2002). Income generated from the sale of any of these products is channelled back into the household coffers. Other rural dwellers engage in setting up micro-enterprises in the form of small shops. Remittances that relatives living in urban areas provide to their rural families also contribute to the livelihood system in the rural economy (Long, 2004b). Unlike in olden times, nowadays fishing, cutting of poles, reeds and grass are highly regulated by the government. Regulating the harvesting of natural resources has come about as a result of the introduction of community conservancies. Although necessary, such regulations have placed rural households in an unfamiliar situation.

## **4.3 Sampling**

### **4.3.1 Sampling procedure**

This thesis used random sampling. Leedy and Ormrod (2005) explain the purpose of randomness, namely to ensure that a representative sample is found. There were about 18 607 households in the Caprivi region (Central Bureau of Statistics, 2006). Although the thesis was

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<sup>18</sup> Floodplains are areas in the Caprivi region that are susceptible to annual floods and are also where most fishing takes place.

born from a survey that was conducted in three constituencies, namely Kabbe, Katima Mulilo Rural and Linyanti, the study area is called the floodplain and reference to this term is made throughout the thesis. The reasons why the survey is restricted to three out of six constituencies are that climate risks are high in the target constituencies, which constitute the floodplain, where the outflows of the Chobe, Kwando, Linyanti and the Zambezi Rivers fill numerous streams that are widely scattered over the region; food aid is usually provided in those constituencies, where the majority of the region's residents and the majority of crop farmers reside; the soil is suitable for crop production and livestock rearing is also practised there.

#### **4.3.2 Type of sampling**

Multi-stage cluster sampling was employed. This involved sampling villages in the floodplains to obtain representative village clusters. Village clusters from the three constituency villages were also sampled to identify representative households. A sample of 253 respondents was finally obtained by stratified random selection from sampled households that were drawn from village clusters. Time and financial constraints influenced the sample size. Time constraints entail that after communal farmers have harvested their crops in May and June, in July they begin to thresh their harvest and also sell any surplus there may be. The months of August and September are usually for attending to other non-agricultural activities that compete for the same household labour. From October to November, land preparation begins and ploughing follows thereafter.

Usually, from November onwards, rural roads become difficult to negotiate for vehicles that are not meant for off-road driving. Rain water is the main obstacle and as the year moves towards the end, even off-road vehicles find it difficult to reach the remotest areas of the Caprivi region because of poor roads that are flooded. Ploughing activities, followed by weeding, continue from December to March every year, but later on in autumn flood water stalls these activities when it inundates crop fields. This sequence of events was significant for the timing for the survey. Furthermore, correct timing ensured that at the time of conducting the survey, communal farmers were around focussing on non-agricultural activities. A representative sample was sought not only to minimise labour demands but also to allocate the scarce financial resources to paying two enumerators and all other logistical demands of the survey. During the survey, the composition of respondents was fairly addressed, considering that both men- and women-headed households were selected by chance and then interviewed; this proves that a stratified random sampling technique was applied. There is variance in the number of households per constituency as a result of differences in the population size in each constituency.

#### **4.4 Data**

##### **4.4.1 Data collection**

Dillon *et al*, as cited by Herbst (2001) state that the essentials of designing a research process are to take into consideration the quality and quantity of data required, sample control, costs, the time frame and the response rate. Since the research relied mostly, but not entirely, on primary data, a structured questionnaire had to be drafted and used to collect data. The questionnaire was



designed to capture both continuous, ratio and categorical data. Other secondary sources, such as census data, other national and regional statistical data, were also utilised.

#### **4.2.2 Data set**

A rural household is a social unit that faces several challenges regarding its economic well-being. Analysing the economic well-being of the household in a proper manner calls for a composite measure of economic well-being (CWB)<sup>19</sup> (El-Osta, Mishra and Morehart, 2005). In this connection, data that was gathered includes rainfall time series data in terms of rainfall patterns and distribution. This information has assisted in the decision analysis that was required to evaluate the effect of climate risk on rural households in the Caprivi region. Other variables that were captured include those on incomes of households, household demographic features such as age, education, size of the household, marital status, household assets, agrarian and non-farm outputs, monthly food budgets, medical expenses, markets for rural produce, ownership of assets, recipients of food aid, perceptions on the sustainability of livelihoods, livelihood and coping strategies that were and are practised to address the problem of starvation.

#### **4.4.3 Ethical compliancy**

Rural communities in the Caprivi region are governed by tribal leaders. Every tribe has its tribal headquarter, locally called a khuta. A tribal khuta, which emulates a civil court, is represented by

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<sup>19</sup> CWB is an indicator that includes all household income and the annualised value of the household's marketable wealth, in other words, household wealth that can be converted into cash to support a household's consumption needs (El-Osta *et al*, 2005).

small tribal khutas in areas where the subjects of the tribal chief resides. In consideration of the existence of the tribal authorities, every time a village was to be entered, enumerators would first report to the village *induna* and inform him about the purpose of their visit. Once verbal permission had been granted, enumerators would, with strict adherence to confidentiality, interview the heads of the households that were selected on a random basis. As a result of observance of the tribal protocols, enumerators were welcome and were treated well by interviewees, except in minor instances.

#### **4.4.4 Data analysis**

For the analysis of data, the thesis applies carefully selected analytical techniques, namely descriptive statistics, Chi-Square, factor analysis, logistics regression analysis and multivariate regression analysis. More on some of these analytical techniques will be explained in subsequent chapters.

## **CHAPTER 5: SOCIO-ECONOMIC FEATURES OF THE SAMPLED HOUSEHOLDS**

### **5.1 Introduction**

This chapter focuses on presenting and discussing the results of the survey. The results presented and discussed here are those on the socio-economic features of the sampled households. Both bio- and non-bio-factors of respondents are covered. The results discussed concern particularly gender, age, civil status, education, household size and ownership of assets. This chapter proposes to provide a description of the socio-economic characteristics of the households and serves to set the scene in order for subsequent chapters to be understood better and to aid further logical analysis. This is essential, given the fact that it is on the affairs of sampled households on which further analysis and policy recommendations will be based.

Data used in the analysis comes from the survey instrument that was applied. The size of the sample was 253 respondents. Using random sampling techniques that were explained in Chapter 4, the results of the sampling techniques will be presented in various socioeconomic features and the presentation of these features will follow in tabular format. Since the study area is in the floodplain consisting of three constituencies, the focus will be on the overall sample rather than on the separate constituencies.

## 5.2 Socio-economic features

### 5.2.1 Gender

Studying the composition of a household in terms of the gender orientation of heads of households is important in a study of rural livelihoods. It is a common phenomenon that women serve as managers of their own household activities. This is common in rural areas where formal employment opportunities are elusive. Therefore, a study and an intervention which together ignore the gender orientation of the sample could easily fail to produce the awaited rational evidence. This view is based on the fact that women are usually vulnerable and men tend to dominate in taking up employment opportunities. In light of this, women should be brought to the fore in studies that seek to establish how they live. Survey outcomes on gender composition appear in the table below.

**Table 5.1: Gender orientation of respondents**

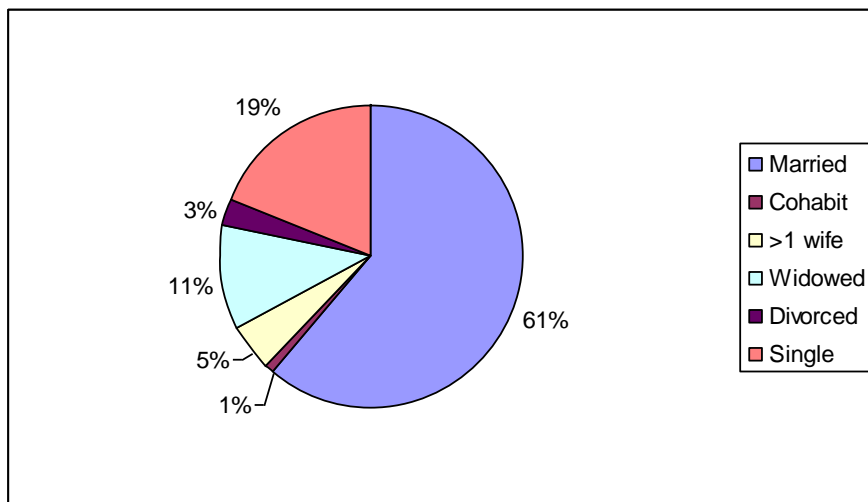
Gender	Frequency
Female	157 (62)
Male	96 (38)
Total	253(100)

Numbers in brackets are percentages of gender composition.

Source: Own survey (2007)

In Table 5.1 it transpires that in the study areas, the majority of household respondents, namely 62%, are women. Men constitute the remaining 38%. This could mean that women are either unemployed or prefer to take up livelihood options around their homes. Raising children is one of the reasons for women's availability at home. Women also undertake cooking and other household labour activities that can be carried out better when one operates from home. It will be interesting to now look at the status of the respondents.

### 5.2.2 Civil status



Source: Own survey (2007)

**Figure 5.1: Marital status of respondents**

As can be seen in figure 5.1, the majority of respondents, constituting 61%, are married, while those who are single and have never had been married before make up 19%. The lowest percentage, which is 1%, is made up of respondents who cohabit. Since household labour is vital to the daily existence of a rural household, married couples with young children have an

advantage with regard to adequate labour supply at their disposal. Usually, the labour that a rural household can offer is for rural livelihood activities and so is not specialised in nature. Studying the age composition of respondents will reveal more about the dynamics of sampled households.

### 5.2.3 Age

Age is an important determinant of a person's ability to contribute to the required household labour. The age of a person can in some way constrain the person's willingness to engage in livelihood activities to meet the needs of the household. The older a person is, the less likely such a person will be involved, especially in manual labour activities. The survey outcome on the ages of respondents follows below.

**Table 5.2: Age category by gender of respondent**

	21-30	31-35	36-40	41-45	46-50	51-55	56-60	>61	Total
Female	32(70)	18(64)	17(74)	14(67)	18(75)	10(63)	12(71)	36(46)	157
Male	14(30)	10(36)	6(26)	7(33)	6(25)	6(37)	5(29)	42(54)	96
Total	46(18)	28(11)	23(9)	21(8)	24(10)	16(6)	17(7)	78(31)	253(100)

Numbers in brackets are percentages of ages of respondents according to their gender orientation

Source: Own survey (2007)

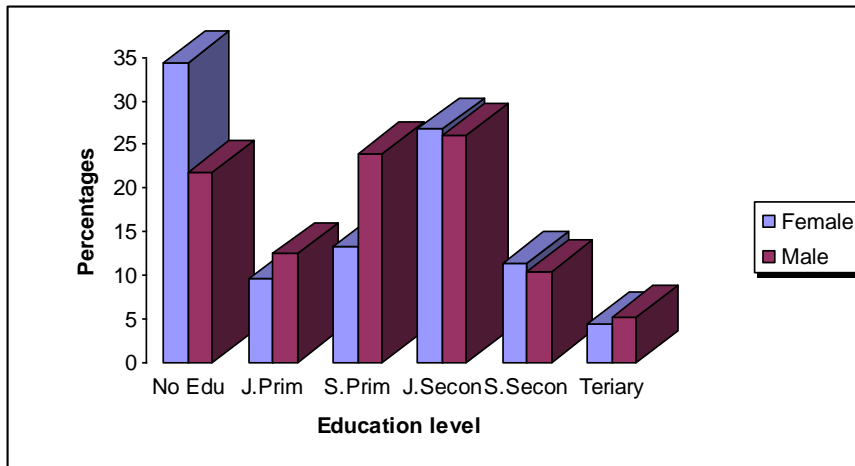
In consideration of the earlier outcome that shows the majority of respondents being women, Table 5.2 indicates that 31% of the respondents are older than 61 years of age, with 54% of them being males, while females constitute 46%. This age category is of people who receive old age

pensions from the government. Second, in this category are respondents who are youths and senior youths. They are in the age category between 21 and 30 years of age and make up 18% of the total respondents. The majority group in this category is female and they make up 70%, while males make up 30% of this age category. Usually young people would be expected to be found employed elsewhere and a very small percentage would be expected to be found at home.

There could be four potential reasons why the young and senior youth are significantly represented in rural households in the study area: unemployment, school dropout that translates into lack of skills, early pregnancy and/or early marriage, considering that 70% of respondents in this age category are female. The obvious fact is that women manage the daily activities of the household and as such they tend to be around their homes most of the time. Their male counterparts constitute 30% of the same age category.

Since Namibia's unemployment rate in 2010 stood at 51.2% (Ministry of Labour, 2010), it is thus reasonable to expect many youths to be loitering at home in rural areas without being formally employed. Jobs are elusive when a country experiences such a high unemployment rate. The third category is adults between the ages of 46 to 50 and they make up 10% of the respondents. The majority, at 75% in this category, are females, while males make up 25%. It shows roughly that there are as many old people as youths in the study area. Ideally, the majority should have been old people, with the youths taking up employment elsewhere in the urban areas and sending remittances to their parents in rural areas.

## 5.2.4 Education



Source: Own survey (2007)

**Figure 5.2: Education level of respondents**

In Figure 5.2, junior primary is from Sub A to Grade 5; senior primary is from grade 6 to 7; junior secondary is from grade 8 to 10; senior secondary is from grade 11 to 12; while tertiary is at least a year of post grade 12 education. Educational levels of respondents are treated on the basis of a proportionate number of respondents of the particular gender. In this case, out of 157 women respondents, 34% did not go to school at all whereas in a proportion of 96 men, about 22% did not go to school at all. This fact alone shows that more women in the study sample did not go to school compared to their male counterparts. At grade 6 and 7 level, out of 96 men who were interviewed, 23% reached that level while of 157 women, only 13% reached grade 6 or 7. Interestingly, for junior secondary and senior secondary education, there is not much difference in the percentages although women outperform men by nearly 1%. For tertiary level both genders reacted the same, with men slightly in the lead, but the difference is insignificant.



Manoeuvring in daily livelihood challenges can also be assisted by a better understanding of the environment. With higher education, people become more aware of how to manoeuvre to survive. Therefore, with many respondents having a very basic level of education, electing better ways that could boost their survivability can be a challenge. This does not mean that education is an end in itself in the strife to survive, but it is an important vehicle to better opportunities.

### 5.2.5 Household size

Studying the size of a household is important. It gives some indication of the food budget and labour available to the household. Furthermore, the size of the household reflects how much a household would need to manoeuvre in search of sustainable livelihoods and strategies in order to keep its members alive.

**Table 5.3: Household size**

	1-2 people	3-4 people	5-6 people	>6 people	Total
Female	10(4)	51(20)	53(21)	43(17)	157
Male	12(5)	28(11)	32(13)	24(9)	96
Total	22(9)	79(31)	85(34)	67(26)	253

Numbers in parentheses are percentages in relation to gender and household size.

Source: Own survey (2007)

As shown in Table 5.3, most sampled households had five to six or three to four members, represented by 34 and 31% respectively. Surprisingly, no household registered a size of four to

five members during the survey. Instead it was found that either a small or big household exceeding five people existed. Since this thesis uses sample data, there may still be such households in existence. There were also many households with at least six people and they constituted 26% of the sample. The focus now has to shift to selected aspects of material well-being. However, livestock ownership is treated separately in subsequent sections.

### **5.3 Ownership of assets**

#### **5.3.1 Land**

Land is a scarce resource and a fixed asset. It is one of the four factors of production. Land in the Caprivi region is subject to the communal tenure system. During the survey, respondents were asked about land ownership. This type of ownership is land ownership in terms of right to use, but without title deeds. The results appear in Table 5.4.

**Table 5.4: Size of land owned according to age categories**

Age	Land owned in hectares									Frequency %
	1-2 ha	3-4 ha	5-6 ha	7-8 ha	9-10 ha	11-12 ha	13-14 ha	15-16 ha	19-20 ha	
<b>21-25</b>	9 (3.55)	2 (0.79)	2 (0.79)	8 (3.16)	8 (3.16)	1 (0.39)	0	0	0	12
<b>25-30</b>	3 (1.18)	6 (2.37)	2 (0.79)	2 (0.79)	3 (1.18)	1 (0.39)	1 (0.39)	0	0	7
<b>31-35</b>	6 (2.37)	3 (1.18)	10 (3.95)	3 (1.18)	3 (1.18)	1 (0.39)	1 (0.39)	0	0	11
<b>36-40</b>	4 (1.58)	3 (1.18)	3 (1.18)	5 (1.97)	2 (0.79)	4 (1.58)	0	0	0	8
<b>41-45</b>	7 (2.76)	7 (2.76)	4 (1.58)	2 (0.79)	1 (0.39)	0	1 (0.39)	1 (0.39)	0	9
<b>46-50</b>	8 (3.16)	3 (1.18)	4 (1.58)	5 (1.97)	2 (0.79)	0	1 (0.39)	0	0	9
<b>51-55</b>	3 (1.18)	3 (1.18)	2 (0.79)	4 (1.58)	3 (1.18)	0	0	1 (0.39)	0	7
<b>56-60</b>	2 (0.79)	3 (1.18)	2 (0.79)	5 (1.97)	5 (1.97)	0	0	0	0	7
<b>&gt;61</b>	9 (3.55)	20 (7.90)	11 (4.34)	19 (7)	11 (4.34)	3 (1.18)	3 (1.18)	0	2 (0.79)	30
<b>Total</b>	<b>51</b>	<b>50</b>	<b>40</b>	<b>53</b>	<b>38</b>	<b>10</b>	<b>7</b>	<b>2</b>	<b>2</b>	<b>100</b>

Numbers in parentheses are percentages of land ownership by age.

Source: Own survey (2007)

As shown in Table 5.4, the youths between 21 and 25 years are on par (9%) with those older than 61 years in terms of ownership of land of a size of 1 to 2 ha. Respondents older than 61 years are in general the majority occupants at 27% of land of between 3 and 10 ha. Second to the age group are those who are between the ages of 21 and 25 at 11% of ownership of land between 3 and 10 ha. Only for land of 11 to 12 ha are those between 36 and 40 years old the largest group of owners at 4%, but those older than 61 years follow at 3%. This brings to light the fact that old people have owned the land for a long time and they may have inherited it at a time when population pressure was minimal. Another dimension is that land in the study areas is not easily transferred across generations but is inherited. It is intuitively rational to assert that young people are energetic and since many of them loiter in villages without employment opportunities, they tend to focus more on agriculture as the main livelihood strategy. As a result, young people utilise and probably even take ownership of the land which their old and retired or deceased parents owned before.

The common outcome reflected in Table 5.4 is that regardless of lack of title deeds to the land which rural households in the study area cultivate, almost every respondent has a piece of land to cultivate. It also comes to light that only about 21% of occupants own between 7 and 8 ha of land, 20% of occupants own between 1 and 2 ha, and in the third place 19% of occupants own between 3 and 4 ha.

