

**Evaluation of ex - ante and ex - post strategies of coping with drought-  
driven food insecurity in Kwale county, Kenya**

**ANDREW MAKONDE MAKOTI**

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**DECLARATION**

I, Andrew Makonde Makoti, declare that the work presented herein is original and has not been submitted in any University or award

Signature: ..... Date:.....

**Andrew Makonde Makoti**

Department of Environmental Studies and Community Development

**SUPERVISORS**

We confirm that the work reported in this thesis was carried out by the candidate under our supervision and has been submitted with our approval as university supervisors.

Signature:..... Date:.....

**Prof. Halimu Suleiman Shauri**

Chairman Department of Social Sciences

Pwani University

Signature:..... Date:.....

**Dr. Fuchaka Waswa**

Department of Agricultural Resources Management

Kenyatta University,

## **DEDICATION**

Dedicated to the almighty God for the wisdom and gift of life for without which nothing would have been possible.

I also dedicate it to my beloved wife Zaharia and children, Faith and Dennis, for their moral support and cooperation throughout my studies.

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## List of Abbreviations

ADB	Asian Development Bank
ALARMP	Arid Lands Resource Management Programme
ASAL	Arid and Semi-Arid Lands
CBO	Community Based Organisation
DAO	District Agricultural Officer
DFID	Departmental Fund for International Development
DFSSG	District Food Security Steering Group
ENN	Emergency Nutrition Network
FAO	Food and Agriculture Organization
FGD	Focus Group Discussion
FSR	Food Security Report
GDP	Gross Domestic Product
IIRR	International Institute for Rural Reconstruction
ISDR	International Strategy for Disaster Reduction
ITK	Indigenous Technical Knowledge
IPCC	Inter-Governmental Panel for Climate Change
KNBS	Kenya National Bureau of Statistics
LTA	Long-Term Average
MDG	Millennium Development Goals
MSF-H	Medicines sans Frontiers - Holland
NGO	Non-Governmental Organisation
PLWHA	People Living with HIV/AIDS
PRA	Participatory Rural Appraisal
(SC)-UK	Saves the Children- United Kingdom
SL	Sustainable Livelihood
SPSS	Statistical Package for Social Sciences
SSA	Sub-saharan Africa
UN	United Nations
UNCCD	United Nations Convention to Combat Desertification

UNCED	United Nations Conference on Environment and Development
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNHCR	United Nations High Commissioner for Refugees
UNSO	United Nations Statistical Office
WCMC	World Conservation Monitoring Centre
WFP	World Food Programme
WHO	World Health Organization
WSSD	World Summit on Sustainable Development
WWI	World Wide Initiative

## ABSTRACT

Drought and famine, in sub-Saharan Africa, are among the leading causes of vulnerability within resource poor households in Arid and Semi-Arid agro-ecosystems. Accordingly, understanding how these communities cope with drought-driven food insecurity is critical for mitigation planning. This study was conducted in Makamini location in Kwale County, an area with a long history of food insecurity. Purposive sampling was used to identify twenty key informants and 30 respondents in each sub location. Data were collected using questionnaires, participatory approaches and environmental observation checklists. Collected data were analysed using Statistical Package for Social Sciences (SPSS) to determine frequency distributions, rankings and correlations. The findings showed that the two most devastating effects of drought were crop failure (79%), and water scarcity (74%). Accordingly, the two most effective ex-ante and ex-post ante strategies were construction of high capacity water reservoirs (85 %), soil and water conservation (74 %), diversification of income (70.8%), and sale of livestock (65%) respectively. Further, analysis showed that there was a negative correlation of -0.32 between the ex-ante drought coping strategies used and those perceived as effective, meaning that the target community used less frequently the ex-ante drought coping strategies perceived to be effective, which was probably due to the relatively high initial cost of investment required. On the other hand, the analysis showed a positive correlation between the ex-post coping strategies used and those perceived as effective meaning that the target community frequently used ex-post strategies that they perceived effective. The study also used Wilcoxon signed rank test and Kruskal Wallis test to determine variables association. Indeed, the devastating effects of drought changed the behavior and practices of the target community, and the most two are migration to urban centres to look for employment (87%) and walking long distances in search of pasture and water (74%). To contribute to mitigating drought-driven food insecurity, this study recommends construction of high capacity water reservoirs to meet people's requirements, developing dynamic and reliable markets for livestock, and investing in off-farm income generating activities.

## **CHAPTER 1: INTRODUCTION**

### **1.1. Background**

Dry land areas, which include arid and semi-arid lands, receive annual rainfall of less than 500mm. Around half a billion people live in such areas, where water is an unavoidable constraint on everything they do (Winpenny, 1991). The true dry lands extend for over 47% of the earth's land surface (UNEP-WCMC, 2000). Salih and Ahmed (1993) indicate that these zones exhibit ecological constraints which set limits to nomadic pastoralism and settled agriculture. Over 70% of the land in Africa is ASAL. Thus, the rapidly growing population and on-going economic development are putting tremendous pressure on these lands (Bernard et al., 1989). The arid and semi-arid lands of sub-Saharan Africa (SSA) are characterized by limited water supply, low and highly variable rainfall, and recurrent droughts (Shauri, 2011). Even where surface water accumulates, it is not easily retained due to high temperatures and intense precipitation that cause water to be lost to evaporation and run off, respectively (IIRR, 2002).

Dry land communities are in greater need for external support because their crops are failing and their herd sizes are being reduced to less than the minimum required for subsistence. High herd mortality has mainly been due to severe and persistent droughts which have led to tremendous human suffering (Intergovernmental Panel on Climate Change (IPCC, 2007). The African continent has been classified as the most vulnerable

region to the impact of drought (Shauri, 2011). At the regional level, this is clearly demonstrated by the fact that the Greater Horn of Africa is the sole recipient of about 40% of the global food aid (Vision, 2030; Northern Kenya and Other Arid Lands draft 3 of 14th November 2009).

Dry land communities are in greater need of external support towards sustaining their livelihoods. For example, during the 2000/2001 financial year, the Kenya Government spent Kshs. 10.5 billion on relief food to combat the drought emergency and this figure did not include the World Food Programme (WFP) and other stakeholder's contributions (Vision 2030; Northern Kenya and Other Arid Lands draft 3 of 14th November 2009).

Drought affects more people than any other disaster in Africa (Rekacewicz, 2002) and its consequences is as a result of many interacting factors such as poverty, high dependency on rain-fed agriculture, population increase, lack of natural resource management and inadequate economic development. Rural areas are more vulnerable to drought because the rural economy is tied to the agriculture sector, which has lower technology and where climate change is a factor whose substitutability is very limited (Tor, 1995; Fankhauser, 1995). In fact, Mendelsohn (2001) indicated that less developed regions are more likely to be vulnerable to climate change, due to the weaker capacity of local residents to adapt and recover from the impacts. Arid and semi-arid lands of Kenya, commonly called the ASAL's, make approximately 80% of the country, and they are a home to one-third of the population. The primary challenge of

these regions is how to ensure food security in a sustainable manner in such environments that are prone to drought and where climate change increases unpredictability (GOK, June 2008).

The economy of the arid district is dominated by mobile pastoralism, while in the better watered and better serviced semi-arid areas a more mixed economy prevails, including rain fed and irrigated agriculture, agro-pastoralism, small businesses based on dry land products and conservation or tourism related activities (Farah et al., 1996). While the challenges facing the region are evident, its potential has been obscured; a significant amount of wealth exists under the radar. The potential for growth is arguably higher because the region is starting from a lower base. Indeed, research in India shows that some of the highest returns to investments in roads, electricity and education, as well as the greatest effects on poverty, occur in marginal rain fed areas, rather than irrigated or more fertile areas (Hazell, 2001). People in such areas have successfully managed climate variability for centuries, their skills and knowledge can be more valuable as the impact of global climate change is becoming more pressing (Farah et al., 1996).

The size of food security gap between ASAL's and the rest of the country means that effective mechanisms that protect the environment, manage drought and enhance adaptability to drought have significance. It is against this background that the present study was conducted to find out the effective food security adaptive strategies among the poor in Kinango Sub-county, Coast Region of Kenya.

## **1.2. Problem Statement**

Kinango Sub-county, where the research was conducted, there has been experiencing persistent drought and famine creating a situation of chronic food insecurity. There seemed to be no adequate coping strategies that would foster improved livelihood opportunities to the local communities and appropriate resilient measures to address the increasing poverty levels in the area. As a result, this has worsened the wellbeing of the local communities leading to lingering malnutrition, high rate of school drop-outs and increase in rural to urban migration. The situation has been aggravating despite government efforts to provide support of relief food in the district (DMO, 2008).

## **1.3. Justification of the Study**

Poverty remains a key challenge to development in ASAL areas of Kenya, and in addressing the Millennium Development Goals (MDGs), especially goal number one that calls for eradication of extreme poverty and hunger by 2015. This scenario has partly been attributed to crop failure and declining herd sizes coupled with increasing frequency of droughts in East African region (Shauri, 2011; Nicola 2006). In Kenya, over 60% of the ASAL population lives below the poverty line (Lamprey and Yusuf, 1981). This has increased vulnerability across a vast area of Kenya from the pastoral North to the Southern range lands, the marginal agricultural areas of Eastern Region and parts of Coast Region (DFSSG, 2008). It is also widely acknowledged that Poverty and insecure livelihoods force people to pursue natural resource management practices that



are ultimately destructive of their long-term welfare; their adaptive capacity and the resilience of the environment (Little et al., 2001).

Apparently, there is a growing interest in the poor as agents for their own self-improvement guided by their own knowledge and strategies which could lead to sustainable livelihoods. This background justified the study in documenting the local knowledge and interventions towards sustainable livelihood, and to conclusively draw out the effective coping strategies practised by Kinango residents that had shown potential to stimulate the transition from food insecurity to improved food security and alleviation of human suffering while at the same time conserving the environment.

#### **1.4. Research Questions**

This study was guided by the following research questions;

- i. How is the concern on effects of drought in Kinango Sub-county of Kwale County?
- ii. How effective have been community's ex ante and ex post drought and food insecurity coping strategies?
- iii. How helpful are the local practices and attitudes in combating drought-driven food insecurity?
- iv. How could drought-driven food insecurity be addressed in a sustainable manner?

### **1.5. Research Objectives**

The overall objective of this study was to assess and compare the most effective ex ante and ex post coping strategies which have so far been put in place by the target community in order to counter drought-driven food insecurity in Kwale County, Kenya.

The specific objectives were to:

- i. Assess the concerns on the effects of drought on community livelihoods in Kinango Sub-county
- ii. Evaluate the ex-ante and ex post coping strategies against drought-driven food insecurity
- iii. Assess and document peoples' behaviour and practices to drought-driven food insecurity and coping mechanisms.

### **1.6. Significance and Anticipated Output**

The study will enable the documentation of the effective adaptive strategies and processes that have led or have the potential to lead to sustainable livelihoods and also identify sustainable livelihoods indicators. The study develops a package of recommendations which can be used to reinforce the identified effective adaptive strategies. Further, drought management strategies are identified for food security improvement. But most specifically, the study will be of much help as summarised below:

- The study results will provide information to policy makers at all levels of administration in the Kenyan government, relevant Non-Governmental Organizations, Development agents at the relevant ministerial Level. Furthermore, the research findings will be published in journals and Swahili brochures for dissemination to a wider audience. This will enhance information flow for decision making on this vital area of food security.
- More of this study was geared towards stimulating the transition from food insecurity to sustainable livelihoods in arid and semi-arid lands and identified ways to empower communities to mobilize their options for making the transition to food security. The results of this research will be communicated back to the community and other stakeholders to trigger positive change for development. Through appropriate feedback of the results across all community, government, private agencies, this information will quite help towards reach out and sensitization, and hence benefit to all. These stakeholders will then work alongside policy makers to help in driving the positive change anticipated for many years by the local communities. Such an approach has the potential of enhancing the achievement of the Millennium Development Goals and the Kenya's Vision 2030. Furthermore, this research envisaged protecting people against hunger and asset depletion and lifting them out of food insecurity. This is to be achieved through improved performance of institutional actions by providing insight on the Kinango Peoples livelihoods strengthening strategies

and modes of information dissemination. Importantly, this will impact positively to the development agenda of the area, the country and elsewhere.

### **1.7. Conceptual Framework**

This study was based on the sustainable livelihood approach (Figure 1.1) to improve the understanding of livelihoods of the rural poor. It drew factors that affect poor peoples' livelihoods and the nexus between these factors. The approach was used in planning new development activities and in assessing the contribution that existing adaptive strategies have made to sustainable livelihoods. This framework attempted to place people particularly the rural poor at the centre of the web of inter-related influences that affect how these people create a livelihood for themselves and their households. The approach was used to identify the main constraints and opportunities faced by the poor. It further in built on these definitions and then supported the poor as they addressed the constraints and took advantage of the available advancement opportunities.

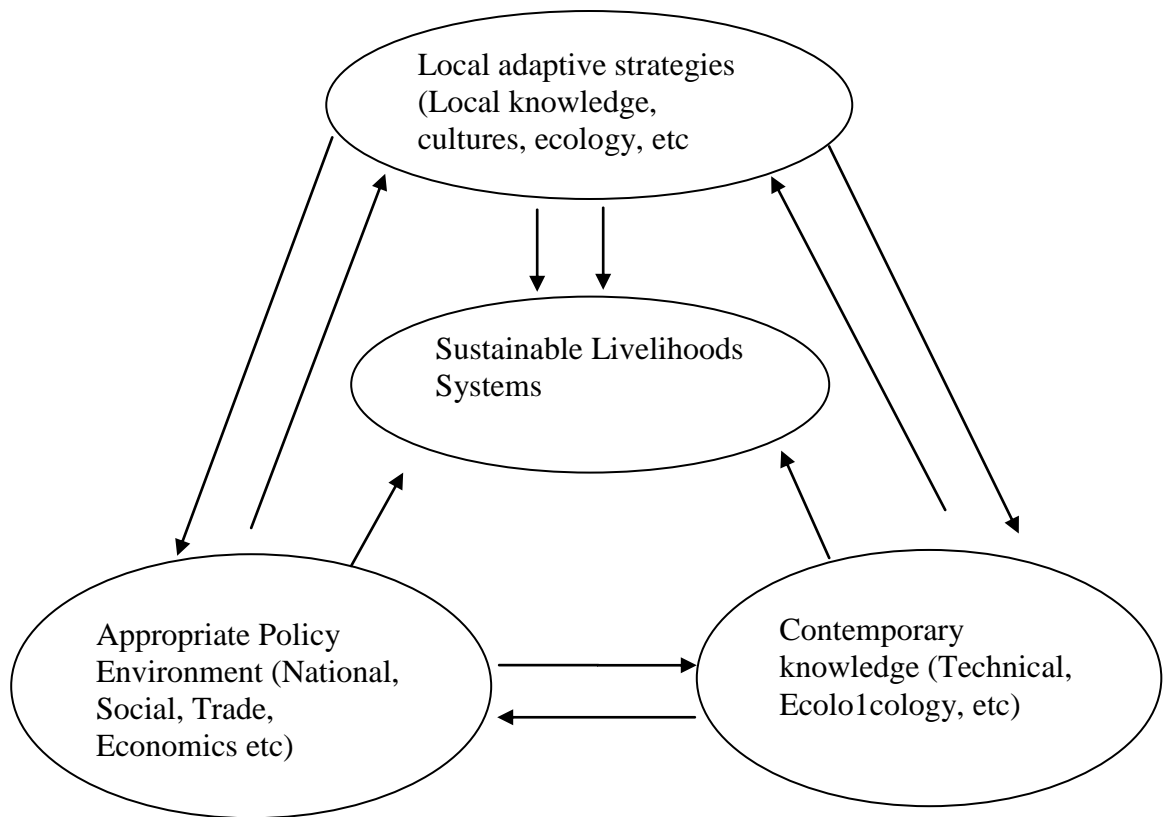


Figure 1.1 Towards sustainable livelihoods and food security, source: (Adapted from Rennie and Singh, 1995)

The framework was neither taken as a model to incorporate all the key elements of Kinango peoples' livelihoods nor a universal solution but as a means of stimulating thoughts and analysis. It built on Kinango peoples perceived strengths and opportunities and supported the existing food security strategies. This helped to identify more effective ways to support food security and reduce vulnerability. The sustainable livelihoods approach is an integrated development method, which brings individual approaches together to achieve sustainable development. It involved an assessment of adaptive strategies and technologies contributing to food security systems, and the

analysis of cross-sectoral policies and investments requirements to enhance food security.

The concept of sustainable livelihood has developed over three decades to a place where it is widely accepted as offering insights into the dynamics of development and the diversity of experiences of the poor throughout the world (Rennie et al., 1995). It is an approach that is flexible and dynamic; provide a basis for understanding the relationship between poor communities, their local environments, and external socio-economic environmental and institutional forces (Soussan et al., 2003). The sustainable livelihood approach (SL) is a systematic and adaptive approach that links issues of poverty reduction, sustainability and empowerment (e.g. participation, gender empowerment, and good governance).

The attractiveness of sustainable livelihoods lies in its applicability to different contexts, situations of uncertainty and in its participatory process for the cross fertilization of ideas and strategies between various stakeholders. Those living in extreme poverty and outside the formal labour market, for example constantly impoverish their livelihood strategies due to high uncertainty and limited options. According to the United Nations Development Programme (UNDP, 2000), sustainable livelihoods are derived from people's capacity to make a living by surviving shocks and stress and improving their material conditions without jeopardising the livelihood options of other people, either now or in the future. These require reliance on both capabilities and assets (i.e. stores, resources, claims and accesses) for a means of living.

Singh and Titi (1994) defined sustainable livelihoods as peoples capacities to generate and maintain their means of living, enhance their wellbeing and that of future generations. Ashley and Carney (1999) are of the view that livelihood priorities vary, outsiders cannot assume knowledge of the objectives of a given household. Livelihood assessment must therefore be based on prior understanding of local customs and traditions as well as deep understanding of how livelihoods are constructed and which factors are the essential causes and manifestation of their poverty.

### **1.8. Definition of Terms**

**Adaptive Strategies:** Davies (1993) defines Adaptive strategies as characteristic of vulnerable socio-ecological systems and modes of production; they constitute a permanent change in the mix of productive activities and require modification of community rules and institutions to meet livelihood needs.

**Coping Strategies:** Coping strategies are defined as "the bundle of poor people's responses to declining food availability and entitlements in abnormal seasons or years", thus coping strategies are characteristic of secure livelihood systems used only during periods of food stress; they constitute a fall-back mechanism during periods of decline in access to food (Davies, 1993). Kivaria (2007) described coping mechanisms as responses of an individual, group or society to challenging situations.

**Mitigation Strategies:** These are actions taken to avoid, reduce the severity of, or eliminate an adverse impact.

**Drought:** UNDP (2000) defines drought as a sustained period of deficient precipitation with a low frequency of occurrence. In the context of pastoral settings, drought implies two or more consecutive years when rainfall is less than 75 per cent of the long-term average (Coppock, 1994). Agriculturally, drought is said to occur when soil moisture is insufficient to meet crop water requirements, resulting in yield losses. It is thus closely linked to soil moisture deficit leading to acute moisture stress and production loss.

**Hydrologically, drought** is defined as the situation of depletion in surface and sub-surface water resources due to a shortfall in precipitation. However, following Nikola (2006), drought is defined in this study as lack of rainy season that is repeated consecutively for three seasons in a row leading to loss of pastures and death of livestock. It is important to stress here that it is a loss of dry season pastures, because according to my respondents, it is only in such conditions that their crops wither and animals begin to starve and die.

**Effectiveness** refers to how coping strategies have been utilized as useful tools in improving the livelihoods of Kinango people in reducing the stress and shocks of drought-driven food insecurity situations.

**Food Security:** The World Food Summit of 1996 defined food security as existing “when all people at all times have access to sufficient, safe, nutritious food to maintain



a healthy and active life”. Commonly, the concept of food security is defined as including both physical and economic access to food that meets people's dietary needs as well as their food preferences as adopted by this study.

**Household:** In this study a household is recognised as a basic unit of analysis which include more than one individual (although a single individual can also constitute a household), who share economic activities necessary for the survival of the household and for the generation of wellbeing for its members (Rudies, 1995).

**Livelihoods:** livelihood is understood in this study, as a dynamic realm that integrates both opportunities and assets available to a household in order for it to achieve desired goals and aspirations.

**Resilience:** resilience is “the ability to build and increase the capacity for learning and adaptation” Developing resilience implies bouncing back after a shock. It particularly means that there are coping strategies in place that enable the successful emergence from such shock or trauma

**Ex-ante Coping Strategies:** These are actions taken before the on set of drought to avoid, reduce its severity or eliminating its impacts.

**Ex-post Coping Strategies:** These are actions taken after the on set of drought to reduce its severity or eliminate its impacts.

## CHAPTER 2: LITERATURE REVIEW

### 2.1. The Drought Phenomenon

Establishing a universal view about drought might be difficult. Drought is a normal, recurrent feature of climate that affects virtually all countries to some degree (Wilhite, 1996). Hisdal and Tallaksen, (2000) consider drought to be extreme rainfall deficits and the resulting periods of low flow of water, which can have severe effects on water managements in terms of river pollution, reservoir design and management, irrigation and drinking water supply. Wilhite *et al.* (2000) also described drought as a natural hazard that differs from other hazards because it has a slow onset, progresses over months or even years, affects a large spatial region and causes little cultural damage. According to them, its onset and end are often difficult to determine, just as its severity.

The quantification of impacts and provision of disaster relief is a far more difficult task on drought than it is for other natural hazards (Wilhite, 1996), which are based on three reasons.

First, drought is a creeping phenomenon, the effects of drought accumulates slowly over a considerable period of time and may linger for years after the termination of the event. Second, the absence of a precise and universally accepted definition of drought adds to the confusion about whether or not a drought exists and if it does, what is its severity.

Third, drought impacts are less obvious and spread over a larger geographical area than the damages that result from other natural hazards because drought rarely results in structural damage. Hisdal and Tallaksen (2000) believe that drought is by no means unusual or unnatural; their conclusion is that drought is by far the most costly to our society in comparison to all the natural disaster. It kills more people and animals than the combined effect of hurricanes, floods, tornadoes, blizzards, and wildfires.

Unlike other disasters that quickly come and go, drought long-term persevering damage has been responsible in the past for man migration and loss of civilizations. The amount of drought induced natural disasters has grown drastically since the 1960s (Shauri, 2011). This is a result of increase vulnerability to prolonged periods of precipitation deficiency rather than because of an increase in the frequency of meteorological drought (Wilhite, 1996).

Drought affects practically all climatic regions and more than one-half of the earth is prone to drought each year (Kogan, 1997; Wilhite, 2000). Hisdal and Tallaksen (2000) state further that all climatic zones might experience drought; however, the feature can vary significantly between regions. Drought is more prominent when it occurs in potential high and medium rainfall areas; however, the most vulnerable regions are described as arid and semi-arid lands of the world, with those in Africa high on the list.

The degree of drought and the resultant land and resources degradation are said to be greater in those countries whose social and economic support systems cannot endure the

effects of drought (Hisdal and Tallaksen, 2000). This includes the fragile environments in dry ecosystem where people have few and limited coping strategies.

## **2.2. Global drought initiatives**

Drought is considered by many to be the most complex but least understood of all natural hazards, affecting more people than any other hazard (Hagman, 1984). However, there remains much confusion within the scientific and policy communities about its characteristics. It is precisely this confusion that explains, to some extent, the lack of progress in drought preparedness in most parts of the world. Drought is an insidious hazard of nature. Although it has scores of definitions, it originates from a deficiency of precipitation over an extended period of time, usually a season or more. This deficiency results in a water shortage for some activity, group, or environmental sector. Drought should be considered relative to some long-term average condition of balance between precipitation and evapo-transpiration in a particular area, a condition often perceived as "normal"(Coppock, 1994).

The impacts of drought are largely nonstructural and spread over a larger geographical area than are damages from other natural hazards. The nonstructural characteristic of drought impacts has certainly hindered the development of accurate, reliable, and timely estimates of severity and, ultimately, the formulation of global drought preparedness plans by most governments. Drought risk is a product of a region's exposure to the

natural hazard and its vulnerability to extended periods of water shortage (Wilhite, 2000).

If nations and regions are to make progress in reducing the serious consequences of drought, they must improve their understanding of the hazard and the factors that influence vulnerability. During the United Nations Conference on Environment and Development (UNCED), held in Rio de Janeiro in 1992, three main objectives to combat drought were identified: to develop national strategies for drought preparedness in both the short and long-term, aimed at reducing the vulnerability of production systems to drought; to strengthen the flow of early-warning information to decision makers and land users to enable nations to implement strategies for drought intervention; and to develop and integrate drought-relief schemes and means of coping with environmental refugees into national and regional development planning ( UNDP, 2000)

Then, at the nineteenth special session of the United Nations General Assembly in 1997, delegations re-energized their commitment to drought management, stating that “The international community is urged to recognize the vital importance and necessity of international cooperation and partnership in combating desertification and mitigating the effects of drought; the transfer to developing countries of environmentally sound, economically viable and socially acceptable technologies relevant to combating desertification and/or mitigating the effects of drought, with a view to contributing to

the achievement of sustainable development in affected areas, should be undertaken without delay on mutually agreed terms” (UNCCD, 2006).

In 2002, the World Summit on Sustainable Development held in Johannesburg, called on countries to integrate measures to prevent and combat desertification as well as to mitigate the effects of drought through relevant policies and programmes, such as land, water and forest management, rural development, early warning systems, environment, energy, national resources, health and education and poverty eradication and sustainable development strategies (UNCCD, 2006).

### **2.3. Impact of drought in Africa**

The loss of natural resources, environmental degradation (Van Crowder et al., 1998) and desertification (UNCCD, 2004) affects food security. The poor households that are affected by drought and desertification do not have adequate resources to deal with food shortages leading to food insecurity and hunger that affects millions of people. If land degradation continues at the current pace, it is projected that more than a half of cultivated agricultural area in Africa could be unusable by the year 2050 and the region may be able to feed just 25 percent of its population by 2025 (FAO, 2006).

Agriculture being one of the main economic activities in Africa (which represents around 40 percent of the region’s GDP and employs about 60 percent of the active

labour force), this would lead to a catastrophe with unprecedented repercussions (FAO, 2006). In the two northern regions of Ghana severely hit by soil degradation, it is estimated that malnutrition among children increased from 50 percent in 1986 to 70 percent in 1990 (UNCCD, 2006).

The most severe consequence of drought is famine. Food aid to the subcontinent accounts for approximately 50 percent of the yearly budget of the World Food Aid Programme ISDR (2007). The consecutive droughts that have occurred in southern Africa since 2001 have led to serious food shortages. The drought of 2002–03 resulted in a food deficit of 3.3 million tones, with an estimated 14.4 million people in need of assistance (Simms and Reid, 2005). At the height of the Horn of Africa's drought in 2000, 3.2 million Kenyans were dependent on food aid, and malnutrition reached 40 percent of the population, more than 3 times the normal level.

In 2005, Concern, in partnership with the Diocese of Malindi, Kenya, provided seed and technical support to 2,129 farm households who were severely affected by drought (DAO Annual Report, 2005). During the same year 2005 many other African countries faced food shortages because of the combined effects of severe droughts (Nhambura, 2006; Radford et al., 2005) and desertification that could become semi-permanent under climate change. The worst affected countries included Ethiopia, Zimbabwe, Malawi, Eritrea and Zambia, a group of countries where at least 15 million people would go hungry without aid (FAO, 2005). The situation in Niger, Djibouti and Sudan also

deteriorated rapidly. Many of these countries had their worst harvests in more than 10 years and were experiencing their third or fourth consecutive severe drought.

The Sahelian drought and famine of 1968 to 1974 is a horrific reminder of the combined effects and impacts of desertification and drought. In the span of six years, hundreds of thousands of people died of hunger and millions of animals perished. Images of starving children, dead livestock and desolate land quickly grabbed the world's attention and catapulted desertification Centre stage (McHarry et al., 2002).

In Africa as a whole, food consumption exceeded domestic production by 50% in the 1980s and by more than 30% in the 1990s (WWI, 1998). Although agriculture will remain for many years a major contributor to the economies of most developing countries (Van Crowder et al., 1998), in some countries, however, its share of GDP will progressively decline as drought and desertification take their toll with food shortages increasing at the same time.

#### **2.4. Drought Events and their Implications on Livelihoods**

Drought is a recurring climatic event and a global phenomenon but its features vary from region to region. It is a chronic problem in arid and semi-arid regions. Conceptually, drought is considered to describe a situation of limited rainfall that is substantially below what has been established to be a “normal” value for the area concerned, leading to adverse consequences on human welfare (Shauri, 2011).



Although drought is a climatically induced phenomenon, its impact depends on social and economic contexts as well. Hence, in addition to climate, economic and social parameters should be taken into account when defining drought. Considering its complex nature and wide variation across time and space, it is somewhat impractical to develop a universally applicable definition of drought. Also, the definition depends on the disciplinary perspective. Three such definitions, based on meteorological, hydrological, and agricultural perspectives, are available (Wilhite and Glantz, 1985).

Drought is not a new phenomenon in sub-Saharan African pastoral lands. Climatologist Glantz (1987) states that “drought is a part of Africa’s climate and not apart from it”. Historically, Dry land areas have suffered numerous such disasters. It has been documented that in sub-Saharan Africa, eight major droughts have occurred in the last four decades: 1965/66, 1972/74, 1981/84, 1986/87, 1991/92, 1994/95, 1999/2001 and 2005/06 (Nikola 2006). In Kenya, as It is indicated in the Kenya (2004) National Policy on Drought Management (Revised Draft), major drought come after every ten-fifteen years and the minor ones come after every three to four years (Table 2.1).

**Table 2.1: Drought events in Kenya (1975 - 1992)**

<b>Drought Years</b>	<b>Area Covered</b>	<b>Remarks</b>
1991/92	Arid lands & semi-arid lands districts of North Eastern , Rift valley, Eastern and Coast	Affected 1.5 million people
1983/84	Widespread	Affected 200,000 people
1980	Widespread	Affected 40,000 people
1977	Widespread	Affected 20,000 people
1975	Widespread	Affected 16,000 people

Source: GOK (2004) Government Printers, Nairobi

These conditions reduce forage production and water supplies, thus placing serious pressure on agriculture (UNDP, 2000; UNSO, 1999). Although these drought problems are increasingly apparent, many countries in sub-Saharan Africa lack clearly defined long-term plans, especially for dry land areas where generally speaking, development has not been a national priority (Hogg, 1987). For instance, during 1968-1973, drought increased dramatically in the Sahelian countries (Senegal, Mauritania, Mali, Nigeria, Chad, and Sudan). This pointed to the vulnerability of pastoral production systems to prolonged droughts as herders lost up to 80 percent of their small stock and 50 percent of the 10 million cattle in the region, both to starvation and infectious diseases (Gudrum and Ander Hjort, 1976). This also resulted in a famine which claimed at least 100,000 human lives in the Sahel and another 100,000 in Ethiopia (Wisner, 1977).

These disasters reawakened peoples' ways of thinking and acting to stem future disasters and make pastoralism more resilient. This resulted in an upsurge in drought management studies (White, 1974). This has led to the need to study and find new ways of improving communities' adaptive capacities which does not exclude Kenya particularly. This is basically because Kenya's arid and semi-arid lands (ASAL), inhabited by more than 3 million pastoralists, incorporate over 80 percent of the country's land surface, and carry approximately 50 percent of its livestock (GOK, 2002). They are drought prone areas of the country and seem to have a regular timetable of natural disasters. They are hit hardest whenever there is a national drought which occasions shortfall in food production.

Evidence suggests that Kenyan dry land communities are just as vulnerable to droughts as the people of the Sahel and Ethiopia. For instance, during 1960-1961 droughts, Maasai nomads lost between 300,000-400,000 cattle. This was estimated to be between 65-80 percent of their total herds. Many Maasai nomads were therefore left stockless and hungry (Dahl and Hjort, 1976). It is not easy to tell when famine breaks out unless there is mass starvation, as happened in the Sahel (1971-1974). Devereux (1993) in his book *Theories of famine* brings to light the various perceptions of the famine phenomenon. In reviewing several famine approaches and theories, as well as case studies, he identifies three dictionary descriptions of famine such as food shortage, severe hunger and excessive mortality.

During the 1971-1974 droughts, the Kenyan nomads once again suffered heavy losses, and the subsequent famines were compounded by an outbreak of cholera and high incidences of malnutrition, tuberculosis, meningitis, and measles (Wisner, 1977). The young, the old, the sick and the weak suffered most severely. Wisner, 1977 records 768 cholera cases in 1971 and 402 in 1974. He suspects that 50 percent of those reported could have died from the combination of famine and diseases. This was followed by the 1979-1980 droughts which hit the Northern part of Kenya particularly hard and obliged many herders to give up pastoralism as a way of life albeit temporarily. More than 90 cattle, nearly 80 of small stock, and 40 of camels died in Turkana (Hogg, 1982).

The 1990-1992 droughts also had devastating effects on nomads' livelihood and forced them to move to relief camps. As a result, external food assistance became more fully integrated into the nomad's arsenal of survival strategies, although at the great cost of dependence on outsiders (Bush, 1995). During the 2005-2006 droughts, Turkana pastoralists were among the hardest-hit communities in Kenya. Experts who had been watching the crisis in Northern Kenya described it in one report as a "pervasive pre-famine condition" (Daily Nation, 5th June 2006:1). This condition was extremely costly to the Turkana people. It had a devastating impact on their livelihoods and changed the resource flows critical for their livelihood sustainability. It triggered a humanitarian crisis in which famine, disease, chronic poverty and loss of human life are all too evident. Access to food was reduced and costs of obtaining food increased. This sequence of events was facilitated by the fact that fewer animals were available for sale,

and less milk was available for consumption and sale. Social costs were the most devastating.

Drought impacts extend beyond the areas physically affected by drought after the event has ended (Coleen et al., 2006). Like other hazards, the impacts of drought are diverse and can be classified broadly as economic, environmental and social in Table 2.2, 2.3 and 2.4 (Paul, 1998; Wilhite et al., 2000; Coleen, 2006).

**Table 2.2: Social impacts of drought**

<b>Social Impacts</b>	<b>Social Effects</b>
Food insecurity	Malnutrition, civil strikes and conflict
Lack or poor distribution of resources (food and water)	Migration, resettlement, conflict between water users
Reduced grazing quality and crop yield	Overstocking; reduced quality of living
Increased quest for water	Increased conflict among water users
Marginal lands becomes unstable	Poverty and unemployment
Employment lay offs	Reduced or no income
Increased forest and range fires	Increased threat to human and animal life
Rural-urban migration	Social pressure and reduced safety

Source: Coleen *et al.* (2006)

**Table 2.3: Economic impacts of drought**

<b>Economic Impacts</b>	<b>Economic Effects</b>
Loss of crops for food and income	Increased expense of buying foods from shops
Reduction of livestock quality	Sale of livestock at reduced market Price
Water scarcity	Increased transport cost
Food and energy shortages	Drastic price increase; expensive import/subsidies
Loss of jobs, income and property	Deepening poverty; unemployment

Source: Coleen *et al.* (2006)

**Table 2.4: Environmental impacts of drought**

<b>Environmental Impacts</b>	<b>Environmental Effects</b>
Increased evapo-transpiration	Crop withering and drying
Decreased soil productivity	Desertification and soil degradation(top soil erosion)
Reduced water quality	More water borne disease; increased salt concentration
Increased day time temperature	Increased fire hazards
Reduced water levels	Lower accessibility to water
Reduced forests, crop, and range land productivity	Reduced income and food shortages
Reduced water levels	Lower accessibility to water
Damage to natural habitats	Loss of Biodiversity
Increased incidences of animal diseases and mortality	Loss of income and food; reduced breeding stock

Source: Coleen *et al.* (2006)

In a society where agriculture is the primary economic activity, the direct or the first order impact of a drought is detected in the form of a reduction in food production, rangeland and forest productivity; reduced water level; increase in fire hazard; increase in livestock and wildlife death rates; damage to wildlife and fish habitat.

In Kinango Sub-county, the 2006 drought was severe (DMO, 2008) and this implicated much on food security including depleted food stocks, decline in livestock prices and the low rates have contributed directly to low purchasing power and therefore leading to poor feeding patterns in majority of the households. Most of the livestock keepers migrated with their herds to the South near Tanzania border leading to negligible milk availability to the household. Livestock units per household have gone very low and are continuing to be depleted as they are sold for the household to access food. The report further states that, households abilities to access food have been considerably eroded by the successive drought conditions that are prevailing which have led to high food prices, depleted household assets, poor terms of trade and limited coping mechanisms. It was the aim of this study to ascertain the effective coping mechanisms so as to stimulate a transition to contemporary adaptive strategies (Rennie and Singh, 1995).

## **2.5. Drought Vulnerability**

The terms ‘vulnerable’ and ‘vulnerability’ are often equated with ‘poor’ and ‘poverty’ (World Food Programme, 1998). The most basic definition of vulnerability is derived from its Latin root *vulnerare* which means ‘to wound’ therefore vulnerability is ‘the capacity to be wounded’ (Kates, 1985). Gallopin (2006) describes vulnerability as a concept that has been used in different research traditions, but there is no agreement on its meaning.



According to Olga and Wilhite (2002), most definitions of vulnerability contain a common thread. They all agree that vulnerability shows the degree of defenselessness of society to a hazard, which could vary either as a result of variable exposure to the hazard, or because of coping abilities. Coping abilities according to Downing and Bakker (2000) include protection and mitigation.

According to Patrick (2003) the more directly dependent a population is on the natural resources base of an area, the greater their vulnerability when there is interference in the productivity of that natural resources base. This situation is factual in dry lands occupied by people considered the most ecologically and politically marginalized group on the globe. The most limiting natural resources in the dry lands is water, a complete disruption in rainfall can initiate disaster such as famine on a catastrophic scale.

The degree to which a population can be affected by drought depends largely on various response or coping options available to them, or their degree of vulnerability, which in turn can be decreased by adequate pre-drought planning and mitigation of effects during the event or the lack of it. According to Patrick (2003), vulnerability to drought is complex, yet essential to understand so as to be able to design drought preparedness and mitigation strategies, relief policies and programmes.

Food insecurity may also expose vulnerable populations such as children, women, the elderly, PLWHA and people with disabilities to negative coping mechanisms. Abuse of such vulnerable groups is a risk in a situation of power imbalances based on control of

resources, in this case food. Furthermore, food has become a valuable commodity, and its distribution can create security risks as well as the potential for violence. Women, children, the elderly and people with disability may be unable to obtain their entitlements or may have it taken from them by force in situations of conflict. Food insecurity can also result in the adoption of negative coping strategies including diverting of food to young children making the elderly especially vulnerable. Drought conditions intensify the need to provide options to promote food security in the household in order to diminish these hazards (WHO, 2011).

With respect to persons with disability, WHO recognizes that, 15% of the population is disabled. In Kenya the official figure is 4.6% from the National Statistic office. Kenya population being approximately 39 million people we can estimate the disabled population to about 1.744 million, among them 50% are children under fifteen years. In the context of the drought 46,000 persons with disabilities are living in the targeted areas. As a result of negative attitude often persons with disability are invisible to relief operation. In an emergency situation persons with disabilities and especially women and children are more vulnerable because of lack of physical accessibility, communication accessibility and lack of knowledge of relief workers. Women with disabilities are more vulnerable to abuse and especially women with intellectual disabilities and mental health issues as they are often left alone while other members of the family are looking for food and water. Because of the drought effect, the prevalence and incidence of disability may increase as malnutrition, lack of access to water and sanitation are causes of disabilities (WHO, 2011).

## **2.6. Drought Driven Food Insecurity Assessments**

Drought driven food insecurity is at the heart of food crises and food-related emergencies. It is an underlying cause of malnutrition and mortality and a significant factor in longer-term livelihood security. Food insecurity may cause irreparable damage to livelihoods, thereby reducing self-sufficiency (Helen et al 2001). It is therefore part of the process leading to malnutrition, morbidity and mortality. In addition, the state of being food insecure directly contributes to destitution and damaged livelihoods long term, in other words, if there is acute food insecurity, there is a nutritional risk (ibid).

Depending on their mandates and the aims of their assessment, different agencies have developed different approaches to assessing food security emergencies (Helen et al., 2001; Davis, 1996). However, the theory behind each approach is based on the same underlying concept. This concept incorporates issues of availability and access to food, and acknowledges that, in an emergency, people may adopt a variety of coping strategies in response to food insecurity (Helen et al, 2001). The concept also includes issues around vulnerability, and sees famine as a process, comprising distinct stages (MSF-H, 1997). Methodologies are also similar, and largely depend on secondary information sources and rapid-assessment techniques, such as interviews, focus groups and proportional piling (MSF-H, 1997; UNHCR/WFP/ENN, 2000).

The main differences between agencies' approaches stem from their different objectives, and the different ways the information is analyzed to determine whether the

population in question is food insecure (Maxwell, 1996; Davis, 1996). For Oxfam for example, the main aim is to assess risks to livelihoods, as well as to lives. In its food-security assessments, Oxfam seeks to identify a variety of interventions that protect livelihoods (Helen, 2001). These may include food aid, but other measures range from de-stocking and fodder distribution to cash-for-work and seeds and tools distributions. This contrasts with Save the Children (SC)-UK's food-economy approach, which is commonly used to estimate food-aid needs (Boudreau et al., 1996). To estimate the severity of food insecurity, Oxfam analyses shifts in food entitlements, coping strategies and nutritional status. The food-economy approach, by contrast, judges severity by the size of the food deficit.