### **5.3.2 Tractors and hammer mills**

Ownership of other assets, in this case a tractor, is important to farmers. Tractors are used mainly for cultivating the land and thus advancing crop production activities. Tractors are very scarce in the study area. In fact, tractors are expensive considering that the majority of the respondents are pensioners followed by young people. It can be argued that the only rural households where tractors were found are those where a formerly well-paid retiree was the breadwinner. Despite this expectation, only one person in the study area was found to own a tractor which was still functioning. The scarcity of tractors in the study area points to their unaffordability for households.

Furthermore, the absence of tractors means that some other substitute means of draught power, such as oxen, are used to plough the land. The absence of tractors is a good indication of the challenges faced by rural farmers in the sample with regard to sustaining crop agriculture. With regard to hammer mills, a hammer mill is a useful asset for milling maize for consumption or for others and one can generate an income from providing such a service to an agricultural community. Hammer mills are also scarce in the study area and only about 3% of respondents own them. The absence of hammer mills in the study area can be based on two reasons, namely that rural sampled households do not have the money to procure hammer mills and also that rural households prefer to buy milled maize-meal from the nearest economic centres.

### **5.3.3 Cars**

Cars are expensive luxury goods and ownership of such goods could be beyond the purchasing power of most of the respondents in study area. Only 2% of respondents own cars. Those who own cars may be respondents who were once formally employed but have retired. The reason why there are only insignificant percentages of people who own cars can be explained by the under-development of the study area, lack of employment opportunities and the fact that these are poor rural communities lacking bank-recognisable collateral and have unreliable income sources. Many of them, as indicated earlier, are old people. Cars are therefore no longer assets they can afford. Again for young people, cars are expensive for people whose income sources and livelihoods are erratic.

### **5.3.4 Boreholes**

Boreholes are important sources of water for both human and animal consumption. Regardless of the purpose of constructing the borehole in terms of whether or not to supply human or animal water needs, a borehole remains an asset that plays a vital role in the supply of water for various needs. Furthermore, a borehole can supply water needed for a vegetable garden, thus enabling the household to consume healthy and nutritious food. Vegetables can be maintained using borehole water and be marketed to meet a rural household's income needs. In this study, it was found that 31% of respondents used water from boreholes. The cost of constructing a borehole could be slightly higher for an average rural household. Most of the boreholes might therefore

have been erected by the government for the benefit of the community, but some could have been drilled through the efforts of individual owners.

#### **5.4 Summary**

This chapter has described the socio-economic scenario of rural households in the study area. It has been demonstrated that households in the study area are headed mostly by married people. The sample contains far more women than men. Age-wise, most of the respondents are older than 61 years. More of those in this age category are married. Those who are at least 60 years old benefit from a national old age pension fund provided by the government of the Republic of Namibia. The youth (21-30) are slightly more than other age categories and are therefore, second to those of  $\geq 61$  years of age.

The largest group of respondents has had no education at all. The minority attained post-secondary education, making it clear that higher education beyond senior secondary level is not common among respondents. Most of the respondents come from households of at least five in number. The majority of respondents do not own a car, tractor or a hammer mill. Boreholes are common but they are mostly shared. However, some are privately owned. After a study of socio-economic features of sampled households, including their ownership of assets, in this chapter, the next chapter will look at how these households have in the past and in recent times managed their livelihoods.

## **CHAPTER 6: PAST AND PRESENT LIVELIHOOD STRATEGIES IN THE CAPRIVI REGION**

### **6.1 Introduction**

Since rural livelihoods are central to this thesis, this chapter will contribute to the broader spectrum of the thesis body by seeking to provide insight on the realities of livelihood strategies in the Caprivi region. This is done by detailing past and present livelihood strategies. Past in this context refers to the period 2002/3 and present is the 2006/7 harvesting season. The aim of this chapter is to reflect on the changes that have taken place for the present situation to be understood. Changes referred to are those at the macro- and micro-level. The study population is the rural households in the study area where crop farming takes place. In other words, rural farming communities are the target population.

Various past and present livelihood and coping strategies in the Caprivi are dealt with. However, the most outstanding and cross-cutting livelihood strategy is agriculture. This means that challenges of hunger and unemployment in the informal sector in the rural areas could be found in the changes that take place in the rural agricultural sector. Therefore, when dealing with agriculture, two classifications are necessary, namely the agronomic component and the animal husbandry component. These two agricultural components are essential and will be treated in the context of conducting the hypothesis test. The first hypothesis is that past and traditional livelihood and coping strategies are no longer useful. The test will be conducted by using Chi-Square test and the results will be interpreted. A summary at the end concludes the chapter.



## **6.2 Livelihood strategies in Caprivi**

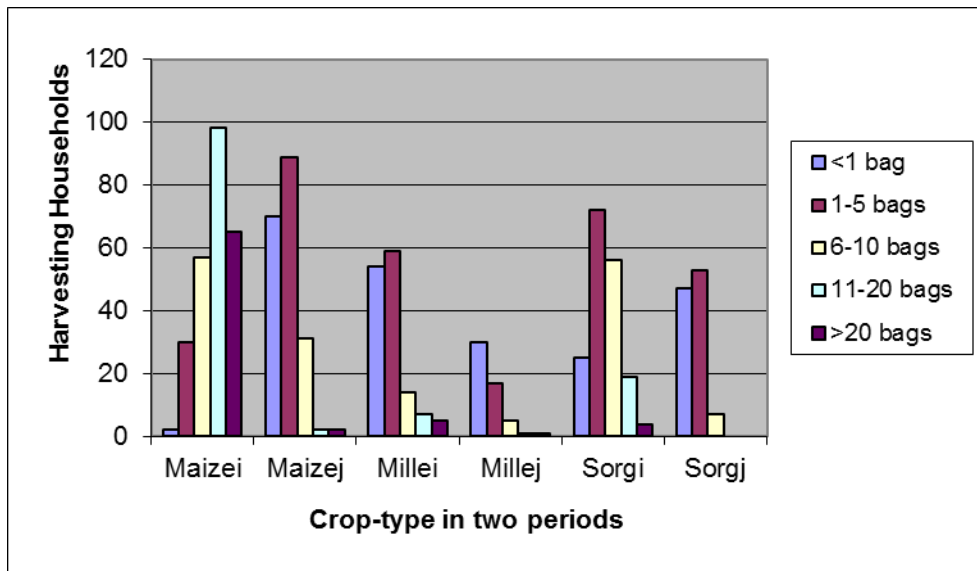
### **6.2.1 Agronomic livelihood strategy component**

Rural households in the study area rear cattle, goats and chickens and they also engage in crop production. Common agronomic crops in the study area are maize, sorghum and millet. Maize is dominant over the other crops. Vegetables are also grown but are very rare. The scarcity of vegetable production in rural areas is blamed on the total absence of irrigation systems. Vegetable enterprises have therefore been excluded from the analysis.

With regard to agronomic crops, some rural households often sell surplus maize to meet the income needs of the household. Income generated from selling surplus maize, millet and sorghum goes a long way in supporting children to pay their school fees, paying for medical expenses and procuring other necessities. Marketing of surplus grains takes place at the urban market situated at Katima Mulilo, where three formal buyers, namely Kamunu Supermarket, Namib Mills and Kalinki Supermarket are found. Sometimes surplus produce is offered for sale at informal rural markets. Below is a graphic portrait of two harvesting scenarios influenced by environmental factors, namely a harvest when conditions were abnormal in 2002/3 and the actual harvests in 2006/7, which are considered because of recorded average annual rainfall.

The terms harvesting under normal conditions and under abnormal conditions should be understood to mean that there are times when annual rainfall received reaches the average of 653

mm and abnormal times when annual rainfall received is extremely low (see Figure 4.1 for 2010/11 annual rainfall) or extremely high and causes floods (see Figure 4.1 for 2007/8 annual rainfall). Despite average annual rainfall, however, the 2006/7 harvesting season was substandard due to low to poor harvests. This is attributed to various factors, which will be further deliberated on in this chapter. Recall questions were not used for the 2006/7 harvesting season since information at the disposal of the heads of the households was still fresh in mind, but recall questions were used to track the events of 2002/3. The 2002/3 harvesting season was subject to drought caused by uneven spread of rainfall and it became even worse in 2003/4 when heavy floods ravaged most of the crop fields and wiped away the hope for a potential crop harvest.



Own survey (2007)

**Figure 6.1: Crop harvests in 2002/3 and in 2006/7 harvesting season**

In Figure 6.1 the maize harvest under abnormal conditions (maizei) involved the highest number of 98 (39%) farming households who produced maize in the output category of 11 to 20 of 50 kg maize bags. Those in the category of at least 20 of 50 kg maize bags represent the second highest number of about 65 (26%) respondents under normal conditions. In 2007, denoted by maizej, the highest number, 89 (46%), of respondent households harvested one to five 50 kg bags of maize. With regard to millet, the highest performing category during abnormal conditions involved those who harvested between one and five 50 kg bags, the same output category in which sorghum producers scored highly as well. However, regarding sorghum (sorgi) it was well harvested by 72 (28%) households compared to millet (millei) that registered 59 (23%), a lower percentage than that of sorghum producers. The two crops are not very different under normal conditions. However, there are genetic differences which go with various cultivars too. Sorghum (sorgi) producers again performed well in the output category of six to 10 bags with 56 (22%) respondents, different from millet (denoted by milleti), where only 14 (6%) of the producers were recorded. As a result of drought resistance and the easy-to-adapt traits of millet, in the 2006/7 harvesting season some pockets of millet producers were recorded in the output category of 11 to 20 and beyond, while sorghum producers failed to register their presence.

The striking observation is that while 2006/7 recorded an average annual rainfall, maize- (denoted by maizej) producing households were more prevalent than those producing other crops in the study area. Reasons for this include the fact that in the Caprivi region, maize is regarded as marketable goods and maize producers may therefore have worked hard in anticipation of a surplus harvest. The currency used in this thesis is Namibian dollars (N\$). The N\$ is pegged to the South African rand (R). Thus N \$1 = R1. At the time of the survey in September/October

2007, the price of maize at Katima Mulilo stood at N \$170 for a 50 kg bag of maize not milled and for a milled one, the price stood at N \$300. This price was astronomical because of an excess demand for maize, not only in Caprivi but also in Namibia at large. However, it should not be confused with the fact that prices of maize and millet are at variance in Caprivi when compared to the regions of Kavango, Ohangwena, Omusati, Oshana and Oshikoto. Unlike in these regions where millet is extensively consumed and preferred as staple food, in the Caprivi region maize is the staple food.

As a result, the price of maize will be expected to surge quickly where demand is high and at times when there is an import restriction. Further, maize is a strategic commodity since it is consumed by many people in Namibia. As a result, annually the Namibian Agronomic Board imposes a moratorium on the importation of maize grain and maize-meal until the local supply has been absorbed into the market. Once a deficit is anticipated due to an occurring excess demand, imports are then permitted by an official announcement in the print media and on radio. Imports are only allowed when the consumption of the locally produced maize has reached a critical low level. This step has a price-escalating effect on locally produced maize. The price effect comes in because often the demand outstrips the supply and as maize becomes increasingly scarce before the borders are re-opened for imports, the price of maize-meal could have become much higher, and inhibitive to the purchasing power of many poor rural households.

From a strategic rural livelihood point of view, the dire situation of rural households having to face serious scarcity of food can be attributed to climate change. Climate change has brought

changes to the natural environment. The changes are such that rural farmers have now abandoned one of the crucial and traditional coping strategies of engaging in a dual harvesting approach in a year. Historically, rural households whose fields are in close to rivers used to plant twice prior to and during the usual planting season. Locally this practice is called *kulima litapa*. *Kulima litapa* is a Lozi statement, which entails planting early but it suggests a provision for the second planting scenario. *Kulima* simply means to cultivate while *litapa* is the type of cultivation practice. The first case scenario of *litapa*, would assist the household in meeting its food requirements when the usual ploughing takes place late in November-December. *Kulima litapa* used to take place around September. Around October, consumption of pumpkin leaves and related crop-field vegetables would usually take place. Late in November, consumption of mealies resulting from *litapa* would then follow.

As indicated, the second planting season usually started late in November to early December for a good reason that school children were on holiday. This timing was crucial for two reasons, namely for accessing the required labour by exploiting the presence of school pupils; and the conduciveness of environmental factors, given that reliable rainfall would be received during the month of December to escalate ploughing activities. The findings show that all rural households in the study area have since abandoned such practices. There are various reasons to switching from *litapa* to a single harvesting approach. Some of the reasons are annual flood water that would still be found in river-based fields, unlike before; reduced labour supply to rural households due to migration and deaths in families and the increased occurrence of terminal diseases such as HIV and AIDS in rural households. These factors have rendered it difficult to

access household labour in attempting to meet the food and income needs of the affected household.

### 6.2.2 Animal husbandry livelihood strategy component

#### Goats

Goats are highly prized for slightly bigger get-together parties in rural areas of Caprivi. Overall, goats provide rural households with meat and milk. However, goat milk is not usually consumed in the study area. Goats are cheap to rear, are resistant to diseases and can multiply more quickly than cattle. This study found that some households own goats. However, there was a shift in the ownership trend between 2003 and 2007. More on this appears in Figure 6.2.

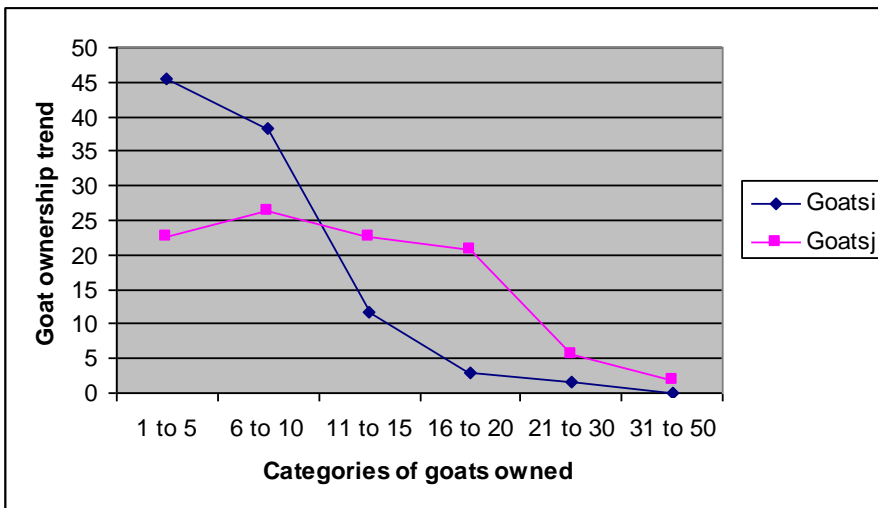


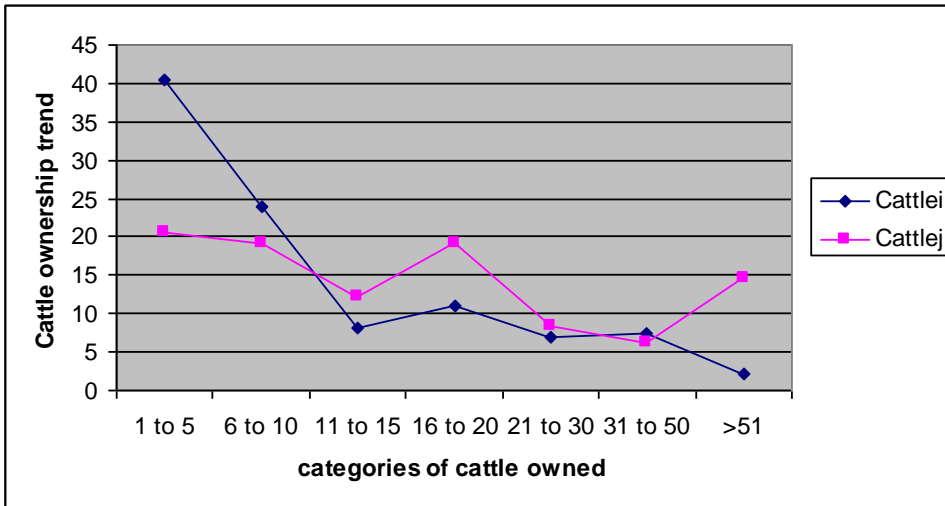
Figure 6.2: Goat ownership in 2003 and 2007

Figure 6.2 indicates that back in 2003, in a sample of 253 respondents, 68 owned goats (denoted as goatsi). Of the 68 respondents who owned goats, about 46% owned between 1 and 5 goats. This implies ownership of between one and five goats per household. The next high cluster of respondents forms 38% and includes respondents who owned between 6 and 10 goats. Ownership declined as bigger categories were considered. For example, in the same period, in the ownership categories of 21 to 30 and 31 to 50, there were only 2% and 1% of respondents respectively. In 2007 the situation changed with the highest number of respondents, i.e. 26%, owning between six and ten goats (denoted as goatsj). The decline with progression to high goat ownership categories remained steady for the 11 to 15 and 16 to 20 categories, compared to the same categories in 2003. The trend is high in subsequent categories of 21 to 30 and 31 to 50 compared to the ownership trend in 2003. The overall picture shows that goat ownership declined generally, since only 58 respondents owned goats in 2007 compared to 68 in 2003.

### *Cattle*

The Meat Corporation, which is locally known as ‘Meatco’, is the main buyer of cattle. There are quarantine facilities in which cattle are confined. Quarantine facilities are used as gatekeepers for observing, inspecting, treating and feeding animals in preparing them for marketing. The duration of confinement is 21 days before slaughtering can take place. Cattle are considered mobile investments for rural households. Cattle are valuable assets and are popular as a means of payment to the family of the bride (*malobolo* in Lozi) when marital negotiations are concluded between two families. Many school-going children including the author of the thesis have benefited from the sale of cattle to pay for their education. Since these are communal areas,

agricultural practices are primarily for subsistence farming purposes but with rising need, cattle can be marketed to meet the immediate income needs of the household.



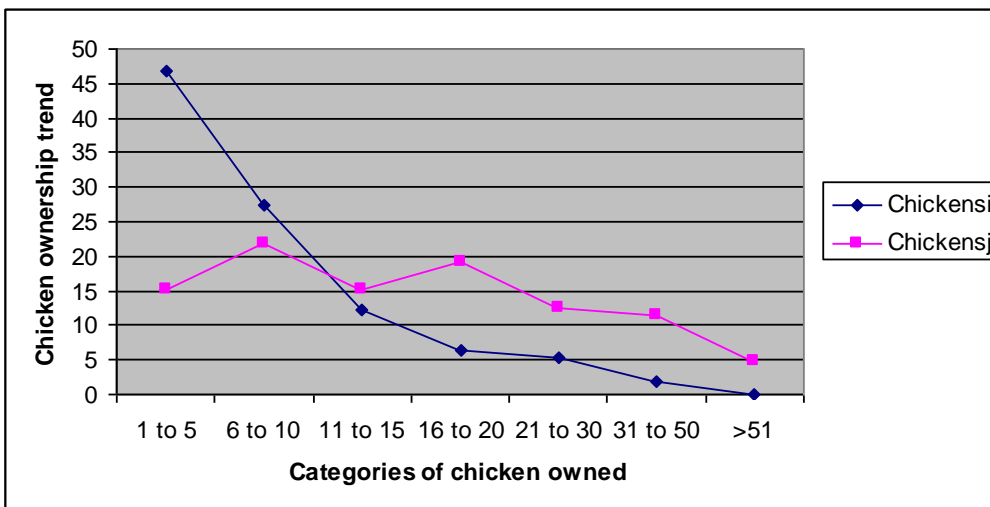
**Figure 6.3: Cattle ownership in 2003 and 2007**

Figure 6.3 indicates that the year 2003 was characterised by high ownership of cattle (denoted as cattlei) in the category 1 to 5. Owners comprised about 40% of the respondents and this category was followed by those who owned (6) six to 10 cattle. Five years later (2007), the trend in cattle ownership (denoted as cattlej) for the 1 to 5 and 6 to 10 categories had declined, registering lower percentages of 20% and 19% respectively. The ownership trend is comparatively high for the categories 11 to 15, 16 to 20, 21 to 31 and >50 compared to the 2001 figures. The difference is that there is a shift, with more cattle owners beginning to own more cattle than before and a salient reflection is for the category >51, which in 2007 stood at 15% compared to 2% five years before. Nonetheless, the overall number of rural households who owned cattle in 2007 is low (131) compared to 146 in 2003.