The livelihoods approach to assessing food security operates at a conceptual level. It does not constitute a methodology, nor is it unique (Helen et al, 2001). Taking a livelihoods approach simply means emergency programming with the aim of supporting livelihoods, as well as saving lives (ibid). This has implications for assessments, analysis and interventions. Assessments need to incorporate an analysis of the food security of different livelihood groups, and the risks they face. This often means doing a more in-depth assessment than would be the case if lives alone were in question. An analysis of the food security of different livelihood groups will lead to the identification of different interventions for each group. Finally, a livelihoods approach to food-security assessments has implications for food-aid recommendations, because the proportion of the population targeted will increase, and more rations will be required (Helen et al, 2001; Davis, 1996).

## **2.7. Coping Strategies of Communities against drought-driven food insecurity**

Adams et al, (1998) defines coping as an array of short-term strategies adopted in response to crisis. According to them, the aim of coping is to maintain the various objectives of the households, including livelihood security, consumption, health and status, thus ensuring individual and/or collective well-being. These objectives includes livelihood security and status, which are longer term objectives involving strengthening of assets, income and social position to maximize future claim on resources, the other objectives are immediate and these are food consumption and health objectives, which involves finding sufficient food and income to meet the health and nutritional needs of the household (Adams et al., 1998; Kinsey et al., 1998).

Societies are dynamic and they use all possible strategies to reduce the vulnerability to climatic impacts. There are two kinds of responses to crisis that overlaps across the temporal scale, coping mechanisms and adaptive capacity. Coping mechanisms are the actual responses to crisis on livelihood systems in the face of unwelcome situations, and are considered as short-term responses (Berkes and Jolly, 2001). Adaptive strategies are the strategies in which a region or a sector responds to changes in their livelihood through either autonomous or planned adaptation (Campbell, 2008). Coping mechanisms may develop into adaptive strategies through times (Berkes and Jolly, 2001). However, it is difficult to make a clear distinction between coping mechanisms and adaptations; this study considers both schemes as coping strategies.

Smallholder systems, especially those located in marginal environments such as Kinango Sub-county, are often characterized by livelihoods strategies that have been evolved to reduce overall vulnerability to drought shocks (adaptive strategies) and to manage their impacts (ex-post coping strategies). The distinction between these two categories is very blurred since what starts as a coping strategy in exceptional years can become an adaptation for households (Morton, 2007). Therefore many features of smallholder livelihoods, whom are the majority in Kinango Sub-county, can be regarded as adaptive strategies to drought.

Despite environmental challenges, African dry land communities practiced a relatively resilient and ecologically sound mode of production during the pre-colonial times (Bovin and Manger, 1990; Gulliver, 1951). These communities were able to cope with ecological stresses by different strategies within their social networks, for example, diversification of activities, dispersion of animal and human groups, and forms of redistribution and reciprocity (Bonte, 1975; Davies, 1996; Gulliver, 1951).

According to DMO (2008), the poor households within the Sub-county have developed coping strategies against drought including enhanced sale of livestock and other households assets, enhanced search of casual labour in nearby towns, dependence on food aid and other social networks, reduced number and sizes of meals, skipping meals and enhanced burning of charcoal and sale of firewood which have a very adverse effects on the environment leading to poverty and environmental degradation. It is obvious that the increased frequency of drought events have challenged the

effectiveness of these coping strategies, and with dwindling natural resources (water and forage) there is little the pastoralists can do to create access to such resources. It is important that external players such as researchers work with these pastoralists to identify ways of creating access to these resources for sustainable livelihoods which was the ultimate goal of this study.

The rural poorer people have been described by Chambers (1997) as “foxes” with many different enterprises with which they cobble together a livelihood, doing different things at different seasons. Researchers have a lot to learn from the insights of local people who are acknowledged within their own communities as experts on local plants (Cunningham, 2001). This study envisaged to find out more on Kinango peoples’ perceptions and attitudes towards drought and famine.

## **2.8. The Nexus between Poverty, Drought and Environmental Quality**

According to the Asian Development Bank (ADB, 2002), the poor are also characterised by their vulnerability to environmental degradation and deterioration of the natural resource base that has a devastating impact on them, given that they tend to be strongly dependent on the exploitation of such resources. This scenario is illustrated in Figure 2.1.

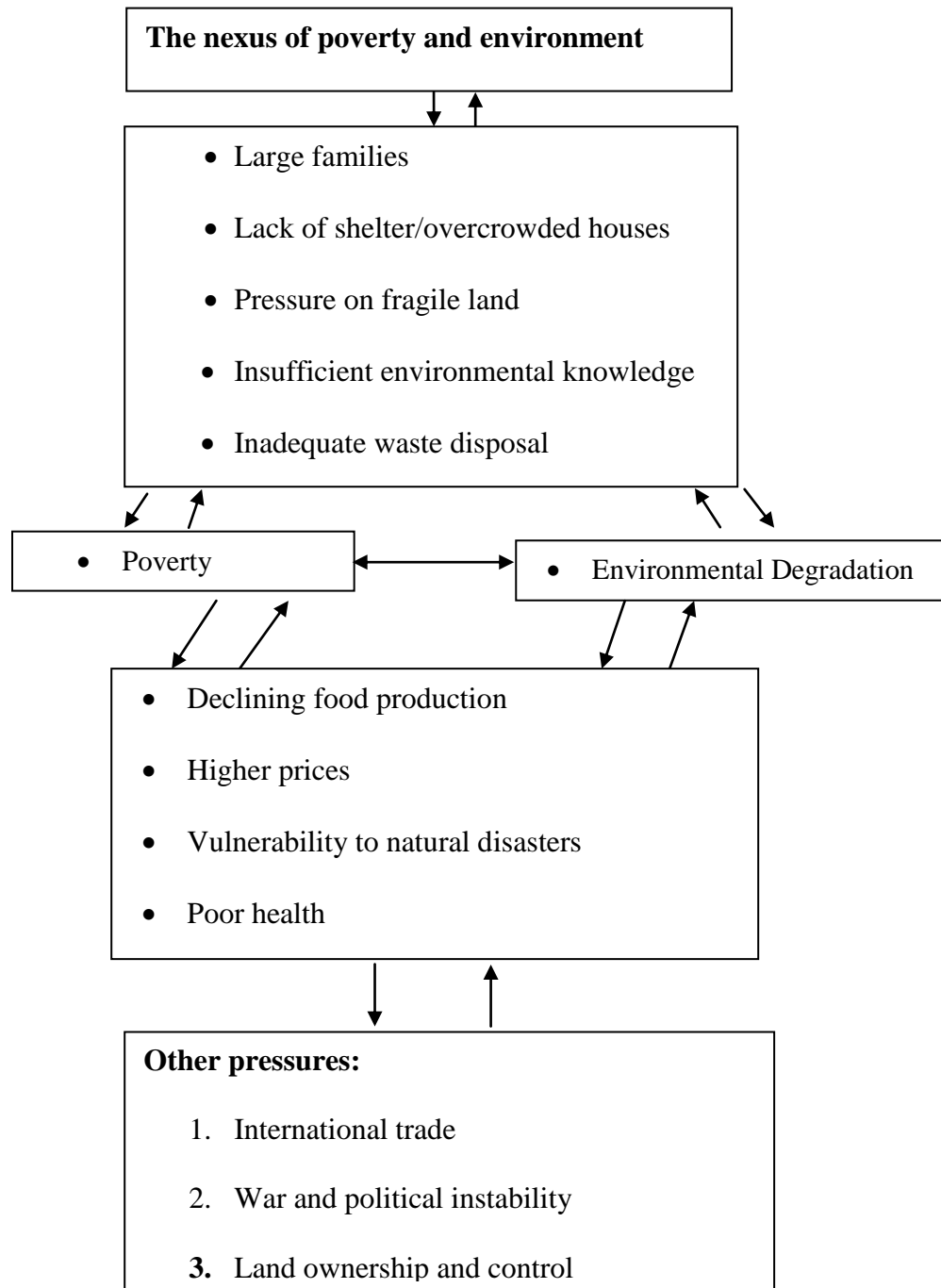


Figure 2.1: Relationship between poverty and Environment (Adapted from Ruck (2006))

The environment supports people's life and other living things. It provides essential goods and services which contribute to meeting the basic human needs and is essential



to human development and quality of life. Costanza et al (1997), asserts that given the heavy dependency on natural resource in Africa, many communities are vulnerable to the biodiversity loss that results from drought. Loss of biodiversity results in serious reduction in the goods such as food, medicine, and raw materials and services such as clean water and nutrients cycling that the earths ecosystems provides and that make human survival and economic prosperity possible (IPCC, 2001).

Poor people, majority of whom are in Africa, are often directly dependent on goods and services from their ecosystems, either as primary or supplementary source of food, building materials, fodder, and fuel. As a result of this dependency any impact that drought has on natural systems threatens the livelihoods, food intake and health of the poor people (Reid et al., 2003). The number of Africans living in extreme poverty rose dramatically from 89.6 million to 233.5 million between 1960 and 1990 (UNCTAD, 2002) with Africans notoriously low adaptive capacity, drought may further erode the peoples livelihood base thereby further entrenching poverty.

World Bank (1992; 1995) elaborates on some of the links between poverty and environment. It stated that a declining natural resource base, largely caused by poor people deprived of access to other resources, exacerbates the conditions of the poor by limiting their already restricted production possibilities. This applies in particular to rural water, soils and energy. One of the basic forces behind the vicious circle between poverty and environment is thus suggested to be that of poverty that limits people's options and induces them to deplete resources faster than is compatible with long-term

sustainability. Hence the poor themselves will aggravate the process of environmental degradation.

Dasgupta (1993) describes how closely dependent poor people are on their surrounding environmental resource base for their livelihood, and how poverty can be a driving force to environmental degradation. Based on theory and some empirical evidence he argues that poverty is both a cause and effect of resource degradation or lack of access to resources, including natural capital. To exemplify the above arguments he describes how poor nomadic dry land herdsman often are excluded from formal credit, capital and insurance markets and are forced to invest their capital in cattle, resulting in non-sustainable herd sizes and overgrazing.

## **2.9. Paradigms for Sustainable Livelihoods**

According to Korten (1995) a sustainable livelihood is not like a substance which can be borrowed from outside, real livelihood sustainability cannot be purchased with foreign aid or assistance, but rather it depends on people's ability and interest for using the local resources efficiently. Cernea emphasizes people's importance in livelihood sustainability as "people are ... and should be ... the starting point, the centre and the end goal of each livelihood intervention" (ibid). Chambers (1983) maintains that there is a need for local participation for solving poverty issues because the people in the community can define criteria for well-being and the key elements of deprivation as they appear in the local context.

Scoones (1998) identifies five key elements of sustainable livelihoods. The first is linked to rural productivity. Livelihood is sustainable if it creates gainful employment either through subsistence production and/or waged labour in activities that enhance the self-worth of rural population. The second is linked to poverty reduction – for livelihoods to be sustainable the causes of poverty (both qualitative and quantitative) must be mitigated to promoting greater equity in access to capital assets. Chambers(1997) indicates that enhanced capabilities and wellbeing constitutes the third dimension, combining abilities to both access and mobilize assets with more subjective experiences of wellbeing (feeling of self-esteem, security, happiness).

In addition to these three dimensions, Scones (1998) highlights two further elements that are crucial to the sustainability of livelihoods. The fourth is the resilience of livelihoods to short term stresses and their ability to recover from longer term shocks. Some livelihoods are more vulnerable to such shocks than others (for example due to lack of diversification, limited access to social or natural capital) making recovery and hence livelihoods less sustainable than others whose capital asset base is perhaps more diversified, or who can, for example, draw on social networks(social capital). The fifth element is the sustainability of the natural resource base – which is the long term resilience of the natural environment to stresses and shocks. The depletion of the natural resources beyond the capacity of a system to maintain productivity may result in the long term depletion of stocks to the detriment of livelihoods.

According to rural communities, the goal of development is not growth as defined by professionals but well-being as defined by the poor (Chambers, 1997). This study

ascertained the existing effective livelihoods strategies against drought and famine undertaken by the resource poor people of Kinango Sub-county and the government and other stakeholders.

A seminal paper by Chambers and Conway (1992) suggested that “a livelihood is sustainable when it can cope with and recover from stresses and shocks, maintain or enhance its capabilities, assets and entitlements, while not undermining the natural resource base.” However, few livelihood studies have pursued the agenda of how livelihoods “can cope with and recover from stresses and shocks,” and the resilience analysis that this study would entail (Berkes et al., 2003). Stresses and shocks that impinge upon livelihoods are the result of interactions between global forces and local contexts (Armitage and Johnson, 2006). Fluctuations in resource abundance, seasonal cycles of resource use and changes in access create conditions that bring challenges for rural households. Similarly, economic drivers (world markets, unaffordable credit) and policy drivers (misguided government programs) also create stresses and shock that impact rural life (International Federation of the Red Cross and Red Crescent Societies 2004, Millennium Ecosystem Assessment (MA) (2005).

Several attempts have been made by the government on improving the livelihoods of people in arid and semi-arid lands. For example, in 1980, an ASAL section was set up in the Ministry of Economic Planning and Development. In 1989, this unit was replaced by a full Ministry of Reclamation and Development of Arid, Semi-Arid and Wastelands. According to reports (Vision 2030; Northern Kenya and Other Arid Lands

draft 3 of 14th November 2009) , it is indicated that their focus was limited, with bias towards cattle and conventional range management approaches in the easier to reach semi-arid districts. In 1996, the World Bank supported Arid Lands Resource Management Project (ALARMP) to alleviate food insecurity through drought and Natural Resource Management. Kinango Sub-county falls within these regions with a total area of 4,178 Square Kilometres, of which 3,686 Square Kilometres are arable. The district is within the coastal lowland Agro-Ecological Zones CL3-CL6 and 60% of the population relies on food aid (Farm Management report 1993-Kwale District).

There exist vibrant livelihoods opportunities within Kwale county that the local communities could use for their livelihoods sustainability. For instance, Kubo divisions is suitable for mixed farming as Lungalunga, Msambweni and Diani divisions support has immense livelihood opportunities in Fisheries, mixed, farming, formal employment in tourism sector (GOK, 2011). In addition, Kinango, Ndavaya, Kasemeni and Samburu divisions of Kinango Sub-County form the livestock livelihood zone (ibid).

However, low local capacity to optimally utilize the available livelihoods opportunities coupled with ill adaptations of the communities towards management of the recurrence drought events occasioned by global climatic changes force the local communities to engage in natural resources utilization practices that exacerbate the impoverishment destruction to the environment, and the natural resources which are key sources of livelihoods to the local communities. In addition, the lack of self-driven abilities among

the local communities to mobilize themselves and generate local solutions to address their own local problems through enhanced participation accelerate the poverty levels.

Poor pricing strategy of livestock such as cattle and goats especially during the drought seasons, as well as marketing and value addition constraints means that farmers get low incomes from livestock, therefore compounding the vulnerability of households to pangs of poverty (GOK, 2011). Due to the persistent drought events, the local communities have had to develop some coping strategies such as engaging in casual labor, gifts, petty trade, remittances, livestock sale, charcoal burning, employment and embracing or strengthening social networks (DMO, 2008).

In view of the above intense analysis of the livelihood framework upon their existing environment and resources, we identify a formidable gap that could be explored to offer remedy to the increased food insecurity in the area. None has offered to explore those effective coping strategies visa vie the available knowledge on resource utilization and thus the dire need for this study.

## **CHAPTER 3: RESEARCH METHODOLOGY**

### **3.1. Introduction**

This chapter provides details of the research methodology used in the study area. It offers descriptive information on the sampling procedures, the target population, the data collection methods and tools, and finally analysis of data

### **3.2. Study Area**

This study was carried out in Makamini Location of Kinango Sub-county (Figure 3.1). The area has a population of 15,378 people with 1922 households (KNBS Report, 1999). It has an area of 707 Square Kilometres with a population density of 22 people per Square Kilometre with an average cultivated farm size of 5 acres. The Topography is fairly undulating with percentage slope ranging from 5-12%. Types of soils are clay, sandy loam and sandy. The average rainfall ranges from 400-700 mm per year. The area is over 60% food insecure with low resilience; rainfall is low, erratic and unreliable.

Poverty levels are high over 60%; most of the people depend on relief food and food for asset which are inadequate, not sustainable and covers only 10% of the population (DAO Annual Report, 2008). Crops failures are persistent and have been successive for

the past three years despite several adaptive strategies in place such water pans, zai pits, drought resistant crop varieties, sunken beds among others (ibid)

The Sub-county is covered by the Government Arid and Semi-Arid Lands Management Programme. Despite many efforts and other programmes focusing on food security and adaptation strategies, food security gap between ASAL areas and other areas of the country is still pronounced. This predicament requires urgent attention, especially in the development of viable and sustainable food security strategies to support the national development agenda. Kenya’s Vision 2030, for instance, underpins the goal of achieving Middle-income industrializing country status by 2030, but for ASAL’s, this looks a pipe dream. Apparently, they have to start by addressing the very basic challenges of chronic poverty, vulnerability and food insecurity.

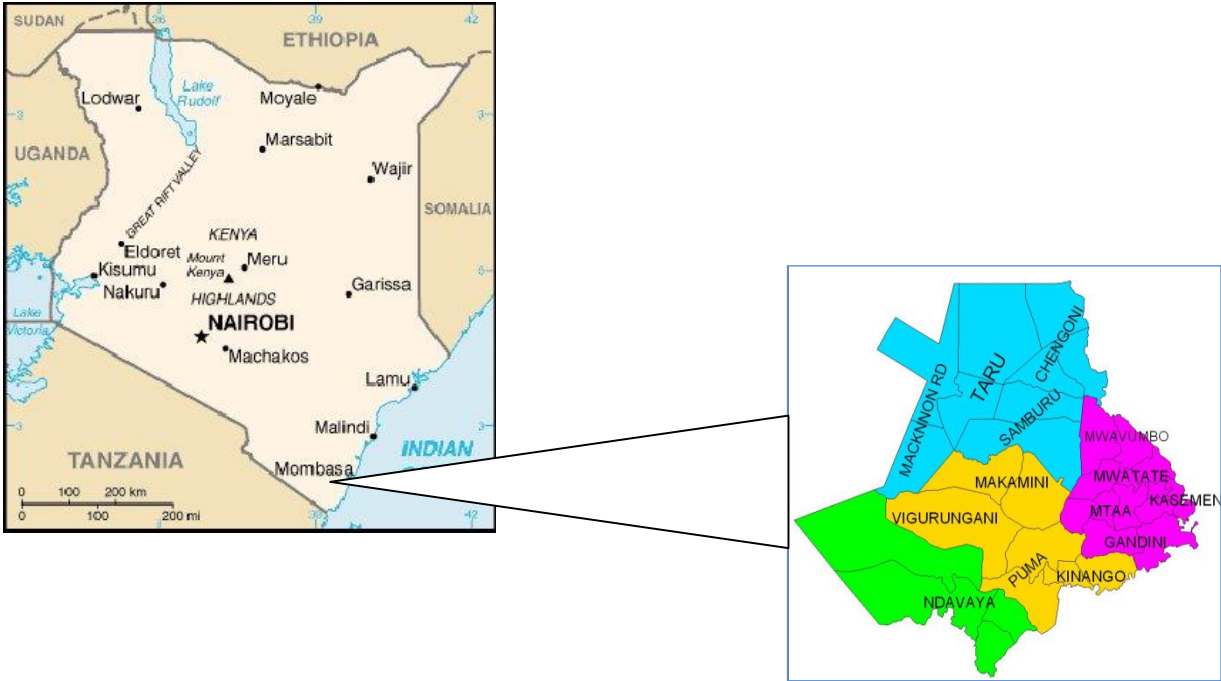


Figure 3.1: A Map of Kinango Sub County showing Administrative Location and Study area



### **3.3. Research Design**

A cross-sectional survey design was used in this study. The design was used because of the study being descriptive where data was collected from multiple groups of people. Data was collected from male and female respondents from different socio-economic classes, multiple age groups and of different abilities and accomplishments. The collected data was both qualitative and quantitative.

### **3.4. Target Population and Sampling Procedure**

The rural poor, dependent on agricultural systems and natural resource base, constituted the target population while the unit of analysis was a household with the household head serving as the unit of observation for the study.

Purposive sampling was used to select Makamini Location because it has the highest percentage of people who are food insecure (DAO, 2009). The selected sample of 20 key informants included local leaders, agricultural extension officers, arid and semi-arid land officials and civil society personnel. This was done through the Provincial Administration who assisted the researcher to identify those persons who had lived in the area for more than ten years. In Makamini Location a sample of 30 households from each of the four sub-locations were selected. The method of sampling was as described by Padgett (1998).

The criterion which was used to select the units of the study considered manageability in terms of the cost of data collection, accessibility to the prospective respondents and the vastness of the area. This made it possible to reach all the selected households effectively with relatively low costs as the area is sparsely populated, approximately three households per square kilometre (KNBS Census Report, 2009).

### **3.5. Methods of Data Collection**

Qualitative data collection approach was used in the collection of data on the effects of drought as well as the effective coping and/or adaptation strategies. However, quantitative approach was also used to collect numerical data for example age distribution of respondents, number of livestock kept by the households while the qualitative approach collected data inform of expressions. But the techniques complemented each other (Neuman, 2003).

#### **3.5.1. Participatory Rural Appraisal (PRA)**

The origin of PRA as an approach to development planning and as a method of investigation evolved from many different sources. Some of the sources were modified to be utilized in a participatory mode, and the others were taken up as they were used for investigation and planning. This method was used because the problem at hand was important to the local or group level, and therefore it facilitated the rural people from the study area guided by the researcher to do their own investigation which they shared

with the researcher. Most of the qualitative data for this study was collected using this approach.

Several other approaches were used in data collection to compliment the main data collection methods and they included seasonal and historical analysis. Pair wise ranking technique was also used to rank most significant drought weather events and sources on income. Further prioritization was used to evaluate the effectiveness of drought coping strategies.

### **3.5.2. Focus Group Discussion (FGD)**

Focus Group Discussions are exploratory research techniques, a structured group process used in this study for the purpose of exploring people's thoughts and feelings and obtaining detailed information on the key study variables (Sherraden, 2001). The respondents were organised into focused group discussions composed of five (5) to twelve (12) people (Bloor et al., 2001). The issues addressed using this method included; implications of drought on people's livelihoods, food insecurity and coping strategies.

FGDs also served as tools to verify data collected by other methods particularly households interviews. They involved development of a community resource map (indicating resources within the community where livelihoods are obtained), Livelihoods mapping, rankings, identification of development actors and their support

in relation to drought driven food insecurity. FGDs were used in data collection because unlike other individual approaches, they eliminate fears and timidity. The data obtained was used to validate data collected by other methods.

(The checklist is summarised in Appendix 1).

### **3.5.3. Field Observations**

Field observations were conducted to validate the answers given during interviews. For instance livestock rearing was identified by most of the respondents as one of their reliable source of livelihoods. This method helped to cross-check such responses during interviewing of the selected households. It also helped to observe the local practices thus Indigenous Technical Knowledge (ITK) and modern technologies engaged in by the community members in strengthening their livelihoods in response to drought.

### **3.5.4. Questionnaire Survey**

This tool was both used to literate as questionnaire and illiterate respondents as an interview schedule. The interview schedule is helpful in interviewing respondents who cannot read and write (Bless and Higson-Smith, 2000; Goddard and Melville, 2001). Investigating of drought coping strategies in Kwale County was also done through administering a questionnaire to the literate respondents. The tool also helped to collect

demographic and socioeconomic information of the respondents. The interview schedule is summarised in Appendix 2.

### **3.6. Data Analysis Methods**

The collected data was organised and analysed using the Statistical Package for Social Sciences (SPSS) computer programme (Norusis, 1998). Most of the data collected was descriptive in nature and so the analysis was using analytical techniques of descriptive statistics such as the mean, ratio, and percentages. The results were presented in the form of bar graphs, pie charts along with tabular data. The open ended questions were dealt with separately in a descriptive manner. Different researchers have generated quantitative descriptions by analysing word count (Silverman, 1993) to draw inferences by breaking the text into discrete units of manageable data that can be reorganised (Weber, 1990). In this study, interview data was coded and sorted into themes. Inconsistencies and unique statements were noted and given particular attention.

The study has mainly used qualitative analytical tools to organize, summarize, interpret and present research findings in relation to the study objectives. The data was edited at different stages while in the field during data collection. Editing each interview soon after it was conducted gave a chance to get back to respondents to fill in missing information. After data collection, the field notes were first organized into categories and subjected to thorough analysis to eliminate any errors. This included rationalized

selection of evidence after corroboration with other sources to ascertain authenticity and validity of information.

After final editing, a coding system was developed. The responses were coded and assigned numbers to the categories. Thereafter, analysis was conducted within the context of the theoretical framework with the aim of searching for emerging patterns, themes, or consistency in ideas. The information was finally evaluated to determine its usefulness in answering the research questions. The facts and opinions heard from the informants are presented as well as authors own observations.

The data collected from the PRA was rearranged in terms of patterns, differences, variations and contradictions guided by the research objectives. Key themes were identified based on the patterns of the data collected and analysed and presented as diagrams, matrices and rankings. Tabulations were used that allowed comparison of differences' between individuals and also avoided relying on general impressions rather than facts to make logical conclusions (Adebo, 2000).

In addition, Wilson rank test of association and Kruskal Wallis test of association analysis were used to test relationship among variables of coping strategies. Priority rank of use and those perceived as effective and also Correlation analysis was used to find the extent of these relationships.

## **CHAPTER 4: RESULTS AND DISCUSSIONS**

### **4.1. Introduction**

This chapter provides results of data analysis from 120 households in Makamini Location guided by the research objectives indicated in Chapter One. This analysis and discussion focuses on the themes: socio-economic dimensions of the local community, droughts events, and impacts of droughts on peoples' livelihoods, effective coping strategies, general behavior and perceptions of people to drought phenomenon. The findings are presented in tabulations and figures that clearly show the variations in responses to the study variables.

### **4.2. Socio-economic Dimension of Respondents**

This focuses on the different or diversified opportunities available towards achievement of household livelihood needs to amicably cope against continued drought regimes. For the purpose of this research, our key interest was an assessment of the following parameters towards sustained household demands; age of respondents, education levels, livestock holding capacity, crop production for domestic use, crop production for sale and income diversification at household level. These parameters were investigated and here below are the results and respective discussions

## Age of Respondents

The descriptive statistics in Table 4.1 show that the minimum age of the respondents was fourteen years while the maximum was seventy four years. The standard deviation from the mean age (40.96 years) is 13.727.

**Table 4.1: Descriptive Statistics of the Age of Respondents**

<b>Description</b>	<b>N</b>	<b>Minimum</b>	<b>Maximum</b>	<b>Mean</b>	<b>Std. Dev.</b>
Age in Years	120	14	74	40.96	13.727
Valid N (List wise)	120				

This implies that, 95% confidence that the mean age of the respondents CI (95%) [37.54, 43.42] were within the labour force bracket who can engage in strengthening of drought driven food insecurity coping strategies for sustainable livelihoods. Despite the suitable positive mean age that is within labour force bracket, there is still much strain resulting from a reasonable number of elderly and young dependents that need immense livelihood support. The ultimate scenarios that may be emergent in the study area is to push so much of the working bracket to provide for the dependents, hence tiring up at early age and thus an increase in the number of dependents in the community.



### Education Level of Respondents

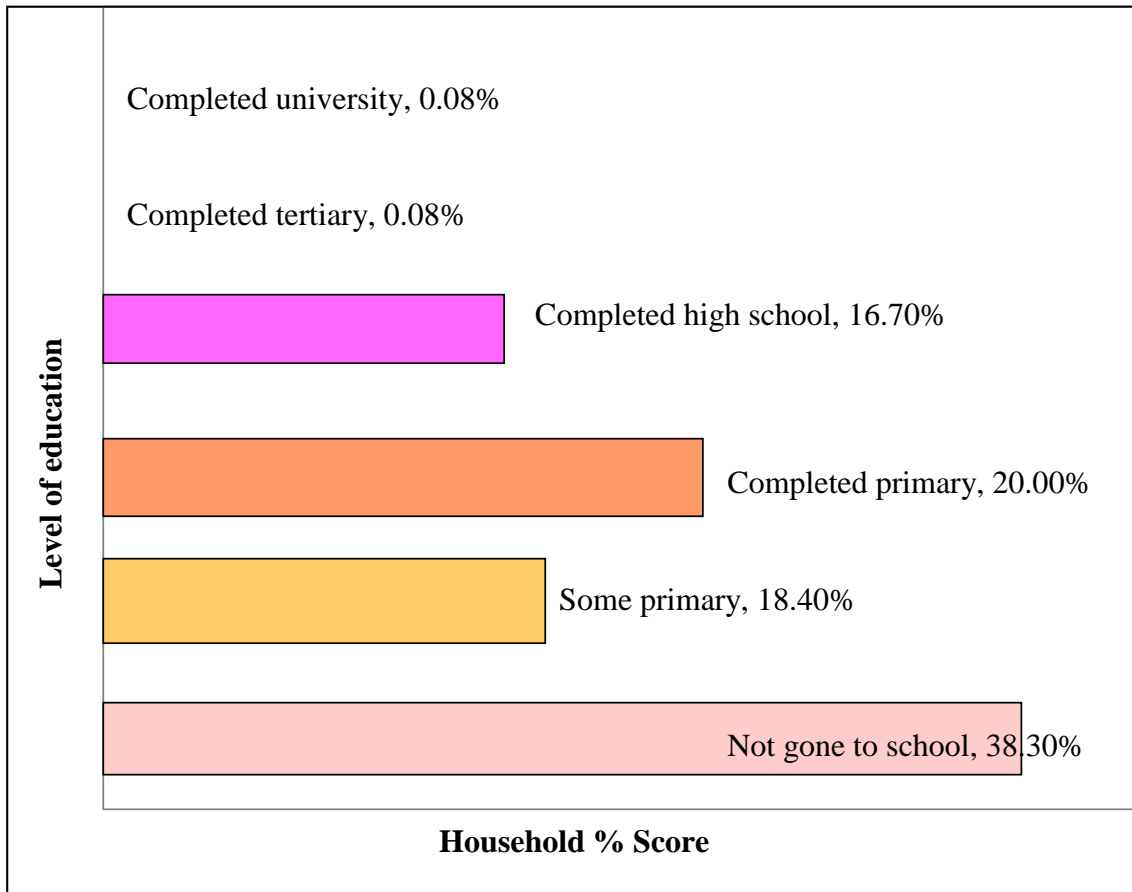


Figure 4.1: Level of education for the respondents of Makamini Location

Out of the sampled respondents, 38.3% had never gone to school; this has been reported to have derailed their income opportunities. Of the sample, 43.4% attended up to primary level and 18.3% had completed high school and above, see Figure 4.1. The level of education has had serious implications on opportunities for securing lucrative employment. It was further reported that education increases farmer's ability to get involved in more remunerative livelihood activities. Barret et al (2001), asserts that educational attainment provides one of the most important determinants of non-farm

earnings, especially in more remunerative salaried and skilled employment in rural Africa.

Education plays a significant role in shaping the socio-economic development of communities and respective household livelihood attainment. If compared in many varied cases, families that have higher levels of education, their income earning power is higher as well as their fulfillment of their livelihood needs. Such families have the ability for take up of new production technologies bent towards realization of their livelihood goals unlike those families that have low level of education.

The levels of education in Makamini location are quite low. This means that the level of uptake for any new agricultural productivity strategies are respectively low and local knowledge of coping with drought emphasized and this has aggravated the situation for worse.

## Livestock Holding of Respondents

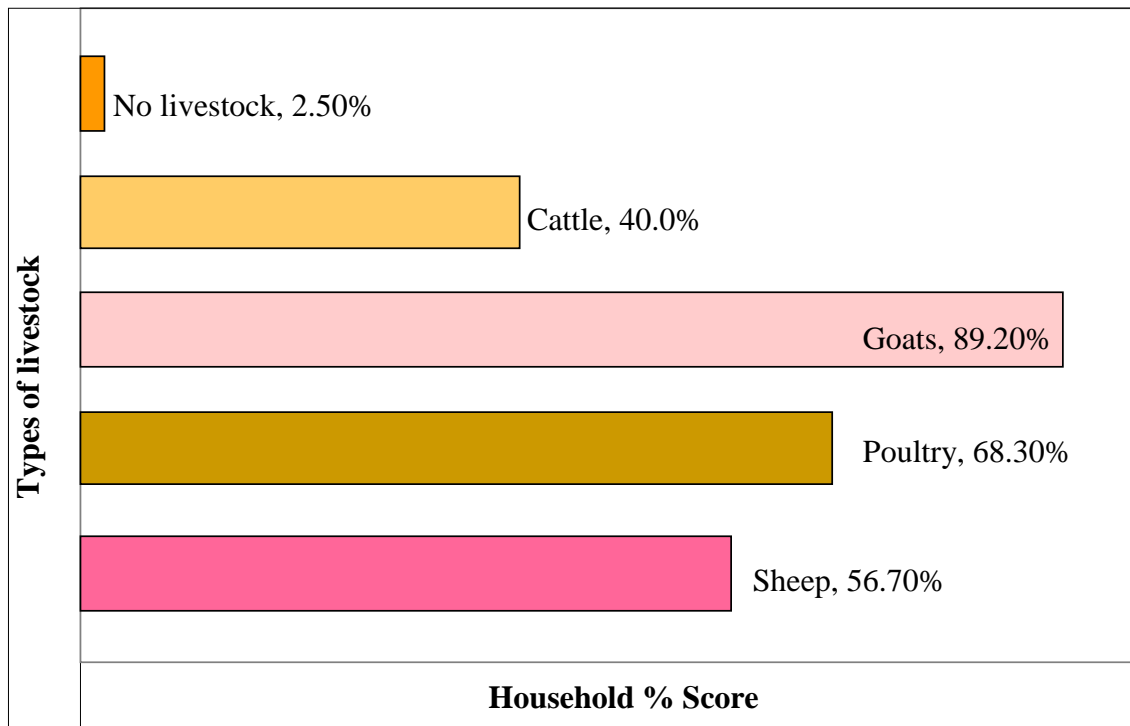


Figure 4.2: Types of livestock as per household

The study findings revealed that 97.5% of the households practice livestock production while only 2.5% do not. Of the total sample 89.2% and 56.7% of the households keep goats and sheep, respectively. It is also clear in Figure 4.2 that 68.3% of the households keep poultry and 40% keep cattle. Most of the respondents keep small stocks probably because they can easily be liquidated during times of drought crisis for livelihood sustenance.

The respondents who were not practicing livestock production, the survey revealed that they exhausted their herds during the prolonged drought of 2006 to 2008. This is in agreement with Hoddinott (2006) who argued that selling assets in response to shocks

today risks permanently lowering future consumption. This is also in line with Drought monthly Bulletin (Kwale/Kinango, 2008) which reported that poor households in the Sub-county have developed coping strategies against drought including enhanced sale of livestock and other household goods.

Livestock is one of the most important and crucial assets that the majority of the respondents depend on to safeguard their household from any sort of crises. Livestock keeping is regarded as part of material wealth and can easily be converted to income. It is also part of their cultural beliefs, and plays a crucial role in their social life including use of livestock as a dowry incentive etc.

#### Household Average Number of Livestock Holdings

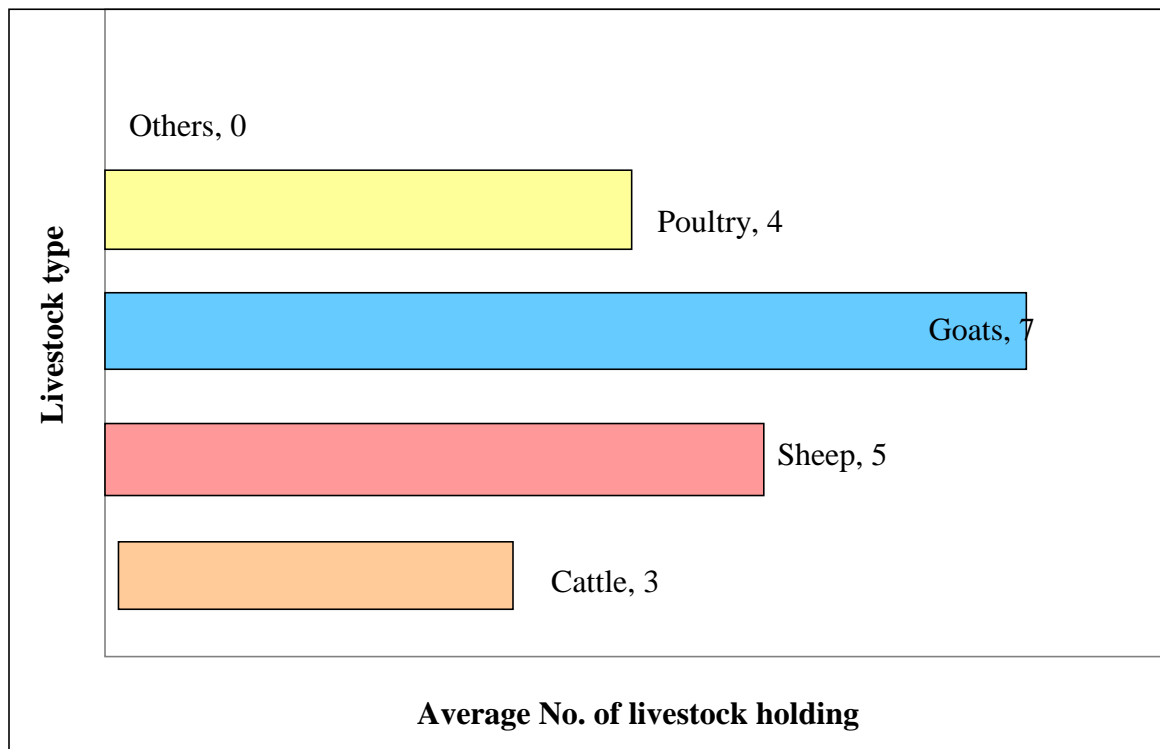


Figure 4.3: Household average numbers of livestock holding

The average numbers of livestock types reared by households were: Goats 7, Sheep 5, Poultry 4, and Cattle 3, see Figure 4.3. The low number of livestock holdings was explained to be due to the frequent persistent droughts which resulted in livestock selling as a survival mechanism.

During the study, it was reported that small stocks of animals such as goats and sheep were mostly kept by the households not only because of their easy liquidation but also they were good browsers, therefore can withstand drought conditions more easily than the big stocks. This observation harmonises with Meuret (1994) argument that goats have the unique ability to utilize forage resources that cannot be utilised effectively by other ungulates such as cattle, and in addition goats exhibits a versatile feeding behaviour which comes from their physical body structure (mobility of upper lip and vigorous grazing) and their variable rumen micro-flora allows them to cope in harsh environments. This livestock diversity is a suitable strategy, though further higher production capacities and breeding models need to be inculcated to adequately address the increasing livelihood needs of the local community.

Diversity in livestock keeping is a local coping strategy quite evident not only in Makamini but across Africa. It offers leverages in times of disaster or drought as some of these livestock species are resistant to drought to some good level, while those that do not withstand adverse conditions are sold immediately to earn an income.

### **Types of Crops Produced by Respondents**

The study revealed that 95.8% of the interviewees grew maize while 37.5% and 36.7 % grew sorghum and cassava respectively. The other crops such as groundnuts, sweet potatoes, bambara nuts, green grams, pawpaw, water melon, traditional vegetables and pigeon peas were grown by less than 30% of the households. Of the sample, 80% grew cowpeas and water melon was grown by 3.3 %. This is illustrated in Figure 4.4.