## Chickens

Chickens are the most commonly used items for a delicious dish, especially when there are events involving family get-togethers. Chickens are popular among rural households. They are cheap to purchase and are also affordable to many rural households in that they keep them on an extensive feeding arrangement. This makes it easy to keep chickens, avoiding feeding cost. In 2007, the price for a rural chicken ranged between N\$30 to N\$50, with cocks being more expensive than hens.



**Figure 6.4: Chicken ownership in 2003 and 2007**

As portrayed in Figure 6.4, the 2007 chicken ownership (denoted as chickensj) trend shows that most of the respondents who owned chickens owned between 1 and 5 chickens. This is represented by about 47%. However, the highest number of chicken-owning respondents owned between 6 and 10 chickens. In 2003 none of the respondents owned more than 51 chickens (denoted as chickensi). Contrary to this, in 2007 about 5% of respondents owned at least 51 chickens. Despite this varying ownership trend, it is noticeable that in 2007 more chickens in high categories were owned by rural households compared to ownership in 2003. Broadly,

chicken ownership declined, with a steady rise in ownership of chickens for higher categories. This is confirmed by the fact that of 154 respondents who owned chickens in 2003, only 105 owned chickens in 2007.

### **6.2.3 Old Age Pension**

One of the salient livelihood strategies that have been making a meaningful contribution to the survival of rural households is old age pension. In 2009, old age pension reached N \$400 per month. In 2010 it was increased to N \$450 per month. It is notable that at the age of 60 pension payments from the government begin. Many old or retired people continue to benefit from this form of support. The old age pension is non-discriminatory in that regardless of gender, marital status or educational level, once a person reaches 60 s/he becomes a beneficiary of this fund. This is a form of social net with no contribution from the beneficiary.

This study found that 37% of respondents had reached the age of 60 and were receiving N \$450 per month. This non-contributory benefit has varied over the years because it depends on the political will of those in influential positions in the government to adjust it in line with the existing flexibility in the national budget. Therefore, there is no fixed rule that would result in an old age pension being adjusted on an annual basis. Its genesis is found in the pre-independence era and it was inherited by the democratic government. Pelham (2007) found that the provision of an old age pension in Namibia and South Africa is founded on the assumption that the elderly are economically vulnerable. There is a difference between this type of pension and one in which the beneficiary makes a contribution while s/he is employed. The one where an employee

contributes is compensatory to the employee, while the old age one is more of a grant made in consideration of the economic challenges an old pensioner faces (Pelham, 2007).

Echoing the finding of Pelham, it came to light that pay points for old age pensions have turned out to attract entrepreneurs who follow pay masters to the pay points where they market various commodities to pensioners. Commodities that are marketed at pay points vary from clothes to food and camping tents. Although pay points have become attractive sites for merchandising, this may place pensioners at risks of being victimised by criminals, but they may also becoming trapped in debts. When this happens, more pensioners may become even more vulnerable and become slaves to their creditors. Pension amounts were low at independence in 1990 but the pension has gradually been adjusted to where it stands now, with the aim of meeting the very basic food needs of the pensioners.

#### **6.2.4 Remittances**

Remittances are also an important factor in the survival of a rural household. However, remittances are difficult to track, given that they come secretly, compared to old age pensions. Respondents tend to shy away from disclosing the monthly or regular amounts they receive from their relatives or children working in urban areas or even abroad. There may be good reasons to harbouring such fears. When classified as belonging to the haves, some rural households fear that if they were known to be better off, it would increase their chances of being denied food aid. The other reason is that since the 1999 uprising in Caprivi, rural communities, especially in the Linyanti constituency where most of the emigrants came from, would not want to be associated with remittance matters in fear of being arrested or interrogated by the authorities. However, the

clear picture is that several households benefit from remittances, as deduced from their monthly expenditure.

This study found that 34% of respondents received monthly remittances. Of those who receive remittances, 39% received monthly transmissions of between N \$150 and N \$200. Those who received between N \$201 and N \$300 make up about 19%. Those who received more than N \$1001 make up 4%. The most frequent receivers of monthly remittances are the age group of more than 61 years old. This group forms about 12% and they are confined to the N \$150 and N \$200 monthly remittance cluster. It shows that remittances are a critical livelihood strategy for some rural households. The only challenge with remittances is that sustenance of it depends on the prevailing economic circumstances of the remitter.

#### **6.2.5 Formal employment**

With Namibia's high unemployment rate of at least 37% (2009), it is not surprising that many people in the study area are not formally employed. Most of the unemployed are youths. A very small, insignificant fraction of respondents is employed. Informal jobs involve exchange labour practices where a person assists another household in return of the help of those s/he benefited from their labour. With regard to formal paid labour, that happens only at urban centres with exceptions when there is construction of rural roads or de-bushing along the roads.

Of the 253 enumerated respondents, only 2% were formally employed. It shows that there is either lack of employment opportunities in the study area or a high level of skills shortage and probably more informal employment opportunities. The truth could be both and could also be

associated with under-development in the study area. Katima Mulilo is the only developed urban centre, in the entire Caprivi Region, where people in the region can get better and/or a variety of job opportunities. In the remote areas, as is in the case of the study area, one can only be a teacher at a nearby school or a nurse at a clinic. These people would usually not be from the area but would only have come because their jobs required them to be there. They would not be seriously involved in livelihood matters in the areas of their job placements or work stations because their traditional livelihood strategies, mainly agriculture, would be practised in the areas from which they originate. Should they be married women, they would involve themselves more in livelihood issues at the places where they married.

#### **6.2.6 Natural resource harvesting**

Since decades ago, rural households in the study area have been benefiting from the harvesting of natural resources. These activities include collecting firewood for their energy needs, cutting poles for building their houses and for selling to prospective buyers and cutting grass for thatching their houses, but also for selling to buyers who need grass. Mopani trees are mostly preferred for firewood. Other natural resource products which are in demand include reed, *Nuphar lutea* (yellow water lily) and weaved baskets using natural resource materials such as coconut leaves. Wild fruits are both consumed and sold. The findings are that 6% of respondents gather wild fruits and wild vegetables, which they sell but also consume. These two sources of food and income are seasonal and occur naturally. Wild vegetables are even sold at the urban community market at Katima Mulilo. Common wild vegetables include those that are locally called *Mulendumuko*, *Tepe*, *Sinshungwa* and *Lihato*. In Zulu and Xhosa the collective name is *imfino*.



**Picture 6.1: *Colophospermum* (mopani) firewood stacks displayed along Ngoma – Katima road**

Firewood is sourced from surrounding forests. For years, some of the rural households have benefited from the sale of firewood as a livelihood strategy. It is common to find stacks of firewood along the road but new legislation imposes limitations, which leave woodcutters frustrated. According to new regulations, a woodcutter is expected to secure a permit first before engaging in some cutting activities. These laws have been applied strictly after the establishment of community conservancies. The law thus prohibits cutting vegetation indiscriminately. Of interest is that 1% of the respondents have stopped selling firewood and poles. Cutting poles and selling firewood are related in some ways; they both require stamina. In respect of selling grass and reeds, 6% of the respondents have abandoned this coping strategy. There are other strategies, such as vegetable gardens, baking scones using self-made clay stoves and consuming *Nuphar lutea* (under water-based yellow water lily) and other river-based vegetables, including selling

these plants. In this regard, 32% have stopped such coping strategies. Others used to brew traditional beer but 11% of the respondents are no longer doing it.



**Picture 6.2: A canoe with *Nuphar lutea* in the background at Kezi tributary near Ibbu village in Katima Rural Constituency**

Canoe carving used to be a livelihood strategy for others; however, it demands skill and stamina to cut huge pieces of timber and carve them for a period longer than two months. Of those who used to be involved in canoe carving, 2% have stopped carving and selling canoes; in fact, no one was found during the survey to be still carving for the purpose of selling rather than for own use. Hunting wild animals used to sustain some rural households. With the entry of conservation practices in the flood plains, 1% has stopped doing it, since it is now a crime for one to be found hunting without a permit.

### **6.2.7 Fishing**

Fishing is a widely practised livelihood strategy in the flood plains. It is a more common activity when annual flooding occurs. Fish is consumed but is also a tradable commodity and as such it earns income for rural households and allows them to purchase other necessities from the urban market. Fishermen in the flood plains have their buyers locally but also from neighbouring countries, especially Botswana and Zambia. Because of under-development of rural road infrastructure and the absence of electricity, most of the fish decays unless dried in the sun, which can preserve it for a while. Fish can be preserved for several months in order to meet the dietary needs of a household. However, the desire to have the necessary infrastructure is high and when this is addressed it could improve this coping strategy. For the moment, fishing is but one of the coping strategies.

This study found that 26% of respondents were involved in fishing. Of those who were involved in fishing approximately five years ago, 10% have stopped practising this coping strategy. There is too much spoilage in the fish supply chain and the urban market is distant from fishing points where actual fishing takes place. Furthermore, rural households rely on traditional preserving mechanisms such as cutting the fish open and drying it in the sun. When sunlight is insufficient, as is usually the case during winter, fish takes time to dry. As a result it can easily rot or bugs may parasite on it, and then spoiling it.



### **6.2.8 Mini grocery retail shop**

A significant proportion of rural households in the study area operate mini grocery shops. Operating a mini retail shop is a coping strategy and often the mini shops remain closed for the greater part of the year. Some of the shops shut down frequently because they have too few customers and sometimes because of the shop owners' poverty, which compels them to consume the groceries. Furthermore, those who operate these shops, keep them in less desirable states when it comes to the availability of stock. There may be other consumption needs which necessitate redirecting income obtained from selling groceries to be spent elsewhere in the household.

Intuition suggests that these shops are operated to meet certain livelihood deficiencies as opposed to carefully designed business ideals. As such, they frequently close for weeks if not months and only reopen later when there is enough cash to buy new stock. So although these shops can be treated as a class of livelihood strategy, they are nevertheless coping strategies because they fill gaps in the livelihood system. Statistically, it was found that 47% of respondents are involved in mini retail shops. Many of the mini grocery shops were started by the owners which amount to 25% of the total number of 118 mini grocery owners, while others were inherited from parents and others were started by other relatives, such as uncles and brothers. Despite the financial challenges that go with managing a small grocery shop, the findings also show that 99% of the mini grocery shop owners were not privileged to access loans to expand their shops. Out of 118 mini grocery owners, only 15% knew where to get loans. This shows how unpopular loan facilities, including microfinance facilities, are in the study area. In fact, there are no loan facilities in the study area except at Katima Mulilo.

## 6.3 Hypotheses test

### 6.3.1 Chi-Square method

The Chi-Square test denoted as  $\chi^2$  is a statistical measure that can be used to test hypotheses. Unlike the  $Z$  and the Student  $t$  statistics which focuses on the central location of population parameters,  $\chi^2$  functions to establish whether or not random variables indeed follow a particular pattern of outcomes in a given population (Mukherjee, White and Muys, 1998; Wagner, 1993; Gomez and Gomez, 1984). Mathematically, Chi-Square can be written as follows:

$$\chi^2 = \sum_{i=1}^R \frac{(n_i - E_i)^2}{E_i}$$

Where  $R$  is the number of categories included,  $n_i$  is the observed frequency falling into class  $i$  and  $E_i$  is the number of unobserved but expected units to fall into class  $i$  if the hypothesised ratio happens to hold. Again borrowing from Gomez and Gomez (1984),  $E_i$  can be found using the following formula:

$$E = \frac{p_i \left( \sum_{i=1}^R n_i \right)}{\sum_{i=1}^R p_i}$$

Where  $p_1: p_2: \dots: p_r$  is the hypothesised ratio. Two classes are then created as follows:

$$\chi^2 = \frac{(n_1 - E_1 - 0.5)}{E_1} + \frac{(n_2 - E_2 - 0.5)}{E_2}$$

where  $|$  stands for absolute values,  $n_1$  and  $n_2$  are observed values or frequencies while  $E_1$  and  $E_2$  are unobserved but expected values of the classes 1 and 2 respectively.

To test for homogeneity of ratio,  $\chi^2_{computed}$  is compared with  $\chi^2_{critical}$ .

This method will be applied in sections 6.3.1 and 6.3.2.

### 6.3.2 Testing the agronomic strategic component

Maize, millet and sorghum are the main crops that are produced, consumed and/or marketed by rural households. Here the hypothesis that is tested is that there is a ratio of 1:1 of total harvest by sample households in 2003 and in 2007. Which also means that  $H_0: = 0$ , that there is no difference in the ratio of the total harvest by the sample households that cultivate maize, millet and sorghum.  $H_1: \neq 0$ , that the ratio of total crop harvested that is maize, millet and sorghum is different.

Table 6.1 presents the results of the survey.

**Table 6.1: Aggregate contingency table for maize, millet and sorghum during 2003 and 2007**

	<1 bag	1-5 bags	6-10 bags	11-20 bags	>20 bags	Total
Maizei	2	30	57	98	65	252
Maizej	70	89	31	2	2	194
Millei	54	59	14	7	5	139
Millej	30	17	5	1	1	54
Sorgi	25	72	56	19	4	176
Sorgj	47	53	7	0	0	107

Source: Own survey (2007)

The disaggregated contingency table is not included here, only an aggregated one. However, the results of the  $\chi^2$  test are based on disaggregated data, which was deduced from Table 6.1. See Annexure A for the disaggregated tables and Annexure B for  $\chi^2$  statistical tables. Applying the  $\chi^2$  formula and using aggregated data in Table 6.1 yield the following results:

Chi-Square sample statistics for maize is 245.18, for millet 4.42, and for sorghum 54.23; the degrees of freedom are 4 for each of the crops; the critical Chi-Square cut-off for 9.488 for all crops respectively as determined by their equivalent degrees of freedom. Thus, at a 5% level of significance,  $H_0$  is rejected that the ratio of the total maize harvested by rural households that cultivate it is different. This implies that there is independence of association between the 2003 harvest which is more than the 2007 harvest. As for millet,  $H_0$  is accepted: that there is no difference in the ratio of the total millet harvested by rural households that cultivate it in 2003 to the one in 2007. For sorghum,  $H_0$  is rejected: that the ratio of total sorghum harvested by rural households that cultivate it is different and it shows that more sorghum was harvested in 2003 compared to 2007. So there have been some changes in the proportion of total harvest of the sorghum crop.

### 6.3.3 Testing the animal husbandry strategic component

Over the years, but especially from 2003 to 2007, rural communities in the study area have received food aid. Something must have gone wrong for them to start receiving food aid. It is on this premise that after presenting current and past livelihood strategies, a need arises to test the hypothesis to determine whether the past livelihood strategy is no longer helpful. The hypothesis test is divided into two sub-tests on goats, cattle and chickens, and the maize, millet and sorghum harvests. Using the Chi-Square test, the first sub-test of the main hypothesis is specified on goat, cattle and chicken ownership as follows:

$H_0: = 0$ , that there is no difference in the ratio of the number of goats, cattle and chickens owned by sample households in 2003 and in 2007.  $H_1: \neq 0$ , that the ration of ownership of goats, cattle and chickens by sample households is different for the two periods.

**Table 6.2: Aggregate contingency table for cattle, goat and chicken ownership during 2003 and 2007**

	1 to 5	6 to 10	11 to 15	16 to 20	21 to 30	31 to 50	>51	Total
Cattlei	59	35	12	16	10	11	3	<b>146</b>
Cattlej	27	25	16	25	11	8	19	<b>131</b>
Goatsi	31	26	8	2	1	0	0	<b>68</b>
Goatsj	12	14	12	11	3	1	0	<b>53</b>
Chickensi	72	42	19	10	8	3	0	<b>154</b>
Chickensj	16	23	16	20	13	12	5	<b>105</b>

Own survey (2007)

As in Table 6.1, the same applies here that the disaggregated contingency tables are not included, but an aggregated one. However, the results of the  $\chi^2$  test are based on disaggregated data, which was deduced from Table 6.2. See Annexure A for the disaggregated tables and Annexure B for the  $\chi^2$  statistical tables. Applying the  $\chi^2$  formula using aggregated data in Table 6.1 yields the following results:

The Chi-Square sample statistics for cattle is 18.61, for goats 20.58, and for chickens 47.50; the degrees of freedom are 6, 5 and 6 respectively; the critical Chi-Square cut-off for cattle is 12.592, for goats 11.071, and for chickens 12.592. Therefore, at a 5% level of significance,  $H_0$  is rejected for all types of livestock in favour of the alternative hypothesis. This means that the ratio of goats, cattle and chickens owned in 2003 is not the same as in 2007. Thus there is a difference in terms of the fact that there were more goats, cattle and chickens owned in 2003 compared to the ownership in 2007.

#### **6.4 Summary**

The high incidence of floods and drought in the Caprivi region often pushes the livelihoods of rural households to the limit. Mini grocery shops are proving to be an alternative livelihood strategy outside the usual agricultural and natural resource-based ones. This creates a need for more external supplies to avert serious hunger. Supplying food parcels has now developed into an annual activity in the study area. As demonstrated, agriculture, which used to be a traditional livelihood strategy, has been declining in terms of both ownership of cattle, goats and chickens, as well as harvest of

crops such as maize and sorghum. The declining performance of agriculture as a livelihood strategy, resulting from frequent climate risk factors, but especially drought and floods, confirms how inefficient this strategy is turning out to be with regard to sustaining rural households. The implication can be that rural households are increasingly consuming externally produced food commodities rather than their own.

On the policy side, the policy nexus is not well supported with needed interventions that can improve the lives of rural households. With annual floods becoming common, weaker households will find it difficult to survive without external support. The government and donor community should assist in finding a permanent solution to the frequent disturbances of livelihood strategies. The solution lies in designing policy interventions that are pro-poor and serve as enablers to the course of rural households. These should be policies that provide for the rural households to have to depend on their own efforts.