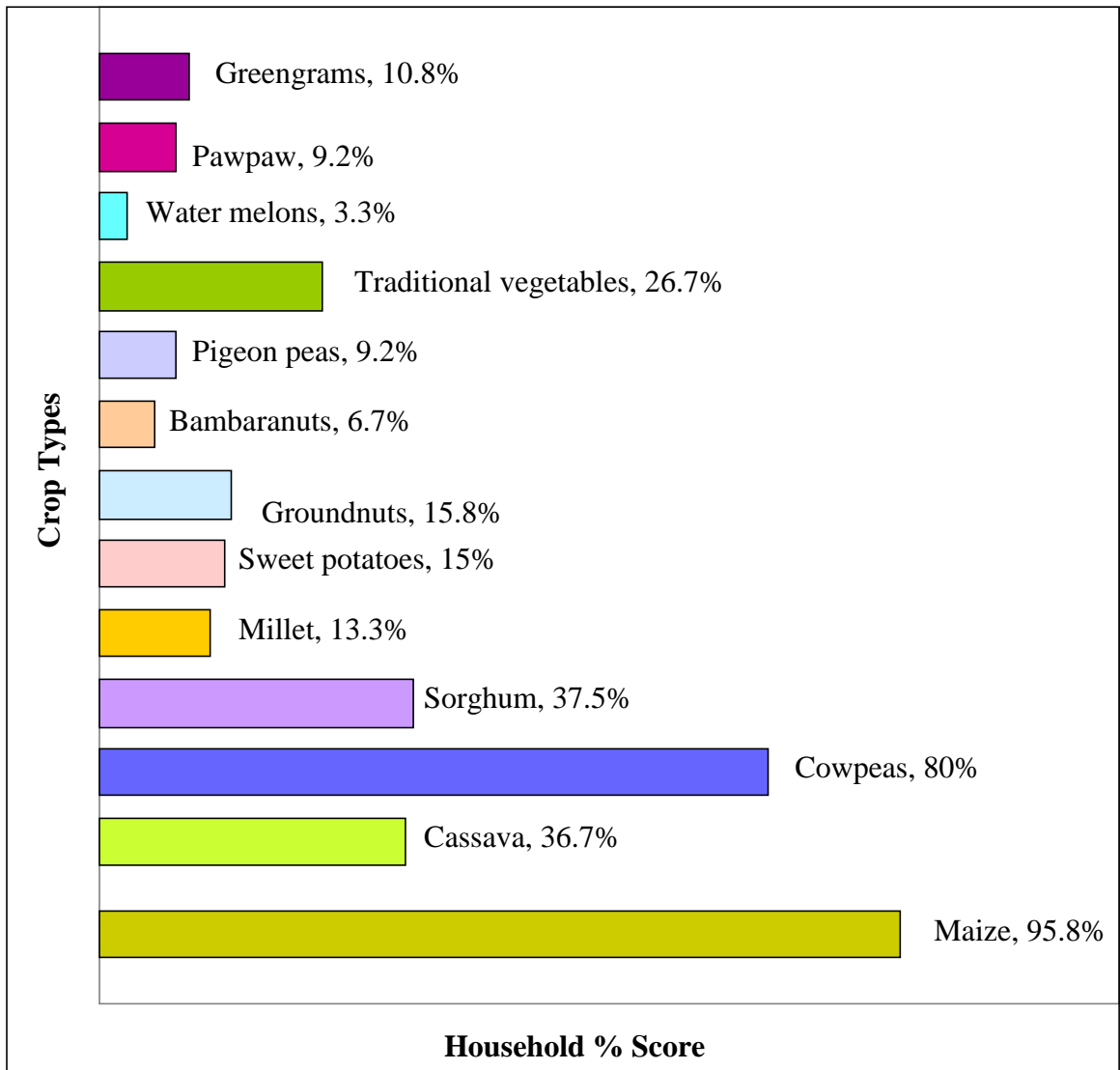


Figure 4.4: Crops grown by households

Cow peas were planted as a relay crop when maize is at knee high. The leaves of this crop are utilized as vegetables, and peas fetch good prices at the market. Water melon is grown by a few households in the study area, and this has been reported to be attributed to low knowledge on the crop and lack of readily availability of planting materials.

They further explained that they were mostly cultivating sorghum and cassava as they are drought resistant crops.

According to DMO (2008), the average acreage under maize was one and a half acres per household over the years and this small acreage was explained to be due to the unpredictability of the rains.

Multiple responses were allowed because small households in drought prone areas have a tendency of planting several crops in one field hence the total frequency exceeded the total sample size of the study. The findings depict that majority of the households grew different types of crops. The results largely reveals that crop diversification is a key strategy for coping with drought adversities and this practice has been transmitted from one generation to another (Makonde, A, 2010, Researchers observation).

### **Percentage of Households Growing Crops for Sale**

The study findings indicate that 83.3% of the respondents were not growing crops for sale whilst only 15.7% grew crops for sale.

According to the respondents, after facing previous food deficit in recent droughts, rainfall fluctuations and low yields, most of the households opt to sell livestock instead of food crops. This implies that farmers in semi-arid lands most probably grow crops for subsistence and not for commercial purpose.



## Households Sources of Income

Income sources can be varied in a community. To capture the sources of income in Makamini multiple responses were allowed. It emerges in Figure 4.5 that 80.00% of the respondents mentioned that livestock production was their main source of income, 73.30% indicated that waged labour (salaried or daily wage) was their main source of income, 67.50% relied on charcoal production. Of the studied respondents only 13.30% indicated crop production to be their main source of income.

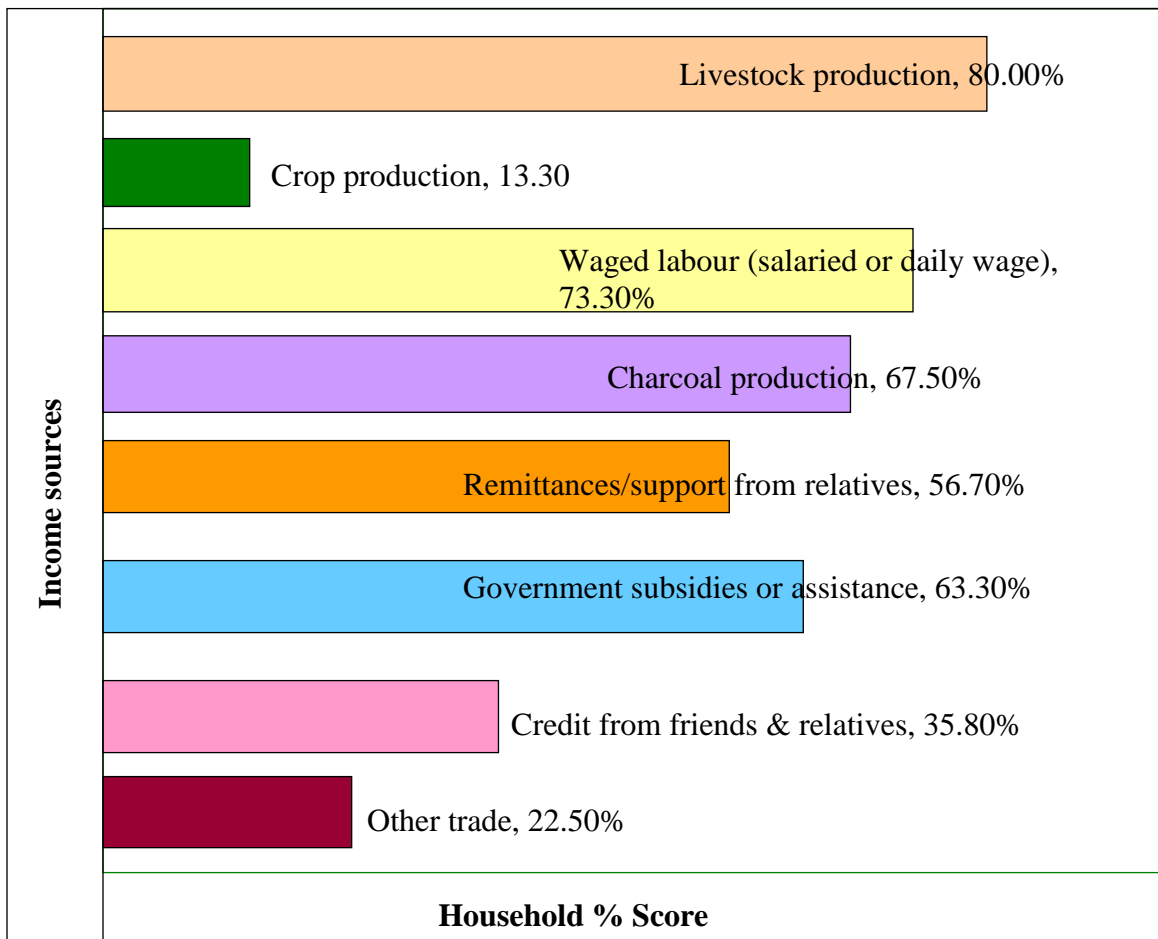


Figure 4.5: Households source of income

This dependency of resources derived from immediate environment for cash have been documented by (Vogel, 1995). This is also supported by Watts (1983) and Mortimore (1989) who observed that households cut and sold charcoal in times of crisis. This implies that the respondents engaged in one or more income generating activities beside their primary occupation to meet food needs. However, it was observed from the field that livestock production is the dominant source of income for the majority of the households in the area.

### **Ranking of Households livelihoods in order of Priority**

Waged labour (salaried or daily wage) was ranked as the major source of income, coming in as number one, as shown in Table 4.2. Livestock production was ranked number two whilst the least source of income was indicated as support from friends and relatives (rank six).

**Table 4.2: Household livelihoods ranked in order of priority**

<b>Income Source</b>	<b>Percentage</b>	<b>Priority Rank</b>
Livestock Production	73.3	2
Waged labour (salaried or daily wage)	96.7	1
Remittances/support from relatives	56.7	5
Government subsidies or assistance	63.3	4
Charcoal Production	67.0	3
Credit from friends & relatives	35.8	6
Other trade	27.5	7

The findings support that of Skeldon (2002), who asserts that livelihoods of rural households are changed by migration labour dynamics. This argument is corroborated by Zhao (2003) when he observes that remittances by the immigrant labour can help households to overcome credit shortage and market imperfection, and help to ensure the steady development of family production and maximise utility.

DFID, (2001) report observes that remittance contribute to economic growth and to the livelihoods of the needy people world-wide. The latter signifies the weakening of social fabric and networks probably due to the overriding forces of social change taking place globally.

**Household Monthly Income**

The findings show that over three fifths (65%) of the studied household’s average monthly income was Kshs. 3000.00 and below, one fifths (20%) was between Kshs. 3000.00 and Kshs. 10,000.00 whilst 15% had an average monthly income of above Kshs. 10,000.00. The study findings indicate that over four fifth of the households interviewed had an average income of below Ksh. 10,000 as shown in Figure 4.6.

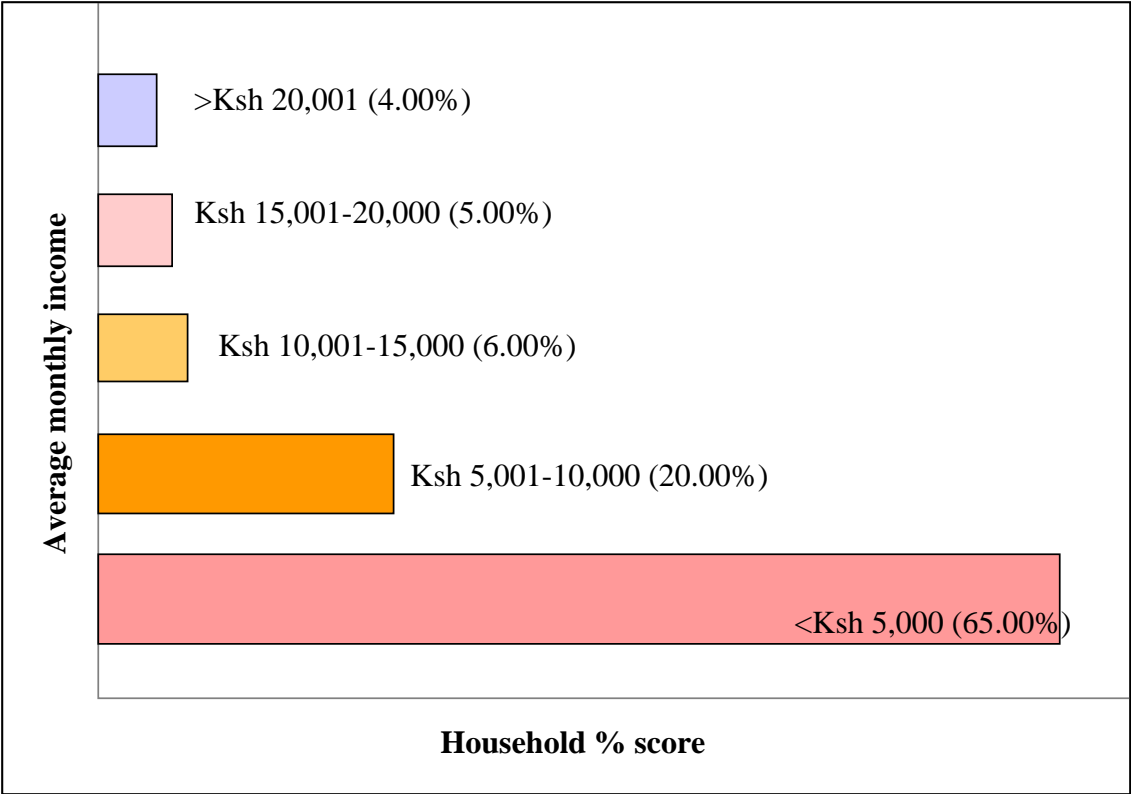


Figure 4.6: Household average monthly income

This implies that their purchasing power is low especially during drought driven food insecurity where prices of foodstuff hike. Low income has increased vulnerability of

dry lands communities of Kinango Sub-county rendering them unable to cope with drought effectively. This was revealed during Focus Group Discussions on the causes and effects of drought and factors exacerbating it.

### **4.3. Effects of Drought in Kwale County**

#### **4.3.1 Historical Profile of Worst Droughts Experienced in Kinango Sub-County**

During the survey, FGD participants were asked to come up with a historical profile of drought events which had caused a serious famine in the area. Table 4.3 shows people's perception on worst drought events ever experienced in Kinango Sub-county.

**Table 4.3: People's perception on worst drought events**

<b>Drought Years</b>	<b>Description</b>	<b>Local Name of Famine</b>
1980-1984	People moved to Msambweni (Dzombo) for yellow maize flour	Njenga
1990-1993	The drought was for three years , wheat flour was at low price , maize flour was scarce	Chapati
2001-2005	The start of making charcoal at high rate, Renovation of Kituu borehole.	Katoto
2006-2008	Three years of extreme drought, prolonged drought	-Not indicated

Source: Fieldwork July, 2010

The study findings revealed that during the period 1980-1984, a drought occurred which caused a serious food shortages and forced the Kinango residents to travel as far as Msambweni, a distance of more than 70 Kms, looking for yellow maize flour. This famine was given a name by the Kinango people as ‘Njaa ya Njenga’ because they were getting the maize flour from Njenga’s shop at Msambweni.

The FGD participants reported that in 1990-1993 a prolonged drought occurred which caused serious food shortage and eventually a famine. During this period wheat flour was in abundance at low price while maize flour which is the main staple food for the Kinango people was very scarce. According to the respondents, missing their staple food meant a serious famine. Bratton (1987) asserts that household’s ability to meet their dietary requirements reduces as drought deepens and hence food shortage may result (Chambers et al., 1981). This historical profile would help in drawing trends and predications for any future similar activities and as well provide suitable interventions measures for the community. These predictions are quite necessary to keep the communities informed of the in eventualities and be prepared enough with tangible coping strategies unlike in the past when the communities were caught unawares.

During the FGD historical profiling it was reported that a drought spell was experienced between 2001 and 2006 causing famine which the Kinango people called ‘Katoto’. During this period the participants of FGDs reiterated that it was the start of serious charcoal burning in the area, the study observed that it was during this time when “Katoto” borehole was renovated to alleviate the serious water shortage at that time.

The FGD stated that the 2001–2006 droughts was the worst they can remember since it was prolonged, they further indicated that it had great impacts on their livelihoods.

Further, findings of the study corroborates the results in a report by the GOK (2004), Revised Draft on the National Policy on Disaster Management which asserts that major droughts come after every ten to fifteen years and the minor ones after every three to four years. The serious recent drought perceived by the respondents occurred between 2006 and 2008, which prolonged for three years. The respondents further indicated that during this period Kinango people relied on relief food, migration to major urban centers for jobs, and income diversification through charcoal burning and waged labour.

#### **4.3.2 Effects of Droughts on Community Well-being**

Crop failure was reported to be the worst immediate impact of drought on people's livelihoods by 79% of the respondents; they further reiterated that it was their major drought related problem, of which 70.8% of them referred it to be the main cause of food shortages. 74.2% of the respondents reported water scarcity and Job shortages were mentioned by 53.3%. 35% of the respondents indicated that drought impacts heavily on their health particularly, are the major causes of malnutrition. This is illustrated in Figure 4.7.

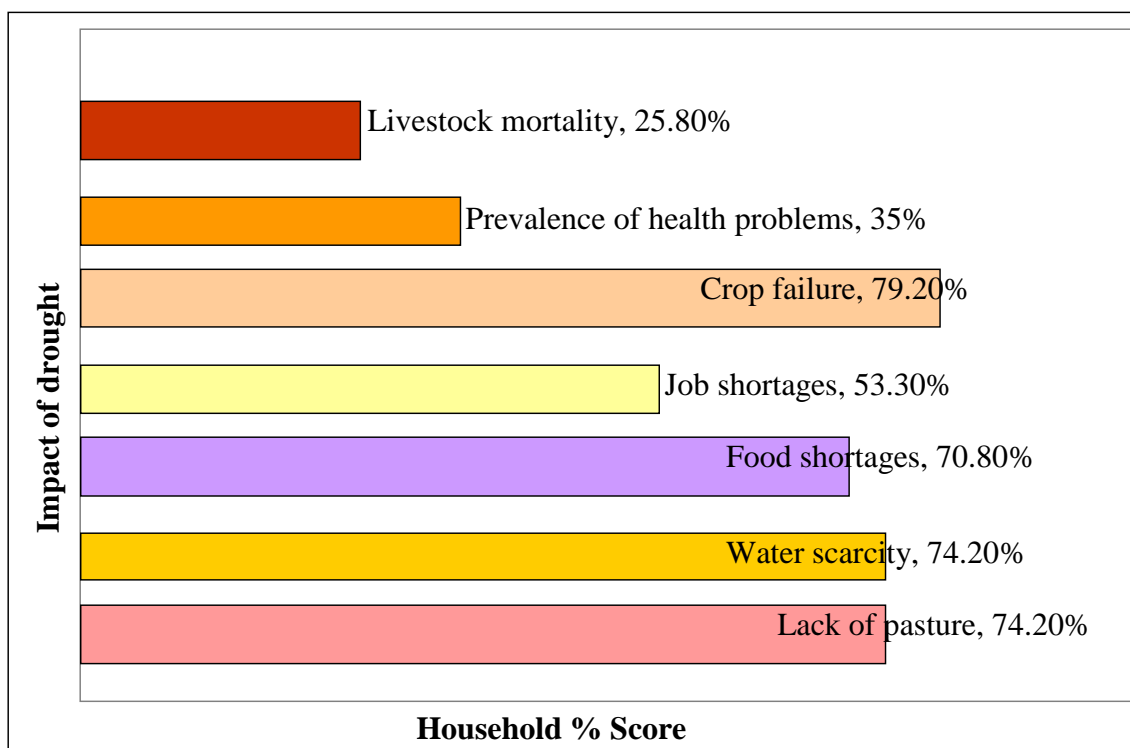


Figure 4.7: Effects of drought on community well-being as perceived by the respondents

They further explained that food crops are their main source of energy and they cannot work without food, resulting to poverty.

The findings support those of other studies which confirm that drought leads to a reduction of water in dams, boreholes and rivers (Tiffen, 1995, McCarty et al., 2001). NDMC (2003) posit that the desiccation of domestic water supplies is the most immediate side effects of drought. The respondents further explained that drought led to drying up of water sources in area, forcing them to walk long distances, of over 10 kms, in search of water. This led to waste of man hours which could have been used in



productive activities. Also, they become emaciated due to walking in the sun for long hours in search of water.

The respondents further explained that during drought period there were no farming activities, and money in circulation was generally low, making it difficult for casual labour availability which most of the residents depended on.

Malnutrition caused by poor diet due to poor harvests was mentioned to be one of the felt impacts of drought affecting human beings and (Bratton, 1987) asserts that it may lead to under nourishment. Chambers et al. (1981) and Mortimore (1989) argue that drought may also result in some children being under weight, while sickness may be prevalent during these periods especially malaria, diarrhoea and skin infections.

### **4.3.3 Effects of Drought on the Environment**

The study found out that drought had severe effects on the environment. More precisely, 87.00% of the respondents reported that vegetation withered completely due to drought and 74.00% mentioned drying up of water pans. Of the 120 respondents, 68.00% indicated that drought pushed them to charcoal burning and 56.00% of the respondents mentioned Conflicts, due to dwindling of basic communal resources such as pasture and water. This is illustrated in Figure 4.8.