Lack of dams in the Caprivi region makes it difficult for rural households to engage in sustainable vegetable production. If there were dams or water-catchment facilities, that water could be used to irrigate agronomic crops and vegetables during dry seasons. This would in turn improve the agricultural livelihoods of rural households. A decision to invest in water-catchment facilities requires strong political will at the level of political office-bearers to support efforts to invest more in rural roads, bridges and dams. Such investments in rural infrastructure could play a multiplier role in livelihood strategies that seem to be interrelated.

## **CHAPTER 7: AN EMPIRICAL ANALYSIS OF THE IMPACT OF FOOD AID ON AGRICULTURAL COMMITMENTS OF ITS RECEIPIENTS**

### **7.1 Introduction**

This chapter seeks to reveal the technical role food aid plays in the decision-making of a rural household that practises agriculture. Although the price effect derived from the provision of food is an economic one, in this study it is treated as secondary and one which is determined by market forces. The purpose of the agricultural practices of rural households is primarily subsistence gain but surplus output is often stored to replenish the following year's grain seed stock, another portion is then marketed. The provision of food aid is a deliberate exercise meant to prevent those in need from starving to death.

It is intuitively discerned that the distribution of food aid in rural communities, especially in the flood plains, is not without uninvited consequences for existing livelihood strategies, especially agriculture. The decision to store for replenishment or to sell can be triggered by the food security needs of a particular household. This comes with an understanding that most of the rural households in the flood plains are engaged in agricultural practices as a livelihood strategy, with crop production being the predominant activity.

The aim of this chapter is: to analyse how the provision of food aid influences sample households' agricultural commitments. This means investigating two issues, namely what



determines eligibility for receiving food aid and also the role food aid plays in influencing farming decisions of rural households that receive food aid. In this chapter, the second hypothesis is tested, the fourth research question is answered and the third objective is addressed. In order to address the objective, answer the research question and test the hypothesis, both Factor analysis (FA) with the use of the component extraction process and the logistics regression model are applied.

## **7.2 Factor analysis**

Factor analysis is a statistical data-reduction technique, which is used to explain variability among observed random variables. This is done in relation to a few unobserved random variables. Darlington (1997) puts it well that FA is used to discover simple patterns of relationships among variables. Therefore FA is an interdependent technique in that it combines two or more factors into one single factor. It does this by grouping related factors together. The ultimate purpose of this technique is to discover if observed variables can be explained sufficiently by a small number of variables. Thus the fundamental goals of FA are to help in identifying the number of latent constructs, which then makes FA exploratory; it condenses information in order to explain variability among items and to attach meaning to the latent constructs (Chioma, 2009; Chojnicki and Czyc, 1976).

There are other reduction techniques, such as cluster analysis and multidimensional scaling, but when compared to FA, they fail to match its capabilities in the following

ways: firstly, unlike cluster analysis and multidimensional scaling, which consider correlations as merely generic similarity measures, FA can recognise some properties of correlations such as reflections of variables. Secondly, FA is typically related to correlation matrix while cluster analysis and multidimensional scaling are not (Darlington, 1997). The weakness of FA lies in the multiplicity of interpretations that can be drawn from the same data and as such the technique fails to identify causality (Darlington, 1997).

The challenge though with FA is that it is mathematically complicated, it entails several considerations and it also uses a rather a complex vocabulary such as eigenvalues, rotate, simple structure, orthogonal, loadings and communality. Its results are lengthy and many scholars therefore avoid including most of its analytical outputs when reporting (Rummel, 2002). With FA, each variable is assumed as a linear combination of some number of the common factors and unique factor. The factor model can be presented as:

$$Z_r = (\lambda)t(lrtQt) + lrvQrv$$

where:

- Z = standardised variable,
- L = factor loading,
- Q = common factor or factor score,
- r = index for variables,
- t = index for factors, and
- v = the unique portion.

### 7.3 Data requirements

Factor analysis was applied to 12 indicators of eligibility for receiving food aid. The eligibility element is essential in pointing out circumstantial matters that predispose rural households to become recipients of food aid. Indicators that were included in the factor extraction process are listed in Table 7.1 below.

**Table 7.1: Indicators for the factor analysis process**

1	Common diseases affecting the household
2	Objectives for tilling the land
3	Education
4	Household size
5	Monthly income
6	Farming experience
7	Household labour
8	New problems
9	Common climate risk factors
10	Satisfaction with early warning systems
11	Land ownership
12	Abandoned economic activities

Indicators which appear in Table 7.1 were treated with FA and the extraction method used was principal component analysis. The rotation method is varimax with Kaiser normalisation.

## 7.4 Factor analysis procedure

### *Correlation matrix*

In matrix correlation that was done, there was no singularity in the data. The determinant is 0.015, which is greater than the necessary value of 0.00001. Such a determinant means that there is no multicollinearity in the data.

**Table 7.2 Kaiser-Meyer-Olkin Measure and Bartlett's Test**

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.650
Bartlett's Test of Sphericity	Approx. Chi-Square	1037.91
		2
	Degrees of freedom	66
	Significance.	.000

Table 7.2 above shows the Kaiser-Meyer-Olkin Measure (KMO) measure of sampling adequacy and Bartlett's Test of Sphericity. With KMO, FA yields 0.65. This figure is closer to 1 and it indicates that the patterns of correlations are relatively compact and so FA is an appropriate technique to yield reliable factors. With regard to Bartlett's test, a significant value of  $<0.05$  is needed. In this case, the outcome is the significance of 0.00, which means that the R-matrix is not an identity matrix and so FA is well suited for the task with degrees of freedom (DF) of 66.

### *Factor extraction process*

In this case, the eigenvalues associated with each linear construct after the extraction process and after the rotation process are all displayed. Kaiser (1960) advocates the need to return only those constructs with eigenvalues which are  $\geq 1$ . The eigenvalues represent the variance explained by each linear construct. In Table 7.3 eigenvalues are shown and the percentage of variance for every construct explained is also presented.

**Table 7.3: Total Variance Explained of extracted factors**

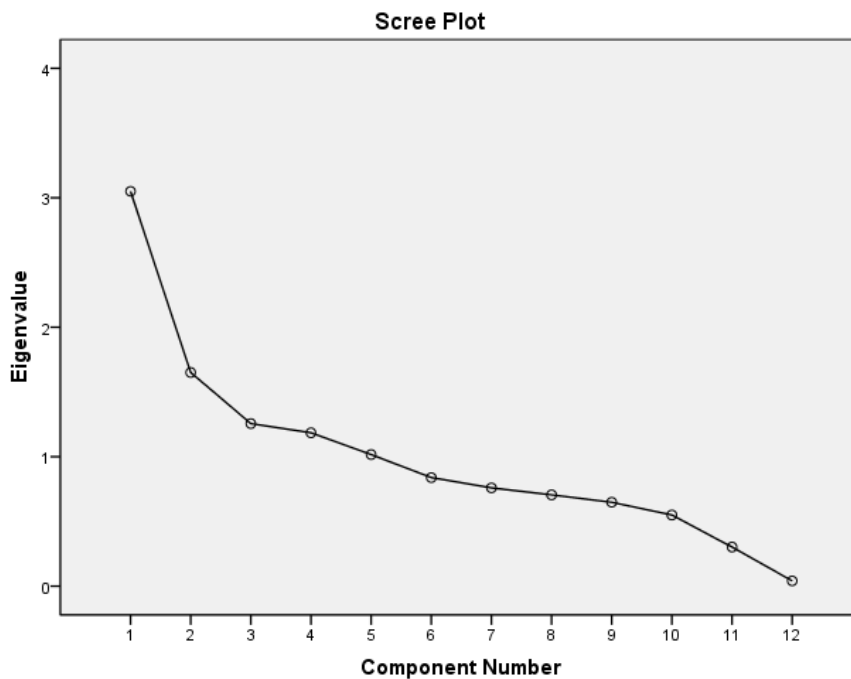
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.050	25.415	25.415	3.050	25.415	25.415	2.963	24.689	24.689
2	1.650	13.752	39.166	1.650	13.752	39.166	1.442	12.015	36.704
3	1.256	10.464	49.630	1.256	10.464	49.630	1.384	11.533	48.237
4	1.184	9.870	59.501	1.184	9.870	59.501	1.290	10.750	58.987
5	1.016	8.470	67.971	1.016	8.470	67.971	1.078	8.983	67.971
6	.838	6.987	74.958						
7	.759	6.327	81.285						
8	.705	5.877	87.162						
9	.648	5.400	92.562						
10	.550	4.579	97.142						
11	.302	2.518	99.660						
12	.041	.340	100.000						

In Table 7.3 are selected linear factor components after extraction which adheres to Kaiser's requirement for retaining eigenvalues that are  $\geq 1$ . Still in Table 7.3 are five factors, which were extracted. The results show that Factor 1 explains 25.415% of total variance. Factor 2 explains 13.752% of total variance. Factor 3 explains 10.464% of total variance. Factor 4 explains 9.870% while Factor 5 explains 8.470% of the total variance. From there on the extent of the influence on the variance of all other subsequent factors becomes progressively less as they continue to explain less and less of the variance. In the part labelled Rotation Sum of Squared Loadings are eigenvalues of the factors after rotation. By rotation, the factor structure is optimised. Again with rotation, the relative significance of the factors is equalised, as is evident from the fact that after rotation the same factors 1, 2, 3, 4 and 5 now account for 24.689, 12.015, 11.533, 10.750 and 8.983% respectively.

**Table 7.4: Communalities**

	Initial	Extraction
Common diseases affecting the household	1.000	.733
Tillage objectives	1.000	.571
Education	1.000	.476
Household size	1.000	.571
Monthly income	1.000	.497
Farming experience	1.000	.849
Household labour	1.000	.773
New problems	1.000	.556
Common climate risk factors	1.000	.767
Satisfaction with early warning systems	1.000	.778
Land ownership	1.000	.865
Abandoned economic activities	1.000	.720

With regard to communalities that are presented in Table 7.4, Kaiser's criterion says that when the sample size is >250, the average communality should exceed 0.6. This criterion has been satisfied because in the current sample of 253 respondents, the average communality is 0.68 and all factors with the eigenvalues >1 were retained. This means that factors which account for most variance in the data have been retained. Principal component analysis assumes that all variance is common and so, before extraction, the communalities are all = 1. After extraction, communalities changed, for example, instead of the initial 1, 73% of the variance is now associated with common diseases that affect the household and 57% is accounted for by objectives for tilling the land. Other constructs have also changed as a result of extraction.



**Figure 7.1: Scree Plot**

In Figure 7.1 the five factor components extracted are presented. On the vertical side of the graph denoting eigenvalues, a sharp fall is observed after the first, second and



third factors. From there on the fall is steady but continues to occur with a slight kink between the fourth and fifth factors where the cut-off point is. From there on the fall continues steadily with an increasing fall from the tenth factor to the twelfth factor.

***Rotated factor component matrix***

The purpose of rotation is to obtain factors which have desired variables that load highly.

In this case the results of the rotated matrix appear in Table 7.5 below.

**Table 7.5: Rotated component matrix**

	Component				
	1	2	3	4	5
Land ownership	.906				
Farming experience	.882				
Common climate risk factors	.872				
New problems	.672				
Satisfaction with early warning systems		.803			
Tilling objectives		-.637			
Education		.478	.446		
Household size			.703		
Monthly income			.667		
Abandoned economic activities				.844	
Household labour					.743
Common diseases					.703

In Table 7.5 the first component is generally highly correlated with whether or not one owns land and has farming experience, as well as common climate risk factors, and these load together on the same factor with new problems that are being experienced, which were never there before. As a result this factor is called *capacity to farm*.

The second component is highly correlated with whether or not rural farmers are satisfied with early warning systems that are in place; the educational level of the head of the household and objectives for tilling the land are relatively high but negative correlated. The factor is therefore labelled *climate risk awareness*. The third component is highly correlated with household size, and relatively correlated with the monthly income of the head of the household, so it is labelled *household economic status*.

The fourth component is highly correlated with economic activities that were abandoned by the household but that were helpful in the past, so it is labelled *past economic opportunities*. The fifth component is highly correlated with household labour and common diseases that affect members of the household. As a result, the factor is labelled *household-labour fitness*.

### ***Reliability test***

It is important that whenever factor extraction component has been undertaken, a reliability test should follow. A reliability test identifies weak items and excludes them. Through a reliability test inter-item correlations are produced and the decision

to raise the Cronbach alpha can then be taken. In view of this, the five factors that were extracted were later subjected to a reliability test. When a reliability test was conducted on these five factors, only Factor 1 finally passed to be turned into a variable. The results appear in Table 7.6.

**Table 7.6: Factor 1 item-total statistics**

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item- Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Land ownership	7.3557	191.476	.925	.911	.777
Farming experience	4.1581	190.784	.903	.903	.801
Common climate risk factors	6.7470	300.182	.699	.498	.975

Table 7.6 gives the result of the reliability test conducted on Factor 1. Initially Factor 1 had four items, but after a reliability test only three items remained. The rule of thumb is that a Cronbach alpha of <0.60 is unacceptable, but an alpha between 0.80 and 0.90 is very good. In Table 7.6 the Cronbach alpha and the standardised item alpha are 0.91 and 0.91 respectively. These are very good alpha values and they reflect that there is a high degree of internal coefficient consistency.

Before the reliability test, Factor 1 was composed of the items land ownership, farming experience, common climate risk factors and new problems. In Table 7.5, the new problems construct was dropped but the other three constructs were returned. This composition of items necessitates returning the initial label of this factor as *capacity to farm*. After having determined the factors which make rural households eligible for receiving food aid, the next issue to be dealt with is the analysis of what

affects the decisions to farm or plough, which will be handled by means of a logistics regression model.

## **7.5 Logistic Regression**

### **7.5.1 Purpose**

In this section, the logistic regression model is used to determine the various factors that influence rural farmers' decisions on their commitment to agricultural production. The application is empirical with the use of primary data gathered during the survey. Before commencing with the analysis, it is necessary to expose the intricacies that underpinning the logistic model.

### **7.5.2 Underlying issues**

Binary logistic regression is another form of a regression model which is a statistically generalised linear model that uses the logit as its link function. This type of regression describes the relationship between a dichotomous response variable and a set of predictors. The dichotomous aspect lies in the probability outcomes of the response variable. These probability outcomes of the response variables may assume a *Yes* or *No* outcome and may take the values of 1 and 0 respectively. With regard to predictor variables, they may be of any type, meaning that both categorical and continuous variables can be included. Both discriminant analysis and logistics model permits the use of continuous response variables although logistic regression restricts their use on the response variable (Garson, 2007; Hosmer and Lemeshow, 1989).

Other models such as log-linear, logit and Probit, extends the principles of linearity in the predictors of generalised linear models. In light of this notion and considering that logistics model is an extension of the logit model allows transformation of data to inculcate linearity. Therefore, logit and logistics can estimate binary outcomes. The difference between logit and logistics is that while logit models reports on the coefficients, logistics focuses mostly on log-odds. Therefore, the predictors in the model logistics model need not linear, normally distributed or to be of equal variance in their category. In other words, the relationship between the response and the predictor variables is not a linear function. Furthermore, the reason why logistic regression has been chosen is the user-friendliness of its mathematical underpinnings when compared to the probability functions of its alternatives, namely Probit and Tobit (Garson, 2007; Connor, 2002).

Binary logistics regression uses maximum likelihood estimation (MLE) to estimate the values of the coefficients. An explanation of the differences between the maximum likelihood (ML) method and ordinary least squares (OLS) will be touched on within this section. When the response variables have been transformed into logit variables, the model can be used to estimate the probability of a certain event occurring. Logit coefficients or logits correspond to  $\beta$  coefficients in OLS. Logits are useful in the construction of prediction equations and they generate predicted values. Binary logistics regression calculates some changes in the log odds of the response variables and not changes in the response variables themselves, like the OLS. The log

likelihood is the basis for the binary logistics regression. In binary logistics regression, the odds ratio is a measure of effect size<sup>20</sup> (Garson, 2007).

On effect size, Maree (2006) recommends reporting on the  $p$  value and the estimated effect size as important in quantitative analysis. Two areas in which one can use the effect size are:

- In a situation where the results are not based on a probability sample and when one is not required to make generalisations but would like to discuss the results, and
- In situations where the results are based on a probability sample and where statistical significance exists.

Binary logistics regression uses certain techniques to test for the significance of the variables in the model. These techniques include the likelihood ratio, which is a logarithmic transformation that yields a  $\chi^2$  and a Hosmer-Lemeshow test, which is used to test for goodness of fit of the overall model (Hosmer and Lameshow, 1989).

In binary logistics regression, the probability outcomes are denoted as  $P_i$  for a *Yes* outcome and  $1-P_i$  for a *No* outcome.

Mathematically, binary logistics regression would take the following logarithmic format:

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<sup>20</sup> Effect size is an index that indicates the magnitude of the result obtained, or the relationship analysed (Maree, 2006).

$$\text{logit}(P_i) = \text{natural log} = \ln\left(\frac{P_i}{1-P_i}\right) = \alpha + \sum_{i=1}^n \beta_i X_i + \varepsilon_i \quad (1)$$

where in parentheses is the probability of an outcome equated to the constant ( $\alpha$ );  $\beta$  is a vector of all the parameters to be estimated; and  $X$  represents explanatory variables.

$$\text{Therefore, } \ln\left(\frac{P_i}{1-P_i}\right) = \alpha + \beta_1 X_{1,i} + \beta_2 X_{2,i} + \beta_3 X_{3,i} + \dots + \beta_n X_{n,i} + \varepsilon_i \quad (2)$$

thus  $X$ s are the predictors,  $\beta_0$  is a constant coefficient and other  $\beta_{1,2,3,\dots,n}$  are the estimated parameters of the predictors  $X_{1,2,3,\dots,n}$  and  $\varepsilon_i$  is an error term and is equivalent to 2.71828.

$$\text{The odds in this case are: } \frac{P_i}{1-P_i} \quad (3)$$

Pindyck and Rubinfeld (1998) explain that binary logistics regression is based on the cumulative logistic probability function, which they specify in mathematical terms as follows:

$$P_i = F(Z_i) = F(\alpha + \beta_i X_i) = \frac{1}{1 + e^{-Z_i}} = \frac{1}{1 + e^{-(\alpha + \beta_i x_i)}} \quad (4)$$

where:  $e$  is the base of natural logarithms and is approximately equal to 2.718.

Given the above information that the response variable for an event occurring is defined as  $Y = 1$  and if contrary, it is then  $Y = 0$ , the logistic regression model then defines the probability  $P(y = 1)$  as:

$$P(y = 1) = \frac{e^{(\alpha + \beta_1 x_1)}}{1 + e^{(\alpha + \beta_1 x_1)}} \quad (5)$$

$$\text{The probability of a } No \text{ outcome is } P(y = 0) = 1 - P(y = 1). \quad (6)$$

In short, the model consists of the response variable, predictors and the error term  $\varepsilon_i$ . However, the sign of predictors depends on the relationship of that predictor to the response variable.

### ***Maximum Likelihood and Ordinary Least Square Methods***

Maximum Likelihood (ML) is a method of point estimation and is characterised by complex mathematical considerations. ML has stronger theoretical coverage than OLS. Unlike OLS, which is commonly used in many studies that are simplistic in nature, ML is often applied in rigorous research. Gujarati (1995) alludes to the convergence matter between ML and OLS. The two methods yield similar results in terms of the estimators of the regression coefficients, the  $\beta_i$  when the error term  $\mu_i$  for both ML and OLS is assumed to be normally distributed, but one condition of a larger sample size should be satisfied for this convergence to hold. Gujarati (1995) further elaborates the following to clarify the convergence aspect and traits of ML and OLS:

Where  $\sigma^2$  is the MLE and so  $\sigma^2 = \sum \hat{\mu}^2 / n$  and

OLS estimator of  $\sigma^2$  is  $\sigma^2 = \sum \hat{\mu}^2 / (n - 2)$  and is unbiased.



### 7.5.3 Variables included in the model

**Table 7.7: Factors that influence farmers' decisions on their agricultural commitments**

Variables	Code	Description	Expected sign
<b>Food</b>	X <sub>1</sub>	Continuous variable cost expressed in Namibian dollars (N\$)	+
<b>Age of the head of the household</b>	X <sub>2</sub>	Expressed in years	-
<b>Value of food aid</b>	X <sub>3</sub>	Expressed in N\$	-
<b>Distance to the market</b>	X <sub>4</sub>	Expressed in minutes	-
<b>Total farm size</b>	X <sub>5</sub>	Expressed in hectares	+

The response variable that was estimated in this model is of a dichotomous nature. The essence was to establish the probability that a rural household would plough or not *ceteris paribus*. The probability of the response variable 'will plough' is denoted by 1 and 'will not plough' by 0. Doing this will provide a platform upon which to test a hypothesis that says food aid provided over a period of time could negatively affect agricultural production commitments of recipients of aid. It is relevant to know that a rural household receives three 12 kg bags of maize, but more can be provided depending on the number of adults in the household.

A 12 kg bag of maize meal is valued at N \$40. Empirically this hypothesis requires restating an assumption that nearly all rural households practise crop production and are recipients of food aid. Endorsing this assumption means complying with a caveat that hedges on the outcome of the model process. The caveat entails considering the decisions of whether to plough or not when recipients of food aid are assured of the

sustained provision of food aid and this should be treated as an agricultural commitment which the hypothesis transcends.

#### 7.5.4 The actual model

Specification of the empirical model transformed in log format to a linear -linear relationship is as follows:

$$\log\left(\frac{Pi}{1-Pi}\right) = \alpha + \beta_1 * LnX_1 + \beta_2 * LnX_2 + \beta_3 * LnX_3 + \beta_4 * LnX_4 + \beta_5 * X_5 + \varepsilon .(1)$$

#### 7.5.5 Results

**Table 7.8 Variables in the equation**

Variables	Coefficients	Standard Errors	Wald	Degrees of freedom	P-value.	Exp (B)
X <sub>1</sub>	.785	.287	7.507	1	.006	2.193
X <sub>2</sub>	-1.398	.687	4.139	1	.042	.247
X <sub>3</sub>	-.002	.001	3.914	1	.048	.998
X <sub>4</sub>	.554	.401	1.906	1	.167	1.740
X <sub>5</sub>	.252	.378	.445	1	.505	1.286
α	1.705	3.397	.253		.616	5.504

In Table 7.8 are five explanatory variables which were entered in the model. The predicting equation is:

$$\log\left(\frac{Pi}{1-Pi}\right) = 5.504 + 2.193LnX_1 + 0.247LnX_2 + 0.998LnX_3 + 1.740LnX_4 + 1.286LnX_5 + \varepsilon .(2)$$

Since coefficients of a logistics model differ from those of models which uphold the assumptions of OLS, there is a need to reflect the odds ratio of the variables that were statistically significant. The variables are: food cost or bill of a household, age of

respondent and the value of food aid, and the odds ratios of these variables are 2.193, 0.247 and 0.998 respectively.

The level of significance for the model is 5%. Although not displayed in Table 7.8, the model simulation yielded a Hosmer-Lameshow test result of a  $\chi^2$  value of 6.311, which is insignificant in view of its corresponding p value of 0.612. This then suggests that the model fits the data well. The probability of obtaining the  $\chi^2$  statistic of 18.627 is 0.002. Overall, the model is statistically significant because of its compatibility with the p value rule of thumb which was mentioned earlier. The model is 89% correct with regard to the overall percentage of cases that are correctly predicted.

#### **7.5.6 Interpretation of the model**

A unit change in the food bill of a rural household is expected to result in a 0.785 increase in the log-odds of the decision to farm, all other explanatory variables remaining the same. Intuition informs that when an impoverished rural household, which suffers from low income, faces high food cost, this can compel the household to engage more actively in opportunities at its disposal, in this case farming, before looking for support elsewhere. Thus high food cost reduces the options for manoeuvring and instead it presses a rural household to produce its own food. With surplus farm produce, a rural household stands a good chance of offering part of the yield for sale in order to earn extra income needed to buy other necessities. The average monthly food cost in a sample of 253 respondents is N \$369. Without other sources of income, this amount can be high enough for a rural household to struggle to afford it on a monthly basis. Thus an increase in food cost might compel rural households to plough their fields because not doing so means they risk having to rely on food aid.

When there is a unit change in the age of the head of a household, it is expected that this would reduce the log-odds of the decision to farm by 1.398, all other explanatory variables remaining the same. Intrinsically, the age of the head of a rural household proved to be significant when it comes to making farming decisions. The older the head of the rural household is, the less likely that the person will engage in farming activities. Thus there is an inverse relationship between the decision to farm and an incremental growth in the age of a head of a rural household. This point is valid, as evidenced by the fact that in the study population, 38% of respondents are at least 56 years of age. These are thus respondents who may have taken early retirement or are approaching retirement. The implication of age for farming decisions is that as heads of rural households become older, food aid provided to them on a sustained basis could influence their decision not to farm, but to rely on food aid. This relationship has been proven in this model.

A unit change in the value of food aid provided to respondents over an extended period of time would reduce the log-odds ratio of a household's decision to farm by 0.002, other explanatory variables remaining the same. It has been demonstrated that exposing rural households to receiving food aid for an extended period, which in this case is  $\geq 5$  years, could result in a negative outcome between food aid and the decision to farm. It means that the longer rural households in the study area are exposed to food aid, the more they will prefer to receive food aid rather than to farm their land. The negative relationship between food aid and the decision to farm is of interest to policy practitioners. Food cost, age of the respondent, and the value of food aid provided are significant, at p-values of 0.006, 0.042 and 0.048 respectively. Therefore,  $H_0$  is rejected

because the coefficients  $\beta_1$ ,  $\beta_2$  and  $\beta_3$  are statistically different from 0. Distance to the urban market and the total farm size proved to be insignificant.

## **7.6 Summary**

Two analytical techniques that were used in this chapter, namely factor analysis and logistics regression analysis, have proven useful. While using factor analysis, five factor-components were extracted, but only one composite variable was identified as being reliably useful in influencing a rural household to become eligible for receiving food aid. With the use of a logistics model, of the five explanatory variables that were entered in the model, food cost, age of the head of the household and the value of food aid provided to a household were significant variables that played a vital role in influencing a rural household's farming decisions with uninterrupted provision of food aid in place. The remaining two variables, size of the household and number of livestock units, were not helpful.

When considering policy interventions, these outcomes call for careful policy prescriptions, which can assist the livelihood course of rural households. In the next chapter, the focus will shift to the climate risk question considering the incomes of rural households.

## **CHAPTER 8: AN EMPIRICAL ANALYSIS OF THE IMPACT OF CLIMATE RISK ON INCOMES OF RURAL HOUSEHOLDS IN THE CAPRIVI REGION**

### **8.1 Introduction**

Rural households face various constraints on their livelihoods. Some of the livelihoods may not be directly affected by climate risk factors, but rather by other prevailing factors. It is the agricultural livelihood strategy that can easily be affected by the frontiers of climate risk. In this chapter, the objective is to study the economic effects of drought and floods, particularly on the incomes of rural households. As has been demonstrated, the greater part of the households which were sampled practised agriculture in one way or another. In addition to agriculture, selling of fish and other natural resource produce has supported rural households in their struggle to survive. Some of the constraints on the livelihoods of rural households will subsequently be discussed. Agriculturally based livelihood strategies are the main focal point in this chapter. It is on this premise that the current chapter serves to test the third hypothesis, which enquires into the effects of climate risks on rural households. Furthermore, the fourth objective and the fifth research question will be answered.

On the analytical front, this chapter places emphasis on the use of an unconstrained multivariate regression model to cascade the analysis. The sample is the 253 rural households which were surveyed in the study area. Since there is an underlying element of risk in this study, referrals to the work of others will help to cement the

theoretical exposition of the study with the aim of setting the scene for the empirical analysis that follows.

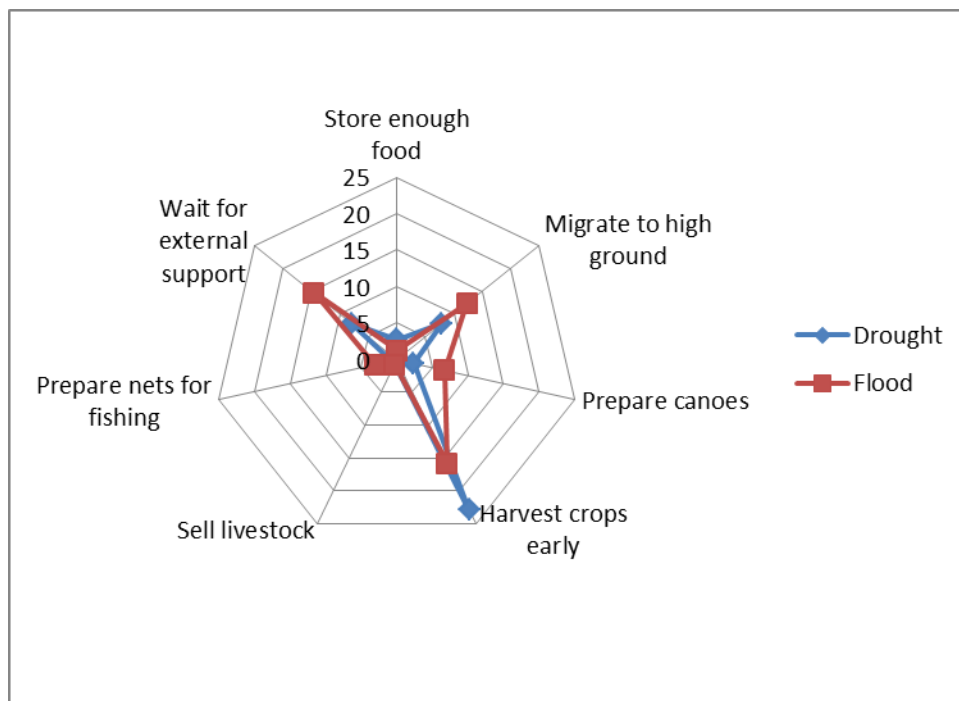
## **8.2 Risk and vulnerability**

### **8.2.1 Household attitude towards risk**

Members of rural households in the Caprivi region face uncertain lifestyles due to numerous social, economic, biological and environmental constraints in their lives. In order for these households to continue to exist and to avoid becoming extinct, they often take decisions on issues that affect their livelihoods. Of interest is the attempt to understand how they react to risk situations which then influence their choices of livelihoods they deem necessary to maintain and those they abandon. This would explain what drives them to seek to engage in certain coping strategies until the climate risk has passed.

In an attempt to understand rural farming households' attitude to risk, Tango International (2004) agrees that poor households derive their income from several sources, but some remuneration, especially for labour, may not be expressed in monetary terms but could be in the form of payment in kind. The risks which a rural household face can shape the behavioural approach to how such a household should carry out its daily activities. In light of this, some researchers have studied rural households' attitudes to risk and they have found that their attitude to risks may be influenced by various factors, such as the agro-ecological environment, types of crops preferred, geographical location, which includes the nature of the terrain, bio-factors of the farming community, such as gender, age, educational level, size of the

household and the farming household's income level (Bester *et al*, 1998). These views highlight the need to understand the attitudes to risk of rural farming households in the study area. The approach of taking into consideration the respondents' attitude to risk in the rural farming environment is important. Using a related method as the one Bester *et al* (1998) followed, it was decided that rural households in the study area needed to be asked how they would react to certain risk situations. Below is a figure that sheds more light on the reactions of rural households to circumstantial risk constraints of drought and flood.



**Figure 8.1: Households' reaction to looming drought and flood**

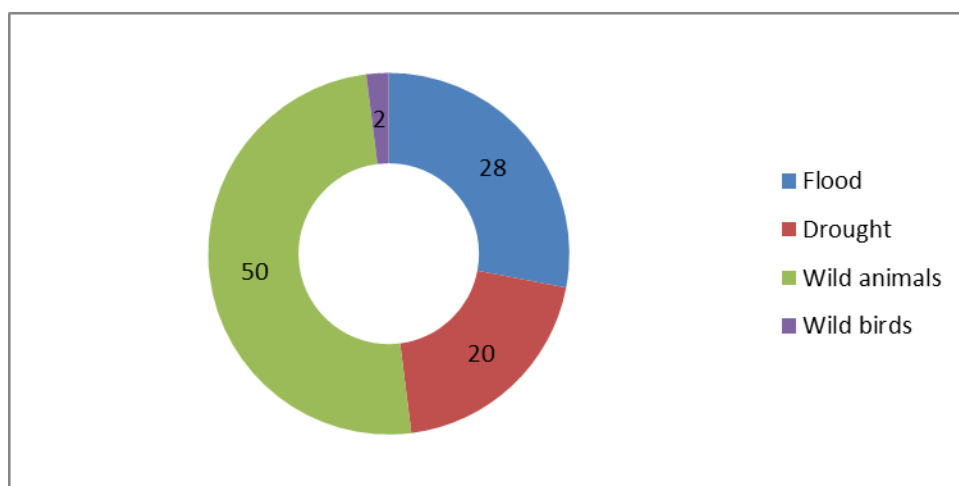
It was clearly evident that households react to climate risk factors before they strike. Figure 8.1 portrays some of the common coping and survival mechanisms households pursue when faced with drought or floods. These reactions occur in preparation for the eventualities before their actual occurrence. Most of the preparatory mechanisms seem to be geared towards mitigating against climate risk factors. As reflected,



harvesting crops early is highly regarded for both eventualities, with 22% and 15% in preparation for drought and flood respectively. Before a flood strikes, 14% of respondents believe in waiting for external assistance, whereas about 7% react in the same way when drought is looming. A reasonable proportion of respondents, forming 12%, would migrate to higher ground when floods are imminent, whereas 7% would react in the same way during imminent drought, which is likely to be a mechanism they enforce in search of better pastures for their livestock. Some would prepare canoes and nets and ready themselves to resort to fishing as a coping strategy, depending on whether drought or floods occur first.

### 8.2.2 Causative factors to poor harvest

Since maize is the mainstay of agricultural crop production in the study area, respondents were asked about causes for losses to their maize harvest in the 2007 harvest. The results of their responses appear in Figure 8.2.



Source: Own survey (2007)

**Figure 8.2: Causes for losses to the 2006/7 maize, millet and sorghum crop**

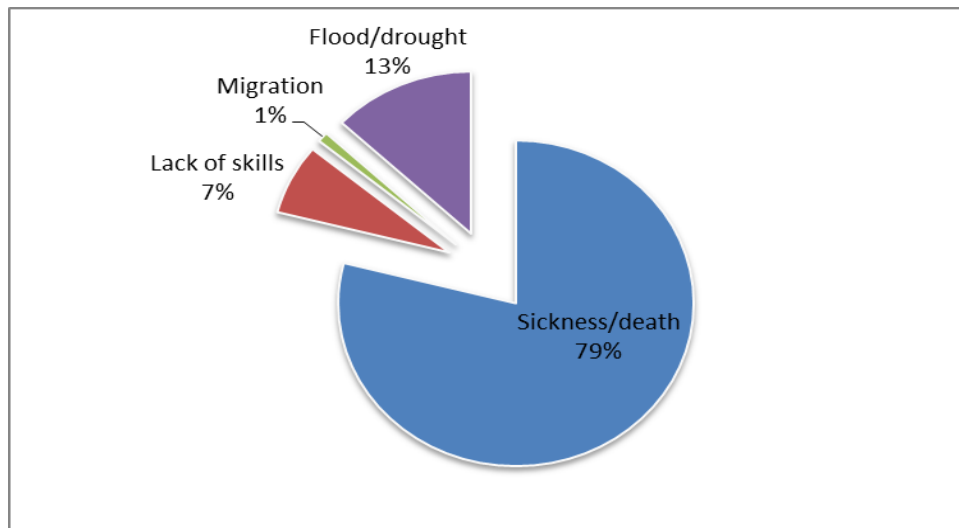
Community-based natural resource management is a concept conceived with substantial benefits for rural communities in mind. While this concept has led to the establishment of community conservancies in the study area, it has also led to increasing losses of crop produce in rural areas. As shown in Figure 8.2, the 2006/7 harvesting season saw un-harvested crops destroyed by wild animals. The common culprits are elephants, buffaloes, hippopotami and porcupines. It is noticeable that 50% of the respondents have cited wild animals as the cause of loss in their crop harvest in 2007.

Since climate risk is a serious challenge to rural farmers, 28% attributed the loss of their maize harvest on floods in the same year. Another 20% pointed the loss of maize to drought. With regard to wild birds, only 2% of respondents blamed the loss on birds. The establishment of conservancies has also resulted in incidents of human/animal conflict in which people have lost their lives. However, no statistics are available on human/animal conflict for inclusion in this thesis. Respondents have nevertheless reported such events as common. Furthermore, such incidents are often reported in newspapers in Namibia.

### **8.2.3 Direction of the standard of living**

Respondents were asked to use their intuitive knowledge on how they viewed changes in the standard of living in their households. This means that a respondent needed to rely on information available to him or her as the head of the household to indicate the direction of the status of the household in terms of whether the standard of living was improving or declining. Furthermore, the respondents were asked to suggest what

they viewed as appropriate means or methods to render some form of stability, should the household's standard of living be found to be declining. It was found that 83% of the respondents perceived the standards of their households as getting worse, whereas the remaining 17% believed otherwise.



Source: Own survey (2007)

**Figure 8.3: Perceptions of households' standards of living**

Four key perceptual causes of declining standards of living are stated in Figure 8.3. These findings are based on responses from all 253 respondents. The sickness and/or death of a family member(s) were the main cause of the declining standard of living of rural households, as supported by 79% of the respondents. More detail on the types of sicknesses that contributed to decline in the standards of living and death and their effects on the efficiency of rural household labour will follow later. The second cause of a decline in the standard of living was perceived to be related to drought and floods (13%), while lack of skills trails with a response rate of 7%.