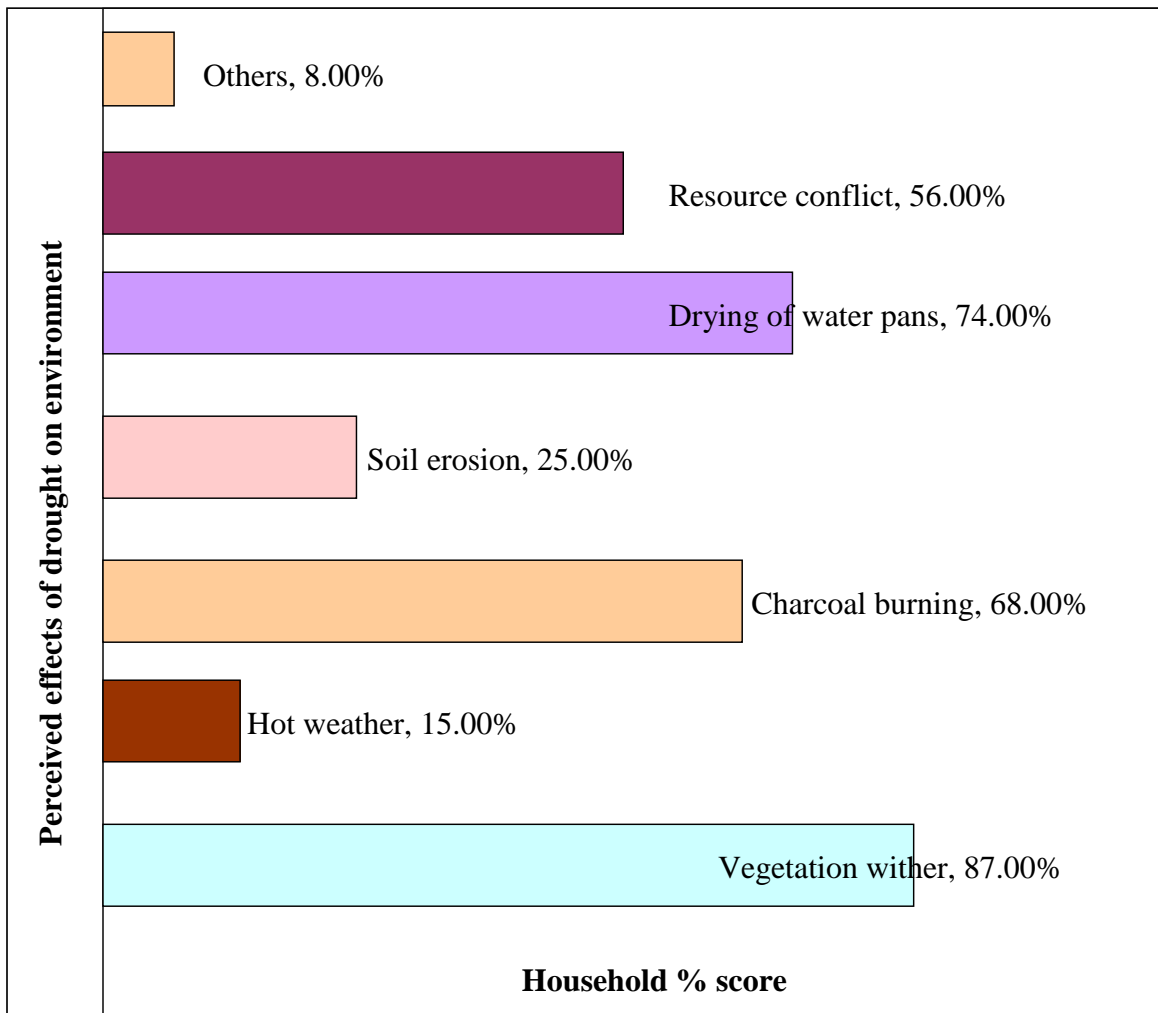


Figure 4.8: People’s perception on the effects of drought on the environment in Kwale County

Drying up of water pans forced community members to walking long distances in search of water for both livestock and domestic use. This caused livestock to be weak and wasted, thereby negatively impacting on their productive capacity. Several studies, for instance, the study by O’Meagher, (2003) confirms that the onset of drought leads to the reduction in farm production and incomes, while the decimation of livestock herds has probably been observed as the most serious long-term effect of drought by Bratton (1987) and Mortimore (1989).

Though charcoal burning helps the rural people to gain income, it has grave long term effects on the environment. This has been evidenced by the piles of charcoal sacks along the roadsides displayed for sale. Respondents argued that grazing on limited pasture exposed the ground cover to wind erosion and therefore reduction in soil fertility. This is similar to Reid et al. (2003) who asserted that as a result of people's dependency on natural resources, any impact that drought has on natural systems threatens their livelihoods, food intake and health.

#### 4.3.4 People's Perception towards Drought

The results indicate that Kinango people's perception towards drought is bound on assessment of temperature and precipitation as they experience them within their locality.

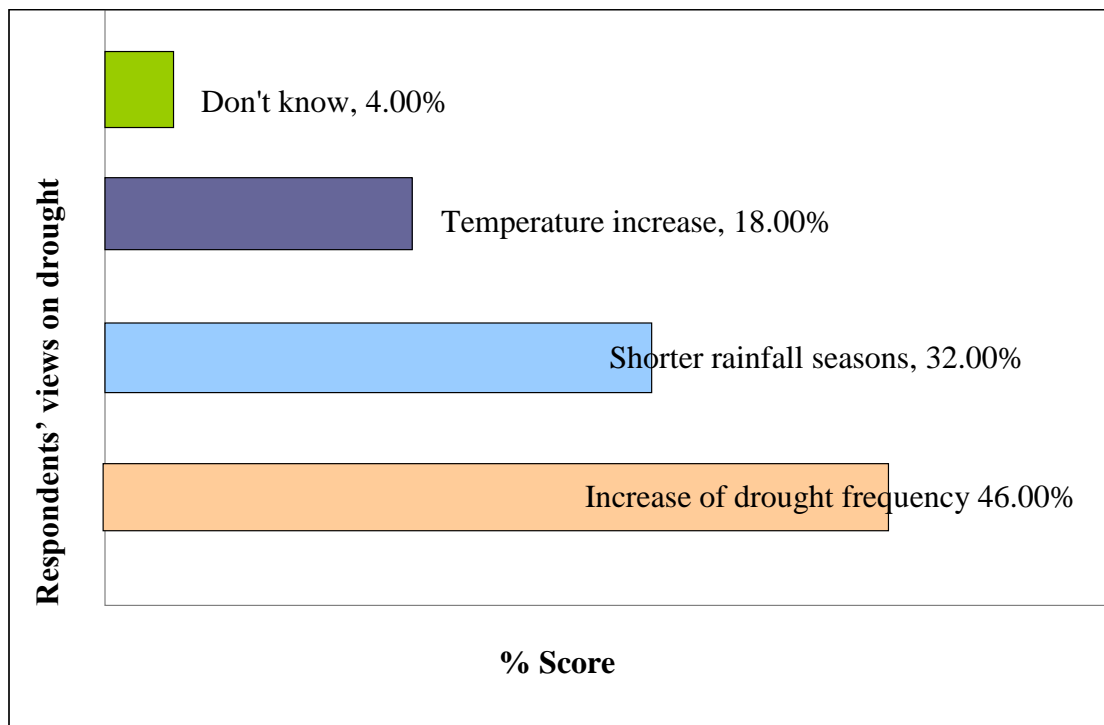


Figure 4.9: Respondents' perception towards drought

From Figure 4.9, it is clear that over two fifths (46.00%) of the respondents viewed drought to be more frequent nowadays than before. Among them, 32% pointed out that rainfall seasons had become shorter and their pattern had become highly unpredictable in the last few years to the extent that people were not able to predict the time of onset of seasonal rainfall. At the same time the prevalence of mid-season dry spells had increased exacerbating food insecurity. Further, 18.00% of the respondents observed that temperatures were continually increasing as evidenced by directly related high rate of drying up of water pans and fast rate of wilting of crops after the occurrence of a precipitation.

According to results from the FGDs, the participants reported evidence of higher frequency of seasonal droughts, mid-season dry spells, and late on set and early ending of the rains which have increased desiccation of the area. It was indicated during the study that rainfall patterns have completely changed. In fact, one of the participants in a FGD had this to say:

*“The rain seasons which used to begin in late March or early April and end as late as mid-August have now changed from the late 1990’s onwards, the trend is that it can start as late as mid-April or mid-May and end as early as mid-July”.*

This rainfall trends dominated by frequent mid seasons droughts have challenged Kinango people in planning for their farming activities. This has resulted to increase in prevalence’s of food insecurity incidences in the area.

#### **4.3.5 People's Perception towards the Causes and Effects of Drought**

The causes and effects of drought identified during field research are indicated in Figure 4.10.

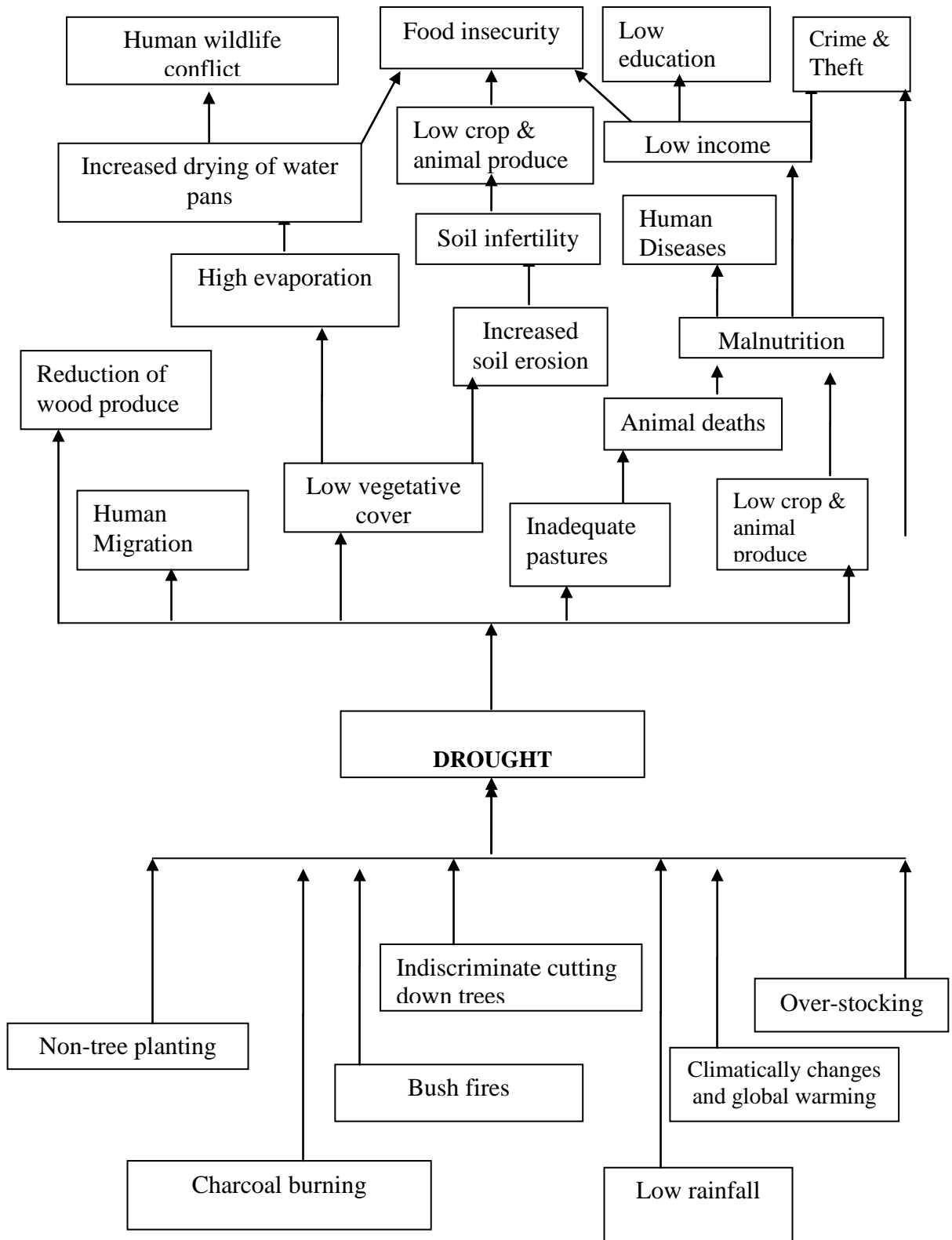


Figure 4.10: Interpretations of the causes and effects of drought events by the respondents (Source: Fieldwork, July 2010)

The study revealed the peoples' perceptions towards the causes of drought to include indiscriminate cutting down of trees, charcoal burning, low rainfall, overstocking among others. The effects were perceived to include low crop and livestock production, human migration, low vegetative cover, increased drying of water sources, reduced wood produce among others. According to the respondents, the impacts of drought were exacerbated by low levels of education, low income, insufficient knowledge/skills to manage drought, lack of awareness on drought occurrences among many others.

It is argued here that a critical assessment of local people's perceptions and attitudes tell us much more about the relevance of the adaptive strategies brought into play.

On the peoples' livelihoods, the respondents indicated that droughts have caused series of crop failure incidences, lack of pasture resulting to starvation of livestock and fetching low prices at the markets. Water unavailability cannot be overemphasized during droughts. Indeed, it was reported that people and livestock walk long distances in search of water for domestic and livestock needs causing devastating effects to the people of Kinango. Key among these effects is that they spent a lot of time which could have been expended for productively. In addition, due to the overwhelming distance covered in search of water, animals became wasted, lose weight and consequently fetch low prices in the market or worse, die.

The respondents also reported that when there is famine they indulge in charcoal burning and in so doing they are depleting the water sources. This in effect creates a downward spiral of poverty. The study findings also showed that drought consequences have been exacerbated by several factors which have been pointed out by the respondents themselves during the discussion to include lack of clear drought occurrence warnings, lack of irrigation equipment, insufficient knowledge/skills in drought resistant crops and livestock management, and low income levels.

The Lack of water as stated above translated into decline in the production of food and hence an increased food shortage and hunger. The implications of droughts as stated by the respondents have led to increased vulnerability of the resource poor households in Kinango Sub-county. This predicament as stated earlier requires urgent attention especially in the development of viable and sustainable food security strategies which are in line with the national development agenda.

#### **4.3.6. Behaviour Change in Consumption Pattern**

From Figure 4.11, it is clear that the most frequently changes in consumption by many (43 %) of the respondents was reduction in consumption. Indeed, most of them indicated eating at least once in a day during drought periods.



Of the total sample, 25.00% indicated a constant consumption, 12.00% indicated an increase in their consumption and 20.00% could not tell what happens to their consumption pattern during these hard times.

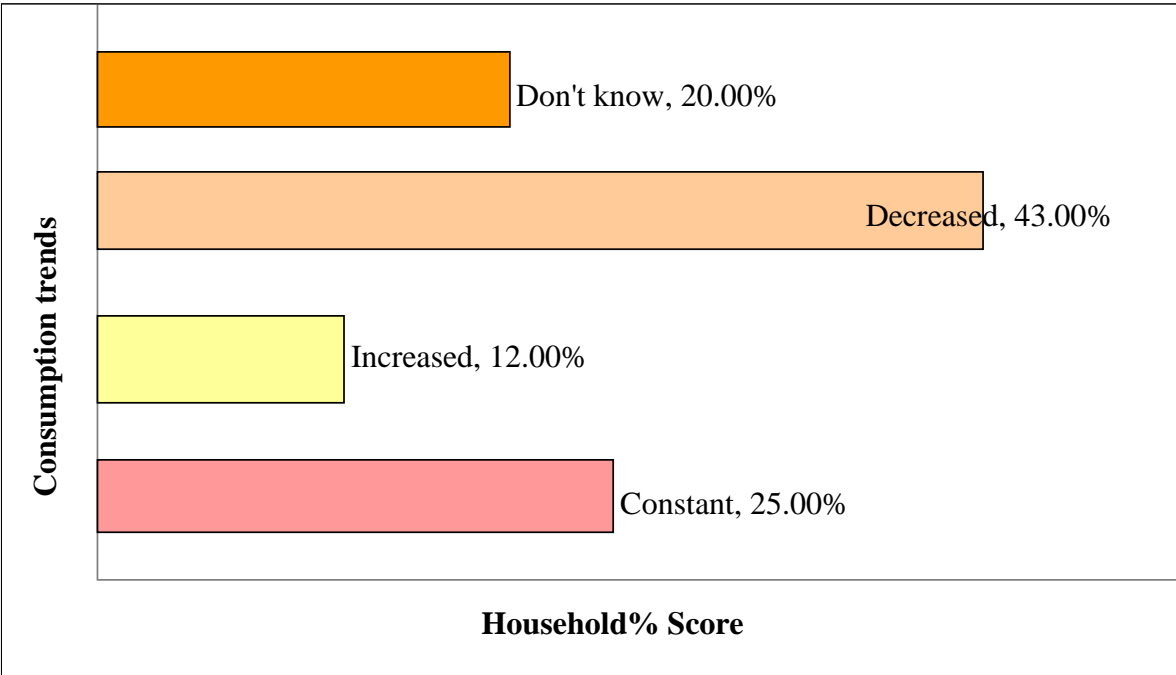


Figure 4.11: Behaviour changes in consumption in terms of number of meals and quantity

The findings also show that majority 43.00% of the interviewed households reduced their consumption habits during periods of drought driven food insecurity which leads to health problems particularly malnutrition. As it has been stated earlier, other studies by Bratton (1987), Chambers et al. (1981) and Mortimore (1989), confirm that impacts of drought affected the health of human beings leading to under nourishment especially in children and aged people.

#### **4.4 Important Drought Coping Strategies**

Although some of the livelihood strategies may be considered short term coping mechanisms, other strategies may in fact lead to enhanced options or other forward looking strategies that help a household or community survive in the face of drought. Furthermore, the participants identified eighteen different coping strategies which the households use to cope with drought.

During the survey, respondents identified eighteen drought coping strategies which were classified into two by the researcher as;

- (i) **Ex-ante coping strategies** including, building up of livestock herds, construction of soil and water conservation structures for crop production, diversification of assets and income, growing of drought resistant crops, looking for employment, merry go round (social networks) and construction of high capacity water reservoirs.
  
- (ii) **Ex-post coping strategies** including enhanced sale of livestock, credits from friends and relatives, reduction of consumption levels, migration, diversification of income, engaging in waged labour, skipping meals, charcoal burning, and consumption of wild fruits, remittances and withdrawal of children from school.

These strategies have been discussed in detail by the researcher in the following section below.

#### **4.4.1 Ex-ante Drought Coping Strategies**

Analysis of the existing coping and adaptive strategies against drought was done and ranked.

More specifically, the study findings showed that 90% of the households interviewed grew drought resistant crops as a coping strategy to drought, ranked number one in priority of use, 89% of respondents indicated that finding a job was the best strategy in coping with drought, ranked two, 84% indicated diversification of income as drought coping strategy, ranked number three, 76% used building up of livestock herds whilst only 25% used excavation of water reservoirs as their strategy. The results of this variable are presented in Table 4.4.

**Table 4.4.: Priority ranking of Ex-ante coping strategies used by households**

<b>Coping Strategy</b>	<b>Percentage Using the Strategy</b>	<b>Priority Rank of Use</b>
Building up livestock herds	76	4
Soil and Water conservation	36	6
Diversification (assets & income)	84	3
Growing drought resistant crops	90	1
Seekingfor Employment	89	2
Merry go rounds (Social networks)	45	5
Water reservoirs (pans)	25	7

The respondents prioritized the following strategies as the most frequently used; (90%) growing of drought resistant crops, (89%) searching for waged labour and (84%) diversification of income.

The primary goal of the ex-ante risk coping strategies is to smoothen income. The income smoothing strategies are ways in which households used to mitigate income shocks before they actually happen. This is often achieved by adopting conservative production choices and diversifying economic activities.

The respondents provided suitable coping strategies since growing of drought resistant cultivars is not only logical but highly preferred technical thinking to foster increased food production despite persistent droughts. It ensures guaranteed livelihood of the

community at all times. Equally, search for waged labour and diversification of income are means geared to harnessing livelihood opportunities of the people.

According to the findings, construction of water reservoirs, construction of soil and water conservation structures for crop production, and merry go rounds were reported to be the least used ex-ante coping strategies by 25%, 36%, and 45% of the respondents respectively. These were lowly used possibly due to the low income level in the community despite the technical significance of construction of soil and water structures which is a suitable long term measure towards coping with drought. However, merry go round is not a suitable coping strategy as affirmed by the respondents, since the communities most need income to purchase food rather than invest when everybody in the family is hungry.

#### **4.4.1.1. People's Views on the Effectiveness of Ex-ante Coping Strategies**

The analysis undertaken in this section attempts to identify the most significant ex-ante coping strategies by the Kinango sub-county Community to hedge against the anticipated shortfalls due to drought. During the study, coping strategies were analysed to determine whether they were able to withstand and offer resiliency to the effects of drought in accordance with people's perceptions. FGDs used preference ranking tool using Sustainability, Benefits, Usefulness, and Importance as the focal points (Criterion) to come up with the rank of the effective coping strategies as perceived by them.

The results as illustrated in Table 4.5 show that 85% of the respondents indicated excavation of high capacity water reservoirs/pans as the most effective drought coping strategy, and it was ranked number one in the priority rank of effectiveness. Soil and water conservation for crop production ranked second as it scored 74%, while looking for employment was ranked third with a score of 69%. Merry go round was ranked the least in the priority rank of effectiveness with a score of 32% of the respondents.

**Table 4.5: Priority ranking of people’s perception on effectiveness of coping strategies**

<b>Coping Strategy</b>	<b>Effectiveness %</b>	<b>Priority Rank of Effectiveness</b>
Building up livestock herds	51	6
Soil and Water conservation	74	2
Diversification (assets & income)	54	5
Growing drought resistant crops	62	4
Looking for employment	69	3
Merry go rounds (Social networks)	32	7
Water reservoirs (pans)	85	1

Similar studies by Watts (1983); Longhurst (1987); Mortimore (1989); Herren (1991); Blaikie et al. (1994); Vogel (1995); Devereux (2009); Swift and Hamilton (2001); Dovie et al. (2002); Hussein and Nelson (2003), confirm that during periods of drought crisis, households search for waged employment on the labour market which usually includes migration to urban centres.