**Table 8.1: Common diseases in the study area**

Percentages		62	7	4	1	26
Diseases	Malaria	Tuberculosis	Arthritis	Stomach	HIV & AIDS	

Source: Own survey (2007)

Five types of diseases were found to be prevalent in the study area, as presented in Table 8.1. Of the respondents, 62% cited malaria as a common disease that kills people in the study area. The reason why malaria is so prevalent is that many rivers and swamps are perennial. HIV and AIDS remain common, with 26% of respondents blaming it for frequent interruptions in the availability of household labour and for deaths. The situation concerning HIV and AIDS is exacerbated by the fact that health facilities are distant from many rural communities in the study area. The findings on HIV/AIDS prevalence in the study area are well supported by what Jayne *et al* (2005) found in their study of HIV/AIDS in the agriculture sector in Eastern and Southern Africa. They argue that HIV/AIDS is to blame for reduced areas of planted land, that HIV/AIDS can compel a household to opt for less labour intensive crops and is also responsible for declining rural livelihoods and agricultural production. Arthritis was also common in the study area, but appears to be confined mostly to the elderly members of the rural households.

In an attempt to elicit suggestions on interventions necessary to reverse declining standards of living, respondents mentioned the need for the government to assist with

financial support in the form of either general loans or agricultural loans and grants to communities. This suggestion was supported by 68% of the respondents. The argument is valid, given the current lack of financial services providers in the study area. However, lack of infrastructure and lack of skilled people in rural households are some of the deterrents to the presence of service providers. For these and other reasons, doing business in remote areas attracts high transaction costs.

The need for community projects was the second suggestion, made by about 14% of respondents. To date, very little if anything has taken place with regard to community projects, resulting in high unemployment. Tractors are scarce, as was already stated in Chapter 5 (Section 5.5.2). Tractors are seen by 13% of the respondents as a necessary service. This entails tractors being contracted to plough for rural communities. Since crop production is widely practised in the study area, the presence of tractors to provide ploughing services to the communities is crucial. This can escalate the size of land that can be cultivated, but also assist those whose cattle are not in good shape for ploughing slightly more land than usual. Increasing the supply of food aid and old age pensions is supported by 2% and 1% of respondents respectively. The next part of this chapter is structured by means of a multivariate econometric model to test the relationship between the quantitative response and quantitative explanatory variables.

Despite a rural household's access to various forms of livelihood, this study adopts the notion proposed by Ellis (2000) in which income is regarded as the most direct and measurable variable needed when studying livelihood. In order to test the third

hypothesis that has to do with the effect of climate risk<sup>21</sup> on livelihoods, income will be treated as a proxy that captures the effects of climate risk in various agricultural enterprise activities. It should be understood that the study is on rural households whose farming practices are mainly subsistence-focused with less focus on marketing the produce. The applicability of income consideration is done using a multivariate regression model that follows below.

### 8.3 Multivariate econometric model

#### 8.3.1 Underlying model issues

A representative multivariate model can be written as follows:

$$Y_i = \phi + \sum_{i=1}^n \phi_i \nabla_i + \varepsilon_i$$

where:

Y = household income in N \$

$\phi$  = constant

$\phi_i$  = the parameters

$\nabla_i$  = the explanatory variables

$\varepsilon_i$  = a disturbance term.

The dependence method of this econometric model assumes un-biasedness in the estimation of parameters. The F test is used to test the significance of the entire model

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<sup>21</sup> Note: Climate risk is considered an implicit factor in farm or agricultural outputs and also in natural resource harvests. Thus it is captured in the enterprise computations such as crop and animal sales.

while the t test is used to test the significance of individual variables. The Total Sum of Squares is the analysis of variance (ANOVA). The F in this model is given by

$$= \frac{\hat{\phi}_i^2 \sum \nabla_i^2}{\sum \hat{\varepsilon}_i / (n - 2)}$$

### 8.3.2 Actual model

The actual model consists of a response variable and some explanatory ones. The response variable is rural household income (RHI).

**Table 8.2: Explanatory variables for the RHI model**

<i>Variables</i>	<i>Code</i>	<i>Description</i>	<i>Expected sign</i>
<b><i>Pension</i></b>	$\nabla_{1i}$	Continuous variable expressed in N \$	+
<b><i>Value of livestock</i></b>	$\nabla_{2i}$	Continuous variable expressed in N \$	+
<b><i>Value of food aid</i></b>	$\nabla_{3i}$	Continuous variable expressed in N \$	+
<b><i>Age of the head of the household</i></b>	$\nabla_{4i}$	Expressed in years	$\pm$
<b><i>Household size</i></b>	$\nabla_{5i}$	Expressed in numbers	-

Variables in Table 8.2 will now be explained. A pension fund, in the form of old age pension or retirement pension and annuities that accrue, is essential to the survivability of a rural household. Pension pay-outs serve as a direct cash injection in

the income structure of the rural household. As such pension pay-outs are expected to have a positive relationship to the income component of the household.

The value of livestock is one of the positive contributors to the income structure of rural households. Rural farmers rear livestock in the form of cattle, goats and chickens. Despite the subsistence-bound purpose of rearing livestock, livestock is partially kept as income generators or as marketable goods. It is from the sale of any of the livestock mentioned that rural households can potentially generate income to meet the needs of the household. Thus a positive relationship is anticipated between the value of livestock and the income structure of the household.

The value of food aid is also an important variable in the rural household income model. Usually, food aid is received to mitigate the crisis of food shortage in a household. Value is attached to the food parcels that rural households receive in emergencies. In this study, the value of food aid parcels has been dealt with in Section 7.5.1. When a household consumes food aid, it consumes the value of the food aid which, if not received, could have meant that the household would have had to pay for it. Thus there is a positive relationship between the value of food aid at the disposal of the household and the income structure of the household.

The age of the head of the household is important both in terms of experience of ending for the household and of energy required for physically demanding activities. Members of the household who are older than 60 years are eligible for receiving old age pension. The relationship can be either way, implying that age could have positive and negative implications.



Household size is a direct reflection of the food budget of a household. This reflects how much income the household needs to remain alive. The bigger a household is the more household labour will be available to provide in the livelihood needs of the household. As for the relationship, it is expected to be negative in the income structure of a household.

The model can functionally be written as follows:  $\text{LnRHI} = f(\text{Ln}\nabla_1, \text{Ln}\nabla_2, \text{Ln}\nabla_3, \text{Ln}\nabla_4, \text{Ln}\nabla_5)$ . By decoupling the model, the response variable that assumes a natural logarithm RHI is composed of remittances, income from the sale of milk and the value of the agronomic crops which the household produced in 2007.

### 8.3.3 Results

Two important tables are presented, namely the analysis of variance table and the coefficient table.

**Table 8.3: Analysis of variance**

Model components	Sum of Squares	Degrees of freedom	Mean Square	F	P-value
Regression	34.170	5	6.834	220.32	.000
				6	
Residual	7.661	247	.031		
Total	41.831	252			

As can be seen from Table 8.3, there are five degrees of freedom. The significance level is 5%. The F statistic is 220.326. At this point  $t^2$  is approximately equal to the F test. The F test measures the suitability of the overall model and is in this context significant with a p-value of 0.000. The simulation also yielded an adjusted  $R^2$  of 80.8%, which shows a good and reliable coefficient of determination.

**Table 8.4: Rural household income coefficients**

<i>Variables</i>	<i>Coefficients</i>	<i>Std. Error</i>	<i>T</i>	<i>P-value.</i>
$\alpha$	5.674	0.051	111.940	0.000
$\nabla_{1i}$	0.001	0.000	31.364	0.000
$\nabla_{2i}$	1.720E-5	0.000	2.223	0.027
$\nabla_{3i}$	0.010	0.004	2.392	0.018
$\nabla_{4i}$	0.001	0.001	1.781	0.076
$\nabla_{5i}$	-0.018	0.017	-1.102	0.271

The results of the simulation are presented in Table 8.4. Coefficients of explanatory variables, the t-test results and also the significant scores are all included.

The model with fitted data is  $\text{LnRHI} = 5.674 + 0.001\text{Ln}\nabla_1 + 0.00001720\text{Ln}\nabla_2 + 0.010\text{Ln}\nabla_3 + 0.001\text{Ln}\nabla_4 - 0.018\text{Ln}\nabla_5 + \varepsilon$ .

### 8.3.4 Interpretation of the model

An F test of 220.236 at 5% level of significance recorded a p-value of 0.000, which makes the F test statistically significant. Thus the model is tenable. The hypothesis that  $H_0: \phi_i = 0$  was rejected for the alternative hypothesis, which provides that  $H_1: \phi_i \neq 0$ . With this outcome the probability of committing a Type I error was very small. The acceptance of the alternative hypothesis means that explanatory variables were responsible for changes in the income of the rural households. Among the explanatory variables that were entered in the model are pension (old age and retirement annuities) fund, the value of livestock owned by a rural household and the value of food aid received by a rural household. Again as a rule of thumb, for a variable to be statistically significant, its p-value should be  $\leq 0.005$  when the level of significance is 5%. When applying these criteria to the model results, it shows that the three variables pension fund, the value of livestock owned by a rural household and the value of food aid received by a rural household were statistically significant with p- values of 0.000, 0.027 and 0.018 respectively.

On the coefficient side, a variable may have little impact on the dependent variable but it can remain statistically significant. An extension on this is that instead of considering coefficients that are too close to zero as zero, the slopes of their t statistics should not be ignored (Ghadim *et al*, 2005; Alemu *et al*, 2003). Following the insightful advice of Ghadim *et al* (2005) and Alemu *et al* (2003), in the current model a unit change in the amount of pension fund in the hands of a rural household could lead to an increase in the income of the respective rural household by 0.001, holding all other explanatory variables constant. A unit increase in the value of livestock in

the hands of a rural household could result in an increase of 0.00001720 in household income while all other explanatory variables are held constant. Again, a unit increase in the value of food aid received by a rural household means an increase of 0.010 in the income of a rural household, all other things remaining constant. With regard to the t statistics, pension fund (31.364), the value of livestock (2.223) and the value of food aid (2.392) are all statistically significant, as their t values are  $\geq 2$ . The significance of the t values of the three explanatory variables corresponds in acceptance with their p values, which were discussed earlier. As for the other two explanatory variables, age of the head of a household and household size, their t statistics and p values rendered them insignificant. Overall, the adjusted  $R^2$  of 80.8% is acceptable in that 81% of the variation in rural income is explained by the explanatory variables that were included in the model.

The results obtained from the model, indicates how climate risk affects the rural household. High rainfall and drought have an impact on the income of the household in that the value of food at the disposal of the household may be reduced when climate risk factors are at the extreme. This aspect is implicit in the response variable that was tested in the model, since the total harvest is a function of a number of factors, including rainfall. At the time when a harvest is obtained, climate risk factors would have already had their effect on the crop produced while it was still in the field. Another way to look at it is that when severe climate risk factors are experienced, the value of food aid provided may be reduced owing to the value of own produce in the response variable, which in this context would be very low or non-existent. It is by theoretical implication, that when this happens, it would have a reduced effect on the household income. Though both drought and flood affect livestock, drought can be a

more serious set-back to the livestock of a rural household. The effect occurs in terms of reduced value of livestock owned by the household. Should this occur, there will be a transitory effect on the income of the household.

#### **8.4 Summary**

Agriculture, particularly crop production, is a cross-cutting activity of every rural household in the study area. Anything that affects crop harvests will surely affect the income and/or survivability of a rural household in the study area. The main causative factor to a reduced harvest in 2007 was wild animals. Climate risk factors are also to blame, but in 2007 they were less devastating compared to wild animals. These two ills have the capacity to reduce the scope of timing to plough and the survival ability of rural farmers.

Various factors inform the direction of the standard of living of rural households. Diseases and death, if and when these occur, were identified as the main contributors to declining standards of living. Together with reduced harvests, diseases and death can potentially make rural households dependent on food aid. Malaria is widespread and HIV is also on the increase. If not addressed, Malaria and HIV will continue to reduce the ability of affected and infected rural households to fend for themselves. Lack of irrigation practices, given the erratic nature and variability of rainfall, holds serious consequences for crop farming by rural households. It was demonstrated that crops that are harvested in the study area are a dietary source and an income earner for rural households.

Food aid is pertinent to complementing the household food basket when households experience poor harvests. Thus reducing the provision of food aid in abnormal rainfall times could expose a rural household to reduced income, since food will have to be bought from urban areas. During severe drought and flood, if food aid is not provided, rural households may possibly starve to death. Livestock is essential to the survival of rural households in terms of income generation from their sale. Unlike crop production, livestock marketing in the Caprivi region is becoming confined to the slightly well-to-do rural households. Finding ways of increasing the income of rural households would thus improve the standard of living of the poor.

## **CHAPTER 9: CONCLUSIONS AND POLICY RECOMMENDATIONS**

### **9.1 Introduction**

This chapter provides a plausible picture on the way forward. This is done by exposing the key thesis tenets, which are its objectives, research questions and hypotheses and the way in which these have been achieved, answered and tested respectively. The way forward is also indicated through policy recommendations and opportunities for further research.

### **9.2 Key tenets**

The thesis is structured to achieve the overall objective of seeking policy recommendations that would augment livelihood strategies of rural households in the study area. Specific objectives had to be met, namely to explore historical and current economic activities and coping strategies to determine their influence on the lives of rural households and how these changed over time; to study the role of socio-economic rights in the strife to enhance livelihoods; to analyse how the provision of food aid affects agricultural production in rural areas; to study the economic effects of drought and floods on current livelihood strategies of rural households and to suggest strategic risk mitigation policy recommendations and survival climate risk management approaches to sustain livelihoods in the rural economy.

In order to achieve the stated objectives, five research questions were addressed, namely what changed in the exogenous or endogenous environment to render the

strategies of rural communities less efficient; how a socio-economic rights approach can assist in devising workable solutions that enhance livelihood strategies; what rural households are doing now and in what ways they react that fail to internalise and accommodate changes; how the provision of food aid affects agricultural production aspirations of the recipients of this aid and how climate risk affects rural households.

In the process, the following hypotheses were tested: current rural households' coping strategies are no longer helpful to sustain livelihoods since these have been replaced by food aid; food aid provided over a period of time has no effect on agricultural production commitments of recipients of this aid and climate risk in the form of drought and floods has no effect on the livelihoods of rural communities in the Caprivi region. The pre-set objectives were achieved by means of answering the research questions. The achievement of the objectives is illustrated in the manner in which the research questions were answered and in the outcome from testing the specified hypotheses.

The process of answering the research questions unfolded as follows: the first research question enquired about **what changed in the exogenous or endogenous environment to render the strategies of rural communities less efficient**. It has been evidenced that the agronomic and animal husbandry components of the agricultural livelihood strategy are no longer as they used to be. Changes have been recorded in the general decline in livestock numbers that were owned in 2007 when compared to the livestock that were owned in 2003. In this thesis livestock is a collective term which represents cattle, goats and chickens. On the agronomic side (maize, millet and sorghum), the harvest in terms of numbers of 50 kg bags was less



in 2007 compared to what it was in 2003. Moreover, the biannual harvesting approach has been abandoned because of the frequent inundation of river-based crop fields that are seen to hold water for a very long time. This situation has rendered the biannual harvesting practice untenable. The proposition that suggests that current coping strategies are no longer helpful was also confirmed.

The second research question asks **how a socio-economic rights approach can assist in devising workable solutions that enhance livelihood strategies**. The universal view on the role of socio-economic rights is viewed as useful in addressing the concerns of poor rural communities. Namibia as a democratic state allows constituency councillors to be chosen by the residents of the constituencies. The expectation is that councillors will represent the communities at government and related forums. It was revealed in the survey of the literature on socio-economic rights that the communal differential obligation suggests that rural communities should benefit from proper representation. Thus, if considered in political circles, the communal differential obligation can become useful in redressing past imbalances in the development of constituencies in the study area but also in addressing backwardness in the Caprivi region itself. Although this sounds noble, the challenge that remains at present is that socio-economic rights are not well articulated in the Namibian constitution and in addition these rights are not easy to enforce, but with political will they can be enforced in future.

The third research question enquires **what rural communities in the study area are doing now and in what ways they react that fail to internalise and accommodate changes**. It emerged that rural households in the study area are involved in several

coping strategies but the central livelihood strategy is agriculture. However, their involvement in coping strategies is minimal, since when allocated more labour hours than agriculture, these coping strategies could potentially become subversive to the very established traditional livelihood strategy, which in this case is agriculture. A greater shift in labour allocation may take place, especially when households face urgent searches for sustainable livelihoods. In view of these events, households are vulnerable to changes in policies that fall in the sphere of the environmental and tourism sector, which encompasses CBNRM. Vulnerability occurs as a result of the unleashing of community conservancy establishments, which have brought about increased destruction of crops by wild animals.

It has been confirmed that the concomitant throes to the agricultural livelihood is in the destruction of crops by wild animals than from climate risk, although the negative effects associated with drought and floods cannot be ignored. This shows that there is lack of a clear policy interface between CBNRM on the one hand and advancing communal agricultural activities on the other hand. This is repugnant and compromises the established agricultural livelihood strategy of rural communities in the study area. In the nascent phase of the conundrum in which there is a nested agricultural policy seeking to advance rural agricultural practices on the one hand and an environmental and tourism ethos which too seeks to empower communities through conservancies, there appears to be a lack of coordination which can be addressed by the harmonisation of the two policy frameworks. Doing so will support the efforts of rural households to augment the food basket without having to rely on food aid.

The fourth research question asks **how the provision of food aid affects agricultural production aspirations of the recipients of this aid.** The hypothesis associated with the research question that was tested is whether or not food aid provided over a period of time could negatively affect agricultural production commitments of recipients of this aid. In the first place it was made clear that food aid is pertinent to the survivability of those in need of it. Food aid is a temporal provision and reliance on it may back-fire in the long term due to likely dependence syndrome that might arise. In line with these views, rural households are eager to produce their own food. However, the circumstantial challenges posed to rural households compel them to rely on food aid. Because of the economic consequences of long-term provision of food aid for the recipients, the decision to produce their own food when the rolling out of food aid was guaranteed was considered. It is upon this understanding that the hypothesis was tested.

Key outcomes are that certain factors make it possible for a household to become eligible for receiving food aid. The first factor component is the capacity to farm, which suggests that a household that does not own land, has little or no farming experience, is not adapted to drought and floods, and suffers from new problems that were not experienced before, such as unprecedented destruction of crop fields, could become eligible for receiving food aid. The second is climate risk awareness; a household which is not abreast with early warning systems and one whose members have no education or only elementary education can suffer in terms of making progressive decisions. Such a household may consequently need food aid.

The third is household economic status; a household that receives no income and has no assets such as cattle, goats, chickens or other assets that can be sold could easily become dependent on food aid to prevent it from starving. The fourth is past economic opportunities, for a household that abandons economic opportunities which kept it going in the past and can still help it survive would easily become vulnerable to food insecurity unless it is helped in one way or another. The last factor is household labour fitness; a household that has terminally ill members or ones who suffer from various illnesses could become dependent on food aid in order for its members to survive.

In respect of the decision to farm in the context of guaranteed food aid, the outcome is that in the long term the provision of food aid could negatively affect a rural farmer's decision to farm. Receiving food aid will not automatically become a disincentive for rural households to desist from continuing to farm; it happens only when all other factors are held constant. Prolonging the provision of food aid for much longer than five years and under changing climatic conditions needs to be tested to determine its impact, but in this study it was confirmed that provision of food aid for a period of at most five years does have an impact.

Other influential factors in the decision to farm are the cost of food and the age of the respondent. As food prices surge, a rural household will plough its field. This outcome is pragmatic, because rural households are not totally dependent on retail goods but more on their own produce. Therefore, if the household had been dependent on retail goods, maybe food aid would have been opted for instead of producing their own food through ploughing. The age of the respondent is also critical in deciding to

plough. The older generation believe in a certain line of thinking. The many years which old people have survived have left them with experience on how to manoeuvre to maintain their livelihoods. Droughts and floods are not new to them but reduced energy to engage in physical activities could result in old people preferring to receive food aid rather than to struggle with ploughing

The last research question asks **how climate risk affects rural households**. Here reference is made to how drought or floods affect rural households. The statement of proposition for this question is that climate risk in the form of drought and floods has a negative effect on the livelihoods of rural communities in the Caprivi region. The model used to answer this question hinges on the assumption that at the time of harvesting, climate risk factors would have taken their toll on the produce and thus on the value of the harvest. Thus, technically, the model assumes climate risk as an implicit factor which needed to be studied from an income point of view.

The outcome has shown that a pension that accrues to the head of the household has a positive influence on the income structure of the household. This means that increasing the old age pension or retirement pension fund of the head of the household will translate into an improvement in the income of the household, all other variables being constant. Livestock is a marketable product which can earn needed income for rural households. Therefore, the increasing value of livestock can positively influence the income structure of the household. Climate risk in the form of drought has a tendency to diminish grazing pastures, leading to many head of livestock starving and dying. This confirms that severe floods and drought are both catastrophic to the

livelihood of a rural household. Thus a reduction in the value of livestock in the hands of a household could easily reduce the total income of the rural household.

The value of food aid is also important in that as the value of food aid increases, it exerts a positive influence on the income structure of the household. Food aid replaces the value of food the household could have purchased and hence it is a valuable contributor to the income structure of the household receiving food aid. Therefore, climate risk factors pose a negative effect to rural households, as they have a negative impact on the rural household's income. In essence, the objectives that were specified have been achieved by means of research questions that were answered and hypotheses that were tested.

### **9.3 Policy recommendations and way forward**

#### **Indigenous knowledge**

This thesis has revealed weaknesses in the livelihoods of rural communities. Since the emphasis is on enhancing livelihood strategies, some areas need to be considered at a policy level. Since time immemorial, rural households in the Caprivi region have used various coping strategies, some of which they still practise, but others have been done away with. In order to learn from such experiences, there is a need to document the indigenous knowledge of rural households. This will create an opportunity for others to learn from but also for policy-makers to establish interventions based on such historical practices so as to improve the livelihoods of those in need.

### **Agricultural infrastructure**

As food aid continues to be provided to rural households in the Caprivi region, the unintended consequences of having to rely on it are increasingly catching up with rural households. As the provision of food aid becomes common, coping strategies are being crowded out by food aid. This may weaken the abilities of rural households to support themselves in critical times affected by climate risk factors. Thus there is a need to support the efforts of rural households, especially to strengthen their main source of livelihood, namely agriculture. Vegetable gardening is hampered by lack of irrigation infrastructure. The government and developing partners should consider introducing irrigation practices to rural households so that they may undertake self-sustaining activities. Investing in dams and water-catchments facilities holds better prospects for rural farming households. These types of community investments are likely to bring about other multiplier benefits, which will in turn benefit rural households.

### **Health needs of rural workers**

The prevalence of malaria and the spread of HIV and AIDS have negatively affected the availability of labour to sustain livelihood activities that improve the standard of living of rural households. In remote areas, people are still not very knowledgeable about how to protect themselves against mosquitoes and against the spread of HIV. More educational programmes are needed to change the way in which rural dwellers manage their day-to day-lives. Clinics are also distant from villages and more investment in building much needed health facilities will have a positive impact on the lives of rural people.

In line with the declining availability of labour, especially to agriculture, the means of haulage available to rural households also need to be diversified. As more people are infected with HIV and others die, remaining members of the households face many labour demands. Further, cattle numbers are declining in the region. In this context there is a need to develop alternative forms of haulage to assist poor rural households. Despite the fact that conservation agriculture is preferred because of its long-term benefits to the environment, tractors and other types of small implements should also be considered to enhance the agricultural livelihood strategies of rural households.

### **Access to finance and to government projects**

Access to rural finance and microfinance needs to be encouraged. At the time of the survey, there were no financial services providers to these poor rural communities, since those situated in urban areas have stringent requirements, which rural communities can hardly meet. The main deterrent is the collateral requirement which, is far beyond the reach of rural communities. Some form of mediation by the government is needed in order to assist rural households to gain access to financial products.

The needed finance service provision to rural communities can improve the rural retail businesses of mini grocery shops that are also prevalent but do not have access to finance. Without financial services, rural communities in the study area may sink further into poverty and lose their already established agricultural livelihood strategy. Quarantine facilities for cattle sellers should also be built closer to rural communities. At the moment these facilities are located far away and to reach them could be prohibitive to poor households in view of the transport costs involved.



Rural households in the study area belong to neither cooperatives nor the government-initiated green scheme. The households in the study area need some form of farmer support systems to improve their livelihoods. Their exclusion from the green scheme, about which they have only heard that it is operational in other regions, denies them an equal footing with their counterparts in other regions of Namibia. There is a need to roll out the green scheme in the study area but also to introduce other community projects so that the unemployed and economically vulnerable rural communities may benefit and also complement their current livelihood and coping strategies. The resultant multiplier effect of this intervention is the opportunity for rural households to participate in organised markets. This in turn broadly expands and adds value to the rural economy in the Caprivi region.

### **Community-based natural resource management and agricultural policy conflict**

The policy conflict between CBNRM and agricultural policy needs to be resolved and harmonised. For the present and as it has been dealt with in the thesis, there is conflict about establishing conservancies in areas where rural communities practise crop production. The lack of harmonisation between these two sectors is will likely worsen the ability of rural communities in sustaining themselves. Although it is the purpose of both these sector policy instruments to improve the lives of rural communities, what has actually happened in this regard has had unintended consequences for rural communities. Thus the policy gap which exists needs to be addressed to prevent the affected rural communities from losing their grip on self-sustaining rural livelihoods. Animal/human conflict that comes with establishing community conservancies is but a glimpse of the deep-seated frustration of the rural community with the policy gap.

Besides looking at interventions that are tangible, rural communities also need to be assisted with the provision of access to reliable weather information. Until now, climate risk factors have been the subject of much speculation by rural communities. Warnings from the weather bureau have often missed the actual magnitude of climate risk factors. Often rural farmers are caught off guard by weather changes and especially floods. As a result of the influence of the Zambezi River upstream activities on the Zambian side, weather predictions which rural communities have been receiving on the Namibian side often miss the realities that go with activities on the Zambian side. The outpouring of the Zambezi River into the outskirts of the Caprivi region has for decades been a challenge to rural farming households in the study area.

In order to address weaknesses in the early warning system, there is a need for an improved early warning system so that rural communities may find better ways of manoeuvring to survive in the region prone to climate risk. Related to this is the need to invest more in the regional extension services. Training of extension service workers needs to be tailor-made to the needs of communities but introducing a process of monitoring and evaluation of the extension services may even be more helpful. Further, training extension officers to have specialised knowledge in the areas of agricultural enterprise as well as knowledge of game farming and wildlife conservation, as these are now at the doorsteps of rural communities will be more helpful to the livelihood endeavours of rural communities.

#### **9.4 Identified areas for future research**

Future research should focus on quantifying the benefits of community conservancies in order to find a better way of strategising on the CBNRM concept to assist rural communities that may want to explore its economic potential amid the existing coping and livelihood strategies. Furthermore, studying the existing agricultural enterprise opportunities under various rainfall scenarios backed up by time series rainfall data will assist in determining the types of agricultural investments required in the study area and will also attract more investments in the rural agricultural sector. Finally, Namibia should develop revisable gross-margins for every region in order to direct agricultural investment objectively to the regions where it is needed most and where it may be economically attractive.

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## APPENDIX

### Annex A: Individual Contingency Tables

#### Annex A1: Contingency table for Maize

Maize ownership in 2003 and in 2007						
Categories	Total bags	Maizei	Maizej	E <sub>i</sub>	E <sub>j</sub>	Computed Chi_Square
<1 bag	72	2	70	36	36	64.23611
1-5 bags	119	30	89	59.5	59.5	29.38029
6-10 bags	88	57	31	44	44	7.693182
11-20 bags	100	98	2	50	50	92.17
>20 bags	67	65	2	33.5	33.5	59.25373
Total Sum	<b>446</b>	<b>252</b>	<b>194</b>	<b>223</b>	<b>223</b>	<b>252.7333</b>

#### Annex A2: Contingency table for Millet

Millet ownership in 2003 and in 2007						
Categories	Total bags	Millei	Millej	E <sub>i</sub>	E <sub>j</sub>	Computed Chi_Square
<1 bag	84	54	30	42	42	6.869048
1-5 bags	76	59	17	38	38	23.22368
6-10 bags	19	14	5	9.5	9.5	4.315789
11-20 bags	8	7	1	4	4	4.625
>20 bags	6	5	1	3	3	2.833333
Total Sum	<b>193</b>	<b>139</b>	<b>54</b>	<b>96.5</b>	<b>96.5</b>	<b>41.86685</b>

Annex A3: Contingency table for Sorghum

<b>Sorghum ownership in 2003 and in 2007</b>						
<b>Categories</b>	<b>Total bags</b>	<b>Sorgi</b>	<b>Sorgj</b>	<b>E<sub>i</sub></b>	<b>E<sub>j</sub></b>	<b>Computed Chi_Square</b>
<1 bag	72	25	47	36	36	6.736111
1-5 bags	125	72	53	62.5	62.5	6.736111
6-10 bags	63	56	7	31.5	31.5	38.12698
11-20 bags	19	19	0	9.5	9.5	19.05263
>20 bags	4	4	0	2	2	4.25
<b>Total Sum</b>	<b>283</b>	<b>176</b>	<b>194</b>	<b>141.5</b>	<b>141.5</b>	<b>71.06173</b>

Annex A4: Contingency table for Cattle

<b>Cattle ownership in 2003 and in 2007</b>						
<b>Categories</b>	<b>Total</b>	<b>Cattlei</b>	<b>Cattlej</b>	<b>E<sub>i</sub></b>	<b>E<sub>j</sub></b>	<b>Computed Chi-Square</b>
1 to 5	<b>86</b>	59	27	43	43	11.91860465
6 to 10	<b>60</b>	35	25	30	30	1.683333333
11 to 15	<b>28</b>	12	16	14	14	0.498754153
16 to 20	<b>41</b>	16	25	20.5	20.5	1.724252492
21 to 30	<b>21</b>	10	11	10.5	10.5	0.095238095
31 to 50	<b>19</b>	11	8	9.5	9.5	0.526315789
>51	<b>22</b>	3	19	11	11	2.988372093
<b>Total sum</b>	<b>277</b>	<b>146</b>	<b>131</b>	<b>138.5</b>	<b>138.5</b>	<b>19.43487061</b>

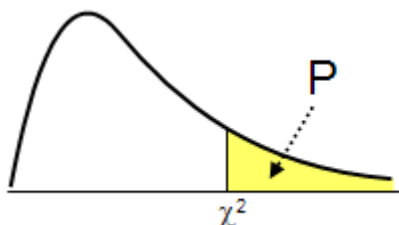
Annex A5: Contingency table for goats

<b>Goat ownership in 2003 and in 2007</b>						
<b>Categories</b>	<b>Total</b>	<b>Goatsi</b>	<b>Goatsj</b>	<b>E<sub>i</sub></b>	<b>E<sub>j</sub></b>	<b>Computed Chi-Square</b>
1 to 5	<b>43</b>	31	12	21.5	21.5	8.418
6 to 10	<b>40</b>	26	14	20	20	3.625
11 to 15	<b>20</b>	8	12	10	14	0.85
16 to 20	<b>13</b>	2	11	6.5	6.5	6.307
21 to 30	<b>4</b>	1	3	2	2	1.25
31 to 50	<b>1</b>	0	1	0.5	0.5	2
<b>Total sum</b>	<b>277</b>	<b>68</b>	<b>53</b>	<b>60.5</b>	<b>60.5</b>	<b>22.451</b>

Annex A6: Contingency table for chickens

<b>Chicken ownership in 2003 and in 2007</b>						
<b>Categories</b>	<b>Total</b>	<b>Chickensi</b>	<b>Chickensj</b>	<b>E<sub>i</sub></b>	<b>E<sub>j</sub></b>	<b>Computed Chi-Square</b>
1 to 5	<b>88</b>	72	16	44	44	35.647
6 to 10	<b>65</b>	42	23	32.5	32.5	5.569
11 to 15	<b>35</b>	19	16	17.5	17.5	0.285
16 to 20	<b>30</b>	10	20	15	15	3.366
21 to 30	<b>21</b>	8	13	10.5	10.5	1.238
31 to 50	<b>15</b>	3	12	7.5	7.5	5.466
>51	<b>5</b>	0	5	2.5	2.5	5.2
<b>Total sum</b>	<b>259</b>	<b>154</b>	<b>105</b>	<b>129.5</b>	<b>129.5</b>	<b>56.774</b>

## Annex B: Chi-Square Statistical Table



DF	P										
	0.995	0.975	0.20	0.10	0.05	0.025	0.02	0.01	0.005	0.002	0.001
1	0.0000393	0.000982	1.642	2.706	3.841	5.024	5.412	6.635	7.879	9.550	10.828
2	0.0100	0.0506	3.219	4.605	5.991	7.378	7.824	9.210	10.597	12.429	13.816
3	0.0717	0.216	4.642	6.251	7.815	9.348	9.837	11.345	12.838	14.796	16.266
4	0.207	0.484	5.989	7.779	9.488	11.143	11.668	13.277	14.860	16.924	18.467
5	0.412	0.831	7.289	9.236	11.070	12.833	13.388	15.086	16.750	18.907	20.515
6	0.676	1.237	8.558	10.645	12.592	14.449	15.033	16.812	18.548	20.791	22.458
7	0.989	1.690	9.803	12.017	14.067	16.013	16.622	18.475	20.278	22.601	24.322
8	1.344	2.180	11.030	13.362	15.507	17.535	18.168	20.090	21.955	24.352	26.124
9	1.735	2.700	12.242	14.684	16.919	19.023	19.679	21.666	23.589	26.056	27.877
10	2.156	3.247	13.442	15.987	18.307	20.483	21.161	23.209	25.188	27.722	29.588
11	2.603	3.816	14.631	17.275	19.675	21.920	22.618	24.725	26.757	29.354	31.264
12	3.074	4.404	15.812	18.549	21.026	23.337	24.054	26.217	28.300	30.957	32.909
13	3.565	5.009	16.985	19.812	22.362	24.736	25.472	27.688	29.819	32.535	34.528
14	4.075	5.629	18.151	21.064	23.685	26.119	26.873	29.141	31.319	34.091	36.123
15	4.601	6.262	19.311	22.307	24.996	27.488	28.259	30.578	32.801	35.628	37.697
16	5.142	6.908	20.465	23.542	26.296	28.845	29.633	32.000	34.267	37.146	39.252
17	5.697	7.564	21.615	24.769	27.587	30.191	30.995	33.409	35.718	38.648	40.790
18	6.265	8.231	22.760	25.989	28.869	31.526	32.346	34.805	37.156	40.136	42.312
19	6.844	8.907	23.900	27.204	30.144	32.852	33.687	36.191	38.582	41.610	43.820
20	7.434	9.591	25.038	28.412	31.410	34.170	35.020	37.566	39.997	43.072	45.315
21	8.034	10.283	26.171	29.615	32.671	35.479	36.343	38.932	41.401	44.522	46.797
22	8.643	10.982	27.301	30.813	33.924	36.781	37.659	40.289	42.796	45.962	48.268
23	9.260	11.689	28.429	32.007	35.172	38.076	38.968	41.638	44.181	47.391	49.728
24	9.886	12.401	29.553	33.196	36.415	39.364	40.270	42.980	45.559	48.812	51.179
25	10.520	13.120	30.675	34.382	37.652	40.646	41.566	44.314	46.928	50.223	52.620
26	11.160	13.844	31.795	35.563	38.885	41.923	42.856	45.642	48.290	51.627	54.052
27	11.808	14.573	32.912	36.741	40.113	43.195	44.140	46.963	49.645	53.023	55.476
28	12.461	15.308	34.027	37.916	41.337	44.461	45.419	48.278	50.993	54.411	56.892
29	13.121	16.047	35.139	39.087	42.557	45.722	46.693	49.588	52.336	55.792	58.301
30	13.787	16.791	36.250	40.256	43.773	46.979	47.962	50.892	53.672	57.167	59.703
31	14.458	17.539	37.359	41.422	44.985	48.232	49.226	52.191	55.003	58.536	61.098
32	15.134	18.291	38.466	42.585	46.194	49.480	50.487	53.486	56.328	59.899	62.487
33	15.815	19.047	39.572	43.745	47.400	50.725	51.743	54.776	57.648	61.256	63.870
34	16.501	19.806	40.676	44.903	48.602	51.966	52.995	56.061	58.964	62.608	65.247