To determine the significance of the relationship between priority rank of use and priority rank of effectiveness, spearman's correlation coefficient was used. Spearman's Rank Correlation Coefficient was used to determine the strength and direction (negative or positive) of the relationship between the priority rank of use and the priority rank of effectiveness of the drought ex-ante coping strategies. Spearman's formula for finding correlation coefficient was used as:

$$\rho = 1 - \frac{6 \sum d_i^2}{n(n^2 - 1)}$$

Where:  $\rho$  = Correlation Coefficient

Where  $d_i$  = difference between ranks of  $i$ th pair of the two variables

$n$  = number of pairs of observations

From the above data (Table 11 and 12)

$$6 \sum d_i^2 = 444 \text{ and } n(n^2 - 1) = 336$$

$$\text{Therefore } r = 1 - \frac{444}{336} = -0.32$$

The Coefficient of Correlation for the ex-ante's drought coping strategies used by the people of Kinango is negative (- 0.32). The relationship between the priority rank of use and priority rank of effectiveness of the ex-ante drought coping strategies as indicated by the respondents was negative and very low. This means that there is very low relationship between the priority of use and priority of effectiveness of the ex-ante drought coping strategies.

Consequently, the study findings showed that most of the household interviewed were using less of the ex-ante coping strategies they perceived as the most effective in coping with drought.

Indeed, the study revealed that construction of water pans, applying soil and water conservation measures were ranked number 1 and 2 respectively in effectiveness, whilst the priority rank of use for these practices were 7 and 6 as illustrated in Table 4.5.

Further the findings showed that in the priority rank of effectiveness for the three most frequently used coping strategies were 5, 3 and 4 meaning that the ex-ante coping strategies used by the Kinango people are not regarded as effective to cope with drought according to the respondents as shown in Table 4.5.

Although this can be investigated further to find out why the respondents were not using the practices they believed as effective, field observation showed that Kinango people



might not be using these strategies because of their initial cost implication, labour requirements and equipment needed as it has been earlier indicated that lack of income was one of the factors which exacerbated drought consequences.

Correlation analysis using SPSS was used to confirm the relationship. This nonparametric analysis shown in Table 4.6 of a non-parametric output confirms that there is a negative correlation of -0.321, between the Ex-ante drought coping strategies used by households and those perceived as effective.

**Table 4.6: Correlation between Ex-ante coping strategies used by households and those perceived as effective**

Description			Ex ante rank of use	Ex ante rank of effectiveness
Spearman's rho	Priority rank of use	Correlation	1.000	-.321
		Coefficient		
		Sig. (2-tailed)	.	.482
		N	7	7
	Priority rank of effectiveness	Correlation	-.321	
		Coefficient		1.000
		Sig. (2-tailed)	.482	.
		N	7	7

This implies that interventions towards ex-ante drought coping strategies used are regarded as not very effective. The correlation is insignificant at 5% level of

significance. Nevertheless, there is a 52% confidence that the coping strategies used and those perceived as effective are slightly negatively correlated, as per the data and the sample size used.

#### **4.4.2 Ex-Post Drought Coping Strategies**

The study findings showed that 70.8% of the respondents used diversification of income as their drought coping strategy which was ranked number 1 in priority of use, 65% mentioned selling of livestock as their drought coping strategy ranked number 2 in priority of use.

54.2% stated charcoal burning, ranked number 4, whilst the least in the rank of use, number 11 was withdrawal of children from school as indicated by 4.2% of the respondents as drought coping strategy. This is as illustrated in Table 4.7.

**Table 4.7: Ex-post drought coping strategies used by households in Kwale County**

<b>Coping Strategy</b>	<b>Percentage using the Strategy</b>	<b>Priority Rank of Use</b>
Sale of livestock	65	2
Credits from friends and relatives	36	7
Reduction of consumption levels	45.2	5
Migration	35	8
Diversification of income	70.8	1
Engaging in waged labour	57.5	3
Skipping Meals	37.5	6
Charcoal production	54.2	4
Consumption of wild foods	9.2	10
Remittances	25	9
Withdrawal of children from school	4.2	11

This finding supports that of Deaton (1991); Paxson (1992); Rosenzweig and Wolpin (1993) who asserted that households build up wealth to create a buffer in order to smoothen consumption after income shocks. During the study it was observed that charcoal burning had extensively dominated in the study area having an indication of posing serious environmental degradation through indiscriminate cutting down of trees. This shows that unless alternative livelihoods are initiated, it might lead to grave consequences in the future.

Though only 4.2% of the respondents stated withdrawal of children from school as a drought coping strategy, the already existing low levels of education with more than 75.% of the respondents having not gone beyond primary level as it has been earlier stated could worsen the situation. Further increasing the number of people with derailed income opportunities hence jeopardising the potential of enhancing the achievement of Millennium Development Goals especially goal number one, and Kenyan's Vision 2030.

#### **4.4.1.2 Peoples Views on Effectiveness of Ex-post Drought Coping Strategies**

The study findings in Table 4.8 show that 71% of the respondents indicated that they engaged in waged labour as their most ex-post drought coping strategy which was ranked number 1 in the priority rank of effectiveness. Diversification of income was priority ranked second by 65% of the respondents while 55% of them indicated that charcoal burning was priority ranked third as an effective ex-post coping strategy. Withdrawal of children from school was identified by 7% of the respondents and priority ranked number 11.

**Table 4.8: Percentage rank of effectiveness of Ex-post coping strategies**

<b>Coping Strategy</b>	<b>Effectiveness %</b>	<b>Priority Rank of Effectiveness</b>
Sale of livestock	48	3
Credits from friends and relatives	32	4
Reduction of consumption levels	27	5
Migration	18	7
Diversification of income	65	2
Engaging in waged labour	71	1
Skipping Meals	25	6
Charcoal production	55	3
Consumption of wild foods	12	10
Remittances	45	5
Withdrawal of children from school	7	11

The latter has implications for the provision of universal basic education that was launched as a Government strategy to meet the Millennium Development Goals by 2015.

Ex-post strategies are also referred to as consumption-smoothing strategies as they help reduce fluctuations in consumption even when income is fluctuating. To find the

strength of relationship between the priority rank of use and priority rank of effectiveness by Statistical analysis, Spearman's correlation of coefficient was used.

$$6\sum d_i^2 = 216 \text{ and } n(n^2-1) = 1320$$

$$\text{Then } r = 1 - 0.16 = 0.84$$

The Spearman's coefficient of correlation for the Ex-post drought coping strategies between priority of use and effectiveness as perceived by Kinango people was found to be 0.84, meaning that there is a very strong relationship between the priority rank of use and priority rank of effectiveness.

The implications that can be drawn from the study findings are that the Ex-post practices used by the Kinango people are the same as those which have been identified by themselves as effective strategies to cope with drought. The results reveal that the most used ex-post drought coping strategies were indicated as diversification of income, sale of livestock, and engaging in waged labour with ranks 1, 2, and 3 respectively. Further, these were ranked 2, 4 and 1 respectively in the priority rank of effectiveness. This means that the ex-post drought coping strategies which the respondents indicated using have been perceived by them as effective to cope with drought with a 99.9 % level of confidence and a correlation coefficient of 0.84. The researcher further did a correlation analysis using SPSS to confirm the relations between the ex-post coping strategies priority rank of use and those perceived as effective as shown in table 4.9.

The output shown in Table 4.9 is Nonparametric Correlations analysis that shows a highly significant positive correlation of + 0.836 between ex-post drought coping strategies priority rank of use and those perceived as effective at 1% level of significance.

**Table 4.9: Correlation between Ex-post coping strategies priority rank of use and those perceived as effective**

Description			Ex-post Coping Strategies priority rank of use.	Ex-post Coping Strategies priority rank of effectiveness
Spearman's rho	Ex-post coping Strategies priority rank of use	Correlation	1.000	.836**
		Coefficient		
		Sig. (2-tailed)	.	.001
		N	11	11
	Ex-post Coping Strategies priority rank of effectiveness	Correlation	.836**	1.000
		Coefficient		
		Sig. (2-tailed)	.001	.
		N	11	11

\*\* Correlation is significant at the 0.01 level (2-tailed)

This implies that the relationship between ex-post coping strategies used by the respondents is strongly effective in drought mitigation. It is shown in Table 4.9 that, there is 99% confident that resources channeled towards the ex-post coping strategies will be effective in mitigating the effects of drought.

In addition, the researcher conducted further analysis to determine the relationship between the ex-ante and the ex-post drought coping strategies priority rank of use and that of effectiveness and their effect to the community livelihood using the non-parametric Wilcoxon Signed Rank test method of analysis and Kruskal Wallis Test of Association.

#### **4.4.2. Wilcoxon Signed Rank Test: Z – Statistical Analysis**

From Table 4.10, the test ( $Z = (-) 0.169$ ,  $p = 0.866$ ) shows that the ex-ante coping strategies used and those perceived as effective have no significant difference. The Wald's Z-statistics is calculated based on the positive ranks; it explains whether the ex-ante coping strategies used and those ex-ante coping strategies perceived as effective are any different. The asymptotic significance (2-tailed), is the one that specifies the size of the test.



**Table 4.10: Wilcoxon signed rank test of Z-statistical analysis**

Description	Ex-post coping strategies rank of use and Ex-post coping strategies rank of effectiveness	Ex-ante coping strategies rank of use and Ex-ante coping strategies rank of effectiveness
Z	.801 <sup>a</sup>	-.169 <sup>a</sup>
Asymp. Sig. (2-tailed)	.423	.866

a. Based on positive rank

b. Wilcoxon signed rank test

This therefore implies that the ex-ante strategies used and those perceived as effective are equally good in determining the choice of community livelihood; with a weak (1-0.866) % that the two will be different, while on the other hand, the ex-post coping strategies used and those ex-post coping strategies perceived as effective, the size of the test (0.423) is slightly higher for the ex-post than for the ex-ante coping strategies, which indicates a (1-0.423) % confidence that ex-post strategies used and those perceived as effective will be of difference in determining the change in community livelihood. The test ( $Z=-0.801$ ,  $p=0.423$ ), is therefore not significant to confidently conclude that there is any difference in ex-post coping strategies used and those perceived as effective in determining the change in community livelihood. However, this is subject to the sample size and the level of significance chosen by the researcher.

#### 4.4.3. Kruskal Wallis Test Association analysis

The non-parametric k-paired sample test on association was applied to determine how well the ex-ante strategies used and those perceived as effective; and the ex-post strategies used and those perceived as effective are associated to the change in the community livelihoods for the people of Kinango in Kwale County.

**Table 4.11: Kruskal Wallis Test: on Association of coping strategies priority rank of use and those perceived effective and the change in community livelihoods**

Description	Mean	Std. Dev.	Min	Max
% rank of ex-ante strategies used and livelihoods:	57.935	22.3025	4.2	93.3
Groups:	1.935	.8920	1.0	3.0
% rank of ex-post strategies used and livelihoods	56.819	23.2583	7.0	93.3
Groups	1.935	.8920	1.0	3.0

Table 4.11, indicates that the entry mean was 57.935, for the ex-ante strategies with a standard error of mean of 22.3025. The minimum and maximum percentage of strategies used/ effectiveness and livelihood change was 4.2 and 93.3. Three grouping variables were used namely: the ex-ante strategies used ex-ante strategies perceived as effective and livelihood change as 1, 2 and 3 respectively. On the other hand, the

analysis show that the entries mean of the ex-post strategies is 56.819 with a standard error of mean of 23.2583. The minimum and maximum percentage of strategies used, effectiveness and livelihood change is 7.0 and 93.3 respectively. 31 cases were used for the test with three grouping variables.

The test statistic ( $\chi^2=10.763$ ,  $df=2$ ,  $p=0.005$ ) is highly significant as shown in Table 4.12.

**Table 4.12: Kruskal-Wallis Test on the association Analysis**

**Test Statistics<sup>a,b</sup>**

Test	% rank of the strategies used, effectiveness and livelihoods change
Chi-Square	10.763
df	2
Asymp. Sig.	.005
Chi- Square	12.082
Df	2
Asym. Sig	.002

a. Kruskal Wallis Test

b. Grouping Variable: Groups

The computed Chi square statistic ( $\chi^2$ ) from Table 4.12 above was used to explain the association between the ex-ante coping strategies used, coping strategies perceived as effective and the change in community livelihoods at two (2) degrees of freedom, since

there are three grouping categories. The asymptotic significance of 0.005 gives the size of the test. This implies a statistical significant association between the ex- ante coping strategies used, those perceived as effective and the change in community livelihoods. This means that the coping strategies used, the people's perception about their effectiveness, highly influences the nature of livelihood adopted by the community; with a statistical confidence of 99.5% that this will be the case.

The Chi square statistic is used to explain the association between the ex-post coping strategies used, effectiveness and the community livelihood change. There degree of freedom and a p-value of 0.002 are used for the test. The test ( $\chi^2=12.082$ ,  $df=2$ ,  $p=0.002$ ) is highly significant. This implies that there is a high association between the ex-post coping strategies used, those perceived as effective and the change in community livelihood. There is a 99.8% confidence that the ex-post coping strategies used, the ex-post coping strategies perceived as effective influences the choice of community livelihoods. The pattern of choice of the coping strategies used and those perceived as effective can highly influence the pattern of the livelihood choice of the community in Kinango Sub County.

From the results, it reflects that the direct relationship between the choice of coping strategies and those perceived as effective coping strategy could easily enhance effective and quick decision making that will be accepted by the people. This will

therefore foster quick adoption of the agreed strategies with anticipated change to the livelihood of the local communities in Kinango.

#### **4.5. Mapping Coping and Adaptation Partnerships in Kinango**

The matrix presented in Appendix 3 show Organisations operating within the area of study, their roles and potential adaptation support they can provide as mentioned by the respondent.

This research exercise was to explore the institutional context in which the community operates and to identify appropriate institutional partners for adaptation in the face of challenges generated by drought in the area. The result of this quest contributes to objective two of the study by highlighting the present knowledge in existence. The respondents, through an FGD identified quite a number of organisations (Government and Non-governmental, private service providers and Community Based Organisations) which operates in the area. Alongside each of the organisations was noted the communities understanding of their primary functions. The respondents identified the roles each organisation that could play in helping them to adapt/cope with the negative impact of drought.

#### **4.6 Lessons learnt from the study on effects and resiliency of drought in Kinango**

From the results obtained from this study, not very new insights were drawn in terms of effective drought coping strategies. However, this study wishes to provide learning lessons to other future studies that may be carried out in the area or similar semi-arid areas in the country from the few drawn insights as:-

- (i) The study was able to identify at a least eighteen drought coping strategies that are used by the local communities.
- (ii) The local communities were able to map and rank the most effective coping strategies, despite their inadequate application of some of these strategies especially the ex-ante strategies due to probable income or capital constraints to facilitate their implementation.
- (iii) It was noted in the priority ranking of use, Ex-ante effective coping strategies were not seriously adopted and implemented by the local communities though the communities affirmed these as the most suitable coping strategies in terms of effective priority ranking scale.
- (iv) The study noted minimal Non-Governmental Organizations partnership with the Government working in the area to facilitate for the effective drought

interventions as seen in other semi-arid areas in the country. This could have been due to lack of Government efforts to lure private investors and agencies that could help in providing and supporting for these effective coping mechanisms.

#### **4.7 Towards Sustainable Livelihoods Strategies**

The concern for drawing appropriate adaptive strategies and streamlining policy strategies for various players towards sustainable livelihood framework for the people of Kinango is vital. This endeavour contributes towards objective (2) and (3) of this study. The development of this adoptable framework that will suitably provide desired solutions for guaranteed livelihoods of the local community shall have arrested the life-long quagmire that has haunted the community for a number of decades, leading to severe infrastructural and economic development of the area, with marginalization and none consideration in the quick development agendum of the country.

A number of similar livelihood strategies have been adopted for implementation that bear practical results and could offer suitable learning lessons for the Kinango community. Strategies stipulated in the Kenya's Vision 2030 strategy and the Northern Kenya and other arid lands strategies emphasize on recognizing not only the challenges but also their potential. Some of the potentials of these zones are, the livestock sector,

renewable energy, and in the region's strategic position as the gateway to markets in the horn of Africa and beyond.

Provision of alternative ways of working, in particular the region's economic and social infrastructure (i.e. roads, water , education, electricity and health) as this will facilitate private sector investment and civil engagement, reduce basic inequalities in access to infrastructure and services , and underpin the productive pastoralism and other dry land production systems (WISP, 2008).



## **CHAPTER 5: SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS**

### **5.1. Summary of Findings**

The overall objective of this study was to assess and compare the most effective ex ante and ex post coping strategies which have so far been put in place on community livelihoods to counter drought driven food insecurity in Kwale County, Kenya. The research gap that informed this study is the persistent food insecurity in Kinango sub-county and other areas of the country, despite the efforts towards food security and adaptation strategies.

The results from this study offered substantive responses as required in the initial research questions and also affirmative sustainable manner to addressing the persistent drought driven food insecurity in the area. The findings revealed that the major concerns on the effects of drought have been exacerbated by low levels of education, low income and lack of sufficient technical knowledge to manage drought. Water unavailability as a major concern usually led the people to walking long distances in search of water for both domestic and livestock use. Lack of rainfall had serious and prolonged effects on causing reduction in drinking water and agricultural production. The results of crop failure led to food shortages and subsequent hiking of foodstuff prices. Equally, poor feeding habits, malnutrition and migration has been in the rise.

The study asserted that lack of farming activities resulted to shortages of casual farm employment forcing people to charcoal burning as an alternative source of livelihood. These concerns were further confirmed to have changed the consumption behavior of the Kinango community through reduced meal quantities and frequency which have led to increased health problems and malnutrition.

In order to document and synthesize sustainable coping strategies and the relationships of peoples' behaviour and practices to drought-driven food insecurity and coping mechanisms, this study identified eighteen drought coping strategies that were later classified into two categories as; Ex-ante and Ex-post ante. Ex-ante coping strategies included, building up of livestock herds, construction of soil and water conservation structures for crop production, diversification of assets and income, growing of drought resistant crops, looking for employment, merry go round (social networks) and construction of high capacity water reservoirs. Despite this preference and effective ranking, the analysis confirmed that community used less frequently ex ante drought coping strategies that they perceived to be the most effective, thus providing the need for further attention. The researcher observed that this was probably attributed to the relatively high initial cost of investment, labour intensive undertakings and high technological skills required.

The other category was Ex-post coping strategies that included, enhanced sale of livestock, credits from friends and relatives; reduction of consumption levels and

migration for diversification of income. The analysis confirmed that, the ex post strategies used are the same which the respondents perceived as effective.

Immigrants labour was observed to support households to overcome credit shortage and market imperfection, and facilitated development of family production and maximise utility. Engagement in waged labour; skipping meals; charcoal burning, and consumption of wild fruits were also mentioned as ex post coping strategies. The research affirmed that poor people closely depended on their surrounding environment resource base for their livelihoods and poverty can be driving force to environmental degradation.

It further revealed that the Kinango community embarked on a wide range of practices which were critical to combat the consequences of drought. These practices included; use of drought resistant crops which was rated one of the most effective coping strategies. This was seen to be beneficial in improving food production and food security. Diversification of income and assets (both crops and livestock) was also evidenced, hence contributed to lesser loss especially of sheep and goats as they both tend to be browsers and their sources of food are less affected by drought. These livestock species could easily be liquidated for improving food security situation. Livestock sale also harnessed increased purchasing power, supported livestock salvage value, maintained small and manageable herds for post drought recovery, reduced overstocking and conflicts over resources.

## **5.2. Conclusion**

As affirmed from the results of this study, the major concerns on the effects of drought in Kinango have been exacerbated by low levels of education, low income and lack of sufficient technical knowledge to manage drought. The unavailability of water has been a major concern that has persistently led the people to walking long distances in search of water for both domestic and livestock use. Equally, Lack of rainfall had serious and prolonged effects on reduction in drinking water and agricultural production hence crop failure and food shortages that led to hiking of foodstuff prices. The above concerns impact negatively to the local community thus, poor feeding habits, malnutrition and rise in, migration while lack of farming activities induced people to charcoal burning as an alternative source of livelihood. More so, impacts of changed consumption behavior through reduced meal quantities and frequency has led to increased health problems and malnutrition.