35	17.192	20.569	41.778	46.059	49.802	53.203	54.244	57.342	60.275	63.955	66.619
36	17.887	21.336	42.879	47.212	50.998	54.437	55.489	58.619	61.581	65.296	67.985
37	18.586	22.106	43.978	48.363	52.192	55.668	56.730	59.893	62.883	66.633	69.346
38	19.289	22.878	45.076	49.513	53.384	56.896	57.969	61.162	64.181	67.966	70.703
39	19.996	23.654	46.173	50.660	54.572	58.120	59.204	62.428	65.476	69.294	72.055
40	20.707	24.433	47.269	51.805	55.758	59.342	60.436	63.691	66.766	70.618	73.402
41	21.421	25.215	48.363	52.949	56.942	60.561	61.665	64.950	68.053	71.938	74.745
42	22.138	25.999	49.456	54.090	58.124	61.777	62.892	66.206	69.336	73.254	76.084
43	22.859	26.785	50.548	55.230	59.304	62.990	64.116	67.459	70.616	74.566	77.419
44	23.584	27.575	51.639	56.369	60.481	64.201	65.337	68.710	71.893	75.874	78.750
45	24.311	28.366	52.729	57.505	61.656	65.410	66.555	69.957	73.166	77.179	80.077
46	25.041	29.160	53.818	58.641	62.830	66.617	67.771	71.201	74.437	78.481	81.400
47	25.775	29.956	54.906	59.774	64.001	67.821	68.985	72.443	75.704	79.780	82.720
48	26.511	30.755	55.993	60.907	65.171	69.023	70.197	73.683	76.969	81.075	84.037
49	27.249	31.555	57.079	62.038	66.339	70.222	71.406	74.919	78.231	82.367	85.351
50	27.991	32.357	58.164	63.167	67.505	71.420	72.613	76.154	79.490	83.657	86.661
51	28.735	33.162	59.248	64.295	68.669	72.616	73.818	77.386	80.747	84.943	87.968
52	29.481	33.968	60.332	65.422	69.832	73.810	75.021	78.616	82.001	86.227	89.272
53	30.230	34.776	61.414	66.548	70.993	75.002	76.223	79.843	83.253	87.507	90.573
54	30.981	35.586	62.496	67.673	72.153	76.192	77.422	81.069	84.502	88.786	91.872
55	31.735	36.398	63.577	68.796	73.311	77.380	78.619	82.292	85.749	90.061	93.168
56	32.490	37.212	64.658	69.919	74.468	78.567	79.815	83.513	86.994	91.335	94.461
57	33.248	38.027	65.737	71.040	75.624	79.752	81.009	84.733	88.236	92.605	95.751
58	34.008	38.844	66.816	72.160	76.778	80.936	82.201	85.950	89.477	93.874	97.039
59	34.770	39.662	67.894	73.279	77.931	82.117	83.391	87.166	90.715	95.140	98.324
60	35.534	40.482	68.972	74.397	79.082	83.298	84.580	88.379	91.952	96.404	99.607
61	36.301	41.303	70.049	75.514	80.232	84.476	85.767	89.591	93.186	97.665	100.888
62	37.068	42.126	71.125	76.630	81.381	85.654	86.953	90.802	94.419	98.925	102.166
63	37.838	42.950	72.201	77.745	82.529	86.830	88.137	92.010	95.649	100.182	103.442
64	38.610	43.776	73.276	78.860	83.675	88.004	89.320	93.217	96.878	101.437	104.716
65	39.383	44.603	74.351	79.973	84.821	89.177	90.501	94.422	98.105	102.691	105.988
66	40.158	45.431	75.424	81.085	85.965	90.349	91.681	95.626	99.330	103.942	107.258
67	40.935	46.261	76.498	82.197	87.108	91.519	92.860	96.828	100.554	105.192	108.526
68	41.713	47.092	77.571	83.308	88.250	92.689	94.037	98.028	101.776	106.440	109.791
69	42.494	47.924	78.643	84.418	89.391	93.856	95.213	99.228	102.996	107.685	111.055
70	43.275	48.758	79.715	85.527	90.531	95.023	96.388	100.425	104.215	108.929	112.317

Source: Medcalc (2012)

## Annex C: Questionnaire

Constituency	
Name of the village	
Name of Respondent	
Questionnaire code	
Date	
Interviewer	
Time taken to interview	

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### Section A: Bio-factors

1 Gender of respondent

Male	1
Female	0

2 Marital status

Married	1
Cohabiting	2
More than one wife	3
Widowed	4
Divorced	5
Single	6

3 Age of respondent in years

21-30	31-35	36-40	41-45	46-50	51-55	56-60	>61
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4 The respondent's educational level

No education	Junior primary	Senior primary	Junior secondary	Senior secondary	Post-secondary
--------------	----------------	----------------	------------------	------------------	----------------

5 How is the composition of your household in relation to the following?

Gender of member 1 for Male & 0 for female	Age in years	Relationship with the respondent	Marital status	If studying, level in years	If working, what job	If unemployed	Main economic activity	If pensioner- indicate old age or retired person	Amount of pension per month

Guide [in the column 'relation' for father = 1; mother = 2; husband = 3; wife = 4; brother, 5; sister = 6; son = 7; daughter = 8; uncle = 9; aunt = 10; grandfather = 11; grandmother = 12; grandson = 13; granddaughter = 14; nephew = 15; niece = 16; other relatives = 17; and worker = 18]. [Example, main economic activity may be agriculture, retail business, natural resource collection, etc]. If married =1; cohabiting =2; more than one spouse =3; widowed =4; divorced =5, and single =6.

## Section B: Ownership of assets

6 How many of each of these do you own?

	Yes	No	Number you had in 2002/3	Number you have in 2007
Cattle				
Goats				
Sheep				
Chickens				
Cars				
Tractors				
Radios				
Cell phone				
Telephone				
TV				
Hammer mill				
Boreholes				
Solar power				

7 How much in N\$ do you spend per month on the each of the following?

	2006/7	2002/3
Food		
Energy for lighting		
Transport		
School children		
Medical costs		
Rent		
Water expenses		

**Section C: Income**

8 Do you have a formal job/are you formally employed?

Yes	1
No	0

9 If the answer to question 8 above is yes, what is your income per month from formal employment?

Per month	200- 500	500- 800	800- 1100	1100- 1400	1400- 1700	1700- 2000	2000- 2300	2300- 2600	>3000
Per year	1000- 2000	2000- 3000	3000- 4000	4000- 5000	5000- 6000	6000- 7000	7000- 8000	8000- 9000	>10000

10 Do you receive remittances?

Yes	1
No	0

11 If your answer is yes to question 10, how much do you receive per month or per year? (You can state the exact amount if you feel comfortable)

Amount in N\$	150-200	250- 300	3350- 400	450- 500	550- 600	650- 700	750- 800	850- 900	950- 1000	>1000
Per month										
Per year										

**Section D: Food aid**

12 Have you received food aid in the past?

Yes	1
No	0

13 When did you start receiving food aid?

Before independence (1990)	1
1990 -1995	2
1995 -2000	3
2000 -2005	4
2005 -2007	5

14 Where did it go wrong for you to start receiving food aid?

.....

.....

.....

15 Did you lose a family member(s) who use to provide remittances to your household in the past ten years?

Yes	1
No	0

16 If your answer to question 15 is yes, do you foresee the possibility of managing to survive without food aid?

Yes	1
No	0

17 With the frequency of occurrence of drought and flood, do you agree that you can no longer survive without food aid?

Strongly agree	Agree	Neutral	Disagree	Strongly disagree
1	2	3	4	5

18 What type of food aid have you received in the past five years?

Relief due to flood	1
Relief due to drought	2
Widowed	3
Project food aid	4

19 If you were to be given money to start your own small business versus receiving food aid annually, which one will you choose?

Money	1
Food aid	0

20 If you were to be given money, how much money would you consider to be enough monthly in order for you to stop receiving food aid?

N\$100 – N\$150	1
N\$150 – N\$200	2
N\$200 – N\$250	3
N\$250 – N\$300	4
N\$300 – N\$ 350	5
N\$350 – N\$400	6
>N\$400 but indicate below	7

21 What is your objective for tilling the land?

Food security	1
To produce a surplus for the market	2
Occupy the land	3
Other – indicate	4

22 If you could be assured about the provision of food aid throughout the coming five years, would you still continue to till the land during that five year period?

Yes	1
No	0

23 With the assurance to receive food aid throughout the five year period, how much of your land will you put into cultivation on an annual basis?

Entire land	1
Half the land	2
Less than half	3
Will not plough	4

**Section E: Retail business**

24 What business are you currently involved with outside agriculture?

.....

.....

.....



25 At what time or when does your business operate?

Everyday	1
On weekends	2
End of the month	3
During school holidays	4
During festive times	5
Other times-indicate below	6

.....  
26 How long have you been operating such a business?

0 – 1 year	1
1 – 3 years	2
3 -5 years	3
5 – 8 years	4
> 10 years	5

27 Who started the business?

You	1
Inherited from parents	2
NGO initiative	3
Cooperative arrangement	4
Government initiative	5
Other – indicate below	6

.....

28 On average, how much do you get from your business daily?

N\$ 10 – N\$30	1
N\$ 30 – N\$ 50	2
N\$ 50 – N\$ 70	3
N\$ 70 – N\$ 90	4
N\$ 90 – N\$ 110	5
N\$ 110 – N\$ 130	6
N\$ 130 – N\$ 150	7
N\$ 150 – N\$ 170	8
N\$ 170 – N\$ 190	9
N\$ 190 – N\$ 210	10
>N\$ 210 but indicate below	

.....

.....

29 If you were to be given money to start your own small business of your choice, what would that be?

Farming	1
Retail shop	2
Lending to others	3
Other - indicate below	4

.....

.....

## Section F: Agriculture

30 Do you farm?

Yes	1
No	0

31 For how long have you been farming (in years)?

1-5	6-10	11-15	16-20	21-25	26-30	31-35	36-40	41-45	46-50	>50
-----	------	-------	-------	-------	-------	-------	-------	-------	-------	-----

32 How did you learn to farm?

Received training	1
Taught by parents/relatives	2
Working elsewhere	3

33 Do you own a field/farm?

Yes	1
No	0

34 If yes, how big is the field in hectares?

In hectares	0.5-1	1-2	2-3	3-4	4-5	>5
-------------	-------	-----	-----	-----	-----	----

35 Do you plough your field?

Yes	1
No	0

36 Do you lease your field/farm?

Yes	1
No	0

37 If the answer to question 36 is yes, how often do you lease it and at what price in N\$?

Yearly		N\$
Every after one year		N\$
Every after two years		N\$
Sometimes		N\$

38 What mode of power do you use when you plough?

Oxen	1
Tractor	2
Hand hoe	3

39 How much in N\$ did you pay for cultivating one hectare of land in 2006/7 season with the mode of power of your choice?

Oxen	N\$
Tractor	N\$
Hand hoe	N\$

40 How much in N\$ did you spend on each of the following?

	During ploughing & harvesting season in 2006/7	In 2002/3 during ploughing & harvesting
Labour costs (hired labour)		
Fuel (diesel or petrol)		
Transport		
Rent		
Water expenses		
Fertilizer		
Seeds		

41 Do you view land to be a business asset?

Yes	1
No	0

42 How many of your household members participate fully in your agricultural activities?

1	
2	
3	
4	
Other-indicate:.....	

43 Which crop(s) and vegetables do you usually plant and rank them in their order of importance to you (e.g. the most important will be 1 and the one which follows will be 2, etc.)?

Crops/vegetables	Ranking	Harvest per year	
		Once	Twice
Maize		Once	Twice
Millet/Mahangu		Once	Twice
Sorghum		Once	Twice
Cotton		Once	Twice
Pumpkins		Once	Twice
Groundnuts		Once	Twice
Spinach		Once	Twice
Tomatoes		Once	Twice
Potatoes		Once	Twice
Cabbage		Once	Twice
Water melons		Once	Twice
Other – indicate		Once	Twice

44 What is the primary sub-sector for your farm business?

.....

45 What problems do you face now which you did not face in the past decade or more with regard to farming?

.....

46 When conditions are normal, on average, how much from each of the following do you consume and how much do you sale from your harvest?

Crops/vegetables	Quantity harvested	Quantity consumed	Income from selling the produce						
			N\$100 – 400	N\$401- 700	N\$701- 1000	N\$1001- 1400	N\$1401- 1700	N\$1701- 2000	>2001
Maize			N\$100 – 400	N\$401- 700	N\$701- 1000	N\$1001- 1400	N\$1401- 1700	N\$1701- 2000	>2001
Millet/Mahangu			N\$100 – 400	N\$401- 700	N\$701- 1000	N\$1001- 1400	N\$1401- 1700	N\$1701- 2000	>2001
Sorghum			N\$100 – 400	N\$401- 700	N\$701- 1000	N\$1001- 1400	N\$1401- 1700	N\$1701- 2000	>2001
Cotton			N\$100 – 400	N\$401- 700	N\$701- 1000	N\$1001- 1400	N\$1401- 1700	N\$1701- 2000	>2001
Pumpkins			N\$21- 50	N\$51-80	N\$81- 110	N\$111- 140	N\$141- 170	N\$171- 200	N\$201- 230
Groundnuts			N\$21- 50	N\$51-80	N\$81- 110	N\$111- 140	N\$141- 170	N\$171- 200	N\$201- 230
Spinach			N\$21- 50	N\$51-80	N\$81- 110	N\$111- 140	N\$141- 170	N\$171- 200	N\$201- 230
Tomatoes			N\$21- 50	N\$51-80	N\$81- 110	N\$111- 140	N\$141- 170	N\$171- 200	N\$201- 230
Potatoes			N\$21- 50	N\$51-80	N\$81- 110	N\$111- 140	N\$141- 170	N\$171- 200	N\$201- 230
Cabbage			N\$21- 50	N\$51-80	N\$81- 110	N\$111- 140	N\$141- 170	N\$171- 200	N\$201- 230
Water melons			N\$21- 50	N\$51-80	N\$81- 110	N\$111- 140	N\$141- 170	N\$171- 200	N\$201- 230
Other – indicate below									

47 What economic activities were you engaged into more than five years ago which sustained the household but which you are no longer doing now?

.....

.....

.....

.....

.....

48 Has the living standard in the house changed compared to five or more years ago?

Yes	1
No	0

49 Is the change a positive one or a negative?

Positive	1
Negative	0

50 If the answer to question 49 is negative, what has changed to affect the household's standard of living?

1 = Sickness and/death in the household

2 = Lack of skills

3 = Household member migrated

4 = Frequency of flood and/drought

5 = Old age

6 = Divorce

7 = Closure of business

8 = Retrenchment

9 = Other -indicate below

.....



51 What diseases affect your members of the household such that you sometimes miss out on their labour or commitment to income generation?

.....

.....

**Section G: Credit and investment**

52 Do you belong to any savings cooperative, stockvels or any other society?

Yes	1
No	0

53 If the answer to question 52 is yes, when did you join and what benefits do you get?

Type of cooperative	Year of joining	Your contribution per month or per year	Benefits in N\$ per month/year
Bulk buying			
Savings			
Stockvels			
Microlending			
Other			

54 In what way do you invest your money?

1 = Bank deposit

2 = Lending to others

3 = Buying cattle

4 = Buying goats

5 = Buying sheep

6 = Buying chickens

7 = None

8 = Other (indicate).....

.....

55 In the past two years, did you invest in any of the following way?

Type	Choice	Value in N\$ in 2002/3	Value in N\$ in 2006/7
1 = Bank deposit	1		
2 = Lending to others	2		
3 = Buying cattle	3		
4 = Buying goats	4		
5 = Buying sheep	5		
6 = Buying chickens	6		
7 = None	7		

56 Do you usually pay for any of the following? Yes or No

	In 2006/7	In 2006/7. If no where do you get the services?	In 200/3	In 2002/3
	Yes	No	Yes	No
Ploughing				
Seeds				
Fertilizer				
Harvesting				
Threshing				

57 Have you received a loan in the past five years?

Yes	1	Who supplied the loan?	How much in N\$ did you receive?	For what purpose is was this loan?	Have you paid it up? Yes =1/No =0	How much have do you have to pay back?	What was the payback period?
No	0				1		

58 Do you know any place where they offer loans for the type of business you are engaged into?

Yes	1
No	0

59 Do you agree that setting up loan facilities for your business interests will assist many people like you to come out of poverty and why do you think so?

Strongly agree	Agree	Neutral	Disagree	Strongly disagree
1	2	3	4	5

### Section H: Climate risk

60 What has frequently affected your livelihood in the past five years?

Drought		Flood	
Yes	1	Yes	1
No	0	No	0

61 Fill the agronomic table below:

	How many (50 or 80kg) bags would you get when conditions are normal?	How many (50 or 80kg) bags did you get in 2006/2007 harvest?	How much in N\$ did you get in 2002/3?	What affected your harvest in the last harvesting season?	Where do you sell?	How long does it take in hours to reach the market?
Millet/Mahangu						
Sorghum						
Cotton						
Pumpkins						
Groundnuts						
Spinach						
Tomatoes						
Potatoes						
Cabbage						
Water melons						
Other – indicate						

62 Fill the livestock table below

	On average, how many would you sale when there is no drought/flood?	How many did you sell in 2006/7?	Where do you sale?	How long does it take to get to the market (in hours)?
Cattle per year				
Goats per year				
Sheep per year				
Chickens				
Guinea fowls				
Ducks				
Other – indicate				

---

63 If you have cattle, fill the table below.

Do you milk them?		Do you sell milk (sour/fresh)	
Yes	1	Yes	1
No	0	No	0

64 If you have sold milk in 2006/7, fill the table below with regard to how much income in N\$ you get from the sale of milk.

Per day	10-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	>91, indicate .....
Per week	10-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	>91, indicate .....
Per month	50-60	61-70	71-80	81-90	91-100	101-110	111-120	121-130	>131, indicate .....

65 In the past before you started receiving food aid, how did you use to prepare your household when drought or flood is looming?

.....

.....

.....

.....

66 In which way does drought affect your household?

.....

.....

.....

67 In which way does flood affect your household?

.....

.....

.....

.....

68 Before you started receiving food aid, what did you use to do to sustain your household when flood or drought strikes?

.....

.....

.....

.....

69 What do you think should be done to assist people like you to sustain your household without depending on food aid?

.....

.....

70 In your opinion, rate your level of satisfaction with regard to the early warning you receive concerning the possibility of drought or flood?

Very satisfactory	Moderately satisfactory	Unsatisfactory	Very poor	Don't know
1	2	3	4	5

**Section I: Natural resource factors**

71 Fill the natural resource based table below with regard to income generated from harvested natural resources.

	On average, how much would you get when there is no drought/flood?	How much did you use to get more than five years ago?	Where do you sell?
Grass			
Reeds			
Firewood			
Wild fruits			
Poles			
Handcrafts			
a.			
b.			
c.			
Traditional beer			
Fish			
Other – indicate below			

72 Is there a community conservancy in your area?

Yes	1
No	0

73 If the answer to question 72 is yes, how do you benefit from this community conservancy?

.....

.....

74 What challenges is your household facing which are associated with the establishment of a community conservancy in your area?

.....



.....

75 Are there any environmental or forestry laws that affect you from harvesting natural resources?

Yes	1
No	0

76 If your answer to question 75 is yes, indicate which laws or government restrictions affect you.

.....

.....

**Section J: New livelihood strategies**

77 Do you agree that you need to change to another crop or business opportunity that will not be affected by drought or flood?

Strongly agree	Agree	Neutral	Disagree	Strongly disagree
1	2	3	4	5

78 Are you willing to learn to cultivate a new crop that will not be affected by flood or drought?

Yes	1
No	0

79 If flood and drought appear to be a serious problem, why don't you switch over to crops that may resist heat stress or those that would tolerate flood water such as rice (flood), cotton (drought), sugarcane (flood), etc.?

.....

.....

80 What is your level of satisfaction with regard to the agricultural extension services you receive?

Very satisfactory	Moderately satisfactory	Unsatisfactory	Very poor	Don't know
1	2	3	4	5

81 What assistance do you think will put your current economic activities in a sustainable mode?

.....  
.....

82 What do you think has changed which contributes to poverty and hunger for rural people?

.....  
.....

The end