The Kinango community has identified and ranked ex ante and ex post effective sustainable coping strategies, and have resourceful local knowledge that needs little touch up to address the drought-driven food insecurity. The building up of livestock herds, construction high capacity water reservoirs, soil and water conservation structures for crop production, diversification of assets and income, growing of drought resistant crops, looking for employment, and strengthening of merry go rounds (social

networks) merit as suitable measures against reigning drought driven food insecurity in the area

### **5.3. Recommendations**

- High capacity water reservoirs (of up to 500,000 cubic metres) should be constructed with accessible water points, that could meet people's requirements throughout the year for domestic, crop production and animal use, especially during drought spells.
- Provide appropriate need oriented training for Livestock owners and other small scale crop production farmers, factoring in drought resistant livestock breeds and crop species, pasture and forage management, with set goals of high productivity, short maturity period and high value.
- The government should introduce insurance policies and reliable markets for livestock to reduce anticipated losses and risks especially during the drought seasons to the smallholder livestock farmers. Also investing in off-farm income generating activities
- The Government should lay strategies of improving the levels of education (formal education, adult education, and other tertiary institutions) to promote creation of employment opportunities, as securing of good employment has been reported to be one major drought adaptive strategy

- The Government should facilitate the provision of affordable rural credit facilities and micro-financing to help farmers in solving capital problems, to buy modern farm inputs and further enhancing use of technologies such as drip irrigation equipment's and suitable greenhouses to support crop farming.
- There should be promotion of vibrant and sound economic activities such as roads networks, electricity distribution, micro-financial institutions among others in the rural areas to promote diversity and diversification of income opportunities for enhanced livelihoods.
- Promote Community natural resource Management through creation of zones of conservation sites, dry land ecosystem restoration, soil and water conservation structures in farm lands, pasture management and agro forestry.
- Further research is required to quantify the financial and other benefits of the identified effective coping strategies so as to come up with the most cost effective ones.

## REFERENCES

- Adams, A. M., Cekan, J. and Sauerborn, R. (1998) Towards a conceptual framework of household coping: Reflections from rural West Africa. Africa.
- ADB,( 2002) Key Indicators of Developing Asian and Pacific Countries 2000, Volume 31. Oxford University Press (China) Ltd.
- Armitage, D. and D. Johnson (2006) Can resilience be reconciled with globalization and the increasingly complex conditions of resource degradation in Asian coastal regions?
- Ashley,C., and Carney, D. (1999) Sustainable Livelihoods Lessons from Early Experience. London: Department of International Development. Berkeley, California: University of California Press.
- Barrett, C.B. Reardon, T. and Webb, P. (2001) Non-agricultural income diversification and household livelihood strategies in rural Africa: concepts, dynamics and policy implications. Food Policy.
- Berkes, F., J. Colding and C. Folke, editors, (2003) Navigating Social-Ecological Systems: Building Resilience for Complexity and Change. Cambridge University Press,Cambridge, UK.
- Berkes, F. and D. Jolly, (2001) Adapting to climate change: social-ecological resilience in a Canadian western arctic community. Conservation Ecology
- Bernard, F.E., D.J. Campbell, & D.J. Thom. (1989) Carrying capacity of the eastern ecological gradient of Kenya. National Geographic Research
- Blaikie, P., Cannon, T., Davis, I., and Wisner, B. (1994) At Risk-Natural Hazards, Peoples Vulnerability and Disasters. London: Routledge
- Bless C, Higson- Smith, C (2000) Fundamentals of Social Research Methods: An African Perspective, Juta Educational Ltd.
- Bonté, P. (1975) Pasteures Et Nomads: I Exemple De La Mauritanie, in Secheresse Et Famine Du La Sahel. In Casciarri, B. (2002). Local Trends and Perceptions of

- Processes of Commodisation in Central Sudan: The Responses of Ahamda Pastoral System to State Pressures and Capitalist Dynamics. Nomadic People.
- Botterill, L.C. (2003). Beyond drought in Australia: The way forward. In: Botterill, L.C. and Fisher, M. (eds.), Beyond drought: People, policy and perspectives. Australia: CSIRO Publishing
- Boudreau, T, King, A., and Lawrence, M, (1996) “Household Food Economy Assessment of Kakuma Refugee Camp,”
- Bovin, M, and Manger, L. (1990). Adaptive Strategies in African Drylands. In Casciarri, B. 2002 Local Trends and Perceptions of Processes of Commodisation in Central Sudan: The Responses of Ahamda Pastoral System to State Pressures and Capitalist Dynamics. Nomadic peoples
- Bratton, M. (1987) Drought, food and social organisations of small farmers in Zimbabwe. In: Glantz, M.H. (ed.), Drought and hunger in Africa: Denying famine a future. Cambridge: Cambridge University Press, pp. 213-244.
- Bush, J. (1995). The Role of Food Aid in Drought: Oxfam's North Turkana (Kenya) Drought Relief Program, 1992-1994. Disasters
- Campbell, A., (2008). Managing Australian Landscapes in a Changing Climate a Climate Change Primer for Regional Natural Resource Management Bodies. Department of Climate Change
- Cernea, M. (1985). Preface. In M. Cernea (Ed.), Putting People First Sociological Variables on Rural Development (pp. xi-xvii). New York: Oxford University Press.
- Chambers, R. Longurst, R. and Pacy, A. (1981). Seasonal Dimensions to rural poverty. New Jersey: Allenheld, Osmun and Co.
- Chambers, R. (1983). Rural Development: Putting the Last First: Harlow: Longman Scientific and Technical, Essex.
- Chambers, R. and Conway, G.R. (1992) ‘Sustainable Rural Livelihoods: Practical Concepts for the 21st Century’, Discussion Paper 296. Brighton, UK: Institute of Development Studies



- Chambers (1997), whose reality counts; putting the first last. Intermediate technology, publication, London Coleen, V., Laing, M. and Monnik, K., (2006). A Global Assessment. Routledge, London,UK.
- Coleen, V., Laing, M. and Monnik, K., 2006. A Global Assessment. Routledge, London, UK.
- Costanza, R, d'Arge, R., de-Groot, R., Farber, S., Grasso, M., Hannon, B., Limburg, K., Naeem, S., O'Neil, R., Paruelo, J., Raskin, R., Sutton, P., van den Belt, J., (1997). The value of the world's ecosystem services and natural capital. *Ecol. Economy*
- Coppock, D.L. (1994). The Borana Plateau of Southern Ethiopia. Synthesis of Pastoral Research, Development, and Change, 1980-1991. Systems Study (Vol. 5). Addis Ababa: ILCA.
- Cunningham, A. B (2001), Applied Ethnobotany: people, wild plants use and conservation. Earthscan publication limited, London and Sterling, VA.
- Dahl, G., and Hjort, A. (1976). Having Herds: Pastoral Herd Growth and Household Economy: Stockholm: Department of Social Anthropology, University of Stockholm.
- Daily Nation (5th June 2006). Drought in Northern Kenya Gets Worse
- DAO (August 2009) Kinango District Food Security Monthly Report
- DAO (February, 2008). Rains Assessment Report, Kinango District.
- DAO (2008) Kinango District Food Security Annual Report
- DAO (2005) District Agricultural Annual Report, Malindi District.
- DAO (1993) Kwale District Farm Management Annual Report
- Dasgupta, P, (1993); Population, Poverty and Local Environment, *Scientific American*, 272(2), pp. 26–31.
- Davies, S. (1993, 1996) Adaptable Livelihoods, Coping with Food Insecurity in the Malian Sahel. New York: Macmillan Press limited.
- Deaton, A., (1991), "Savings and Liquidity Constraints", *Econometrica*, vol.59, no.5
- Devereux, S. (1993). Theories of Famine, Harvester Wheat sheaf: Hemel Hempstead.

- DFID (Department for International Development) (1999), Sustainable Livelihoods Guidance Sheets
- DFID (Department for International Development) (2001), Meeting the Challenge of Poverty in Urban Areas.
- DMO (March 2008). Kwale/Kinango Drought monitoring bulletin, Arid and Semi-arid Lands Resource Management Project.
- Dovie, B.D.K. Shackleton, C.M. and Witkowski, E.T.F. (2002). Direct-use values of woodland resources consumed and traded in a South African Village, *International Journal of Sustainable Development and World Ecology*, vol. 9, no.3
- Downing, T.E. and Bakker, K. (2000). Drought discourse and vulnerability. Chapter 45, in *Ecology and Society*.
- Fankhauser, S. (1995), *valuing climate change: the economics of the greenhouse*, London: Earthscan
- FAO (2006) Agricultural and Development Economics Division. Food Security (2)
- FAO (2005). [www.fao.org](http://www.fao.org) (on food security and climate change- section on desertification)
- Gallopín, G.C. (2006). Linkages between Vulnerability, Resilience and Adaptive capacity, *Global Environmental Change*
- Glantz, M.H. (1987). Drought and economic development in sub-Saharan Africa. In: Glantz, M.H. (ed.), *Drought and hunger in Africa: denying famine a future*. Cambridge University Press.
- GOK (2011) Ministry for the Development of Northern Kenya and other Arid Lands Arid Lands Resource Management Project II; Kwale County Drought Monitoring Bulletin.
- Government of Kenya, (2008): ‘Constituency Report on Well-Being in Kenya Government Printer, Kenya.
- Government of Kenya, (2009) Vision 2030 – Northern Kenya and other arid lands draft 3 of 14<sup>th</sup> Nov 2009.

- GOK (2004) National Policy on Disaster Management (Revised Draft)
- GOK (2002).Turkana District Development Plan 2002-2008: Effective Management for Sustainable Economic Growth and Poverty Reduction. Nairobi:
- Gudrum, D., and Ander Hjort (1976) Having Herds: Pastoral Growth and Household Economy: Stockholm.
- Gulliver, P. H. (1951). A Preliminary Survey of the Turkana.A Report Compiled for the Government of Kenya. University of Cape Town: Communication from the School of African Studies, New Series No. 26.
- Hagman, G. (1984) Prevention Better than Cure: Report on Human and Natural Disasters in the Third World, Swedish Red Cross, Stockholm
- Hazell. P, ( 2001) ‘Strategies for the Sustainable Development of Dry lands Areas
- Hellen.Y, Susanne J, Rebecca B, Jackie F and Hisham K, (2001) Food-security assessments in emergencies: a livelihoods approach. Oversea Development Institute
- Herren, U. (1991). “Droughts have different tails” The impacts of and response to crises in Mukogodo Division, Laikipia District, Kenya. In: Stone, J.C. (ed.), Pastoral economies in Africa and long-term responses to drought. Aberdeen University: Aberdeen University Central Printing Services
- Hisdal, H. and Tallaksen, L.M., (2000). Assessment of the Regional Impacts of Drought in Europe.Drought event definition.Technical Report No 6.
- Hoddinott, J. (2006), “Shocks and their Consequences Across and Within Households in Rural Zimbabwe”, Journal of Development Studies, Vol. 42 (2): 301–321
- Hogg, R. (1982). Destitution and Development: The Turkana of North West Kenya Disasters
- Hogg, R. (1987). Development in Kenya: Drought, Desertification and Food Scarcity. African Affairs
- Hussein, K. and Nelson, J. (2003) Sustainable livelihoods and livelihood diversification. IDS Working Paper 69.

- IIRR. 2002. Managing Dry land resources-An extension manual for Eastern and Southern Intergovernmental Panel on Climate Change
- International Federation of the Red Cross and Red Crescent Societies. (2004). World disasters report: focus on community resilience. ATAR Roto Presse, Geneva, Switzerland
- IPCC (2001): Climate change 2001: Impacts, Adaptation and Vulnerability, IPCC Working group.
- IPCC (2007). AR4 Synthesis Report CWT 2-bis Meeting. 5-6 May, Royal Princess Hotel, Bangkok
- Kates, R.W. (1985). The interaction of climate and society, in R.W. Kates, J.H. Ausubel and M. Berbarian (Eds), Climate Impacts Assessment.Chichester: John Wiley.
- Kinsey, B., Burger, K. and Gunning, J.W. (1998). Coping with drought in Zimbabwe: Survey evidence on responses of rural household to risk. World Development
- Kirsten J (2003). Agriculture in the national economy, in: Nieuwoudt L & Groenewald J (eds.). The challenge of change: agriculture, land and the South African economy. Pietermaritzburg: University of Natal Press.
- Kivaria, K. (2007). Pastoral Coping Mechanism to Drought and Floods. Available at [www.mifngo.go.tz/documents\\_storage/ahn.doc](http://www.mifngo.go.tz/documents_storage/ahn.doc). (Accessed 30 July, 2007).
- KNBS, Report,(1999): Kenya National Bureau of Statistics Household Survey Report.
- KNBS Report,(2009): Kenya National Bureau of Statistics Population and Housing Census Report.
- Kogan, F.N, (1997) Global drought watch from space
- Korten, D. C. (1995) When Corporations Rule the World. London: Earthscan Publications Ltd.
- Lamprey, H., and Yusuf, H. (1981).Pastoralism and Desert Encroachment in Northern Kenya.
- Little, P., Mahmood, H., and Coppock, D. L. (2001). When Desert Flood: Risk Management and Climatic Processes among East African Pastoralists. Climate Research

- Longhurst, R. (1987). Famines, food and nutrition: Issues and opportunities for policy and research. In: Bulletin, 9 (1), Brighton, UK: Institute of Development Studies, University of Sussex
- Lumpkin, G. T., & Dess, G. G. (2001). Linking two dimensions of entrepreneurial orientation to firm performance: The moderating role of environment and industry life cycle. *Journal of Business Venturing*, 16(5), 429–451
- McCarthy, J.J. Canziani, O.F. Leary, N.A. Dokken, D.J. and White, K.S. (2001). *Climate change 2001: Impacts, adaptation and vulnerability*. Cambridge: Cambridge University Press.
- McHarry, J. Scott, F. and Green, J. (2002). *Towards Global Food Security: Fighting against hunger*. Towards Earth Summit 2002.
- Mendelsohn, R. (2001), *global warming and the American economy: a regional analysis*, Cambridge, survey: Edward Elgar publisher
- Meuret, M. (1994). A grazing route in Provence. EC/EAAP/SCANS meeting on the welfare of extensively farmed animals. Edinburgh, U.K
- Millennium Ecosystem Assessment (MA). (2005). *Multi-scale assessments: findings of the sub-global assessments working group*. Volume 4. Millennium Ecosystem Assessment. Island Press, Chicago, Illinois, USA.
- Mohammed Salih, M. A., and A. G. Ahmed. (1993). The impact of indigenous knowledge and traditional coping strategies on the desertification process. Paper presented at the IDRC-sponsored workshop on Indigenous knowledge and desertification in Africa. Cairo.
- Mortimore M (1989) *Adapting to drought: farmers, famines and desertification in West Africa* Cambridge University Press, New York
- Morton, J.F., (2007). The impact of climate change on stakeholder and subsistence agriculture.
- MSF-H (December 1997) *Food Security Assessments in Emergencies: Report of an Inter-Agency Workshop*.

- NDMC, (2003). Understanding and defining drought. (Internet), Available: from <http://www.drought.unll.edu/whatis.concepts.htm>. (February 18, 2005).
- Neuman, W.L. (2003). Social research methods: Quantitative approaches. London: Allyn and Bacon.
- Nhambura F. (2006). Africa must address food security; The Herald, (Zimbabwe) 14 February 2006
- Nikola, R. (2006). Policies and Strategies to Address the Vulnerability of Pastoralists in Sub-Saharan Africa. Retrieved March 18 2008, from <http://www.fao.org/ag/ppipi.html>
- Norusis, M.J. 1998. SPSS 8: Guide to data analysis. Illinois: Prentice-Hall, Inc.
- O'Meagher, B. (2003). Economic aspects of drought and drought policy. In: Botterill, L.C., and Fisher, M., (eds.), Beyond drought: People, policy and perspectives. Australia
- Padgett, D. K. (1998). Qualitative methods in social work research: Challenges and rewards. Thousand Oaks, CA: Sage
- Patrick, E., (2003). Drought: Vulnerability and Crisis in Dry lands. Dry land development Centre, UN Development Program Available at [www.undp.org/seed/unso/aboutus/ddc.htm](http://www.undp.org/seed/unso/aboutus/ddc.htm)
- Paul, B.K. (1998). Coping Mechanisms Practiced by Drought Victims (1994/95) in North Bengal, Bangladesh.
- Paxson, C.H. (1992), "Using Weather Variability to Estimate the Response of Savings to Transitory Income in Thailand," American Economic Review
- Pennings and Smidts (2003), The shape of utility function and organizational behaviour management science.
- Prokopenko, J. (1987). Productivity management: a practical handbook. Geneva: International Labour Organization
- Radford, T. and Vidal, J (2005) One in six countries facing food shortage; in the Guardian; thursday June 30, 2005.

- Reid,H. P isupali; B. and H. Baulch (2003): How Biodiversity and climate change interact.
- Rekacewicz.P, (2002). People affected by natural disasters in Africa from 1971 to 2001.
- Rennie S. & Singh N.(1995). Participatory research for sustainable livelihoods in the arid and semi-arid areas of Zimbabwe. A guide book for research on adaptive strategies.
- Rosenzweig, and Wolpin (1993), 'Credit market constraints, consumption smoothing, and the accumulation of durable production...', Journal of Political Economy.
- Ruck Barbra (2006). Poverty and the environment: topic sheet. Publication of the World Vision, Australia
- Rudies, I. (1995) The significance of eating: Cooperation, support and reputation in Kelantan Malay households. In:W.J. Karim (ed.), 'Male' and 'female' in developing Southeast Asia.Oxford, Washington DC: Berg Publishers
- Sarmiento, J.P. (1998). Drought, food security and marginalisation: A long-term perspective on humanitarian response. Tufts University: Feinstein International Famine Centre.
- Scoones (1998) Sustainable Livelihoods: A Framework for Analysis, IDS Working Paper 72
- Sen, A. (1981). Poverty and famine: An essay on entitlement and deprivation. Oxford: Clarendon Press.
- Shauri, H., S., (2010), Health care Services Delivery in Kenya Crises, Reforms and Transition, LaP Lambert Academic Publishers, Germany
- Shauri.H, S., (2011), Drought and Famine Mitigation Strategies; Basics, Concepts and Strategies, LaP Lambert Academic Publishers, Germany
- Sherraden (2001). Chronic poverty research centre toolbox: focus group discussions
- Silverman, D. (1993). Interpreting Quantitative Data: methods for Analyzing talk, text, and interaction. Thousand oaks, California: Sage publications

- Simms, A. and H. Reid, (2005). Africa – Up in smoke? The second report from the Working Group on Climate Change and Development. International Institute for Environment and Development. London, UK
- Simon Adebo (2000): Training Manual on Participatory Rural Appraisal
- Singh, N., &Titi, V. (1994) Adaptive strategies of the poor in arid and semi-arid lands: In search of sustainable livelihoods. IISD working paper. Winnipeg: International Institute for Sustainable Development.
- .Skeldon, R. (2002) Migration and poverty. Asia Pacific Population Journal
- Soussan, J.et al, ( 2003).Poverty, water security and household use of water. International Symposium on Water, Poverty and Productive uses of Water at Household Level. Jan.2003, Muldersdrift, South Africa
- Stafford Smith, M. (2003). Linking environments, decision-making and policy in handling climate variability. In: Botterill, L.C. and Fisher, M. (eds.), Beyond drought: People, policy and perspectives. Australia: CSIRO Publishing
- Swift, J. and Hamilton, K. (2001).Household and livelihood security. In: Devereux, S. and Maxwell, S. (eds), Food security in Sub-Saharan Africa. London: ITDG Publishing
- Teklu, T. von Braun, J. and Zaki, E. (1991). Drought and famine relationships in Sudan: Policy implications. Washington, D.C: International Food Policy Research Institute, pp. 25-51.
- Tiffen, M. (1995). The impact of the 1991-1992 drought on the environment and people in Zambia. In: Binns, T. (ed.), People and Environment in Africa. Chicester: John Wiley and Sons.
- Tor, R. (1995). The damage costs of climate change: towards more comprehensive estimates. Environmental and resource economics
- UNCCD,( 2004). Ten years on: UN marks World Day to Combat Desertification; Observances Worldwide on June 17, 2004



- UNCCD( 2006). Implementing the United Nations Convention to Combat Desertification in Africa; Ten African experiences. UNCCD Secretariat. Bonn, Germany
- UNCTAD, (2002). The United Nations Conference on Trade and Development's Report, Least Developed Countries.
- UNDP (2000); Report on the Status of Drought Preparedness and Mitigation in Sub-Saharan Africa. United Nations (Volume 1). New York: Office of Combat Desertification and Drought, United Nations Development Programme (UNDP).
- UNEP-WCMC. (2000). Global Biodiversity: Earth's living resources in the 21st century.
- UNHCR/WFP/ENN (2000) Food Security Assessments, Self-Reliance and Phasing Out in On-going Refugee Situations: Summary Report of an Inter-Agency Workshop. Rome: World Food Programme
- ISDR Africa Regional Unit, (2007), Review of Disaster Risk Reduction in Sub-Saharan Africa Region, Disaster Risk Reduction profile of Sub-Sahara African (SSA) Countries. Draft Report. Nairobi, Kenya.
- UNSO (1999); Drought Preparedness and Mitigation in Sub-Saharan Africa. New York: United Nations Office to Combat Desertification and Drought.
- Van Crowder, L., Lindley, W.L., Bruening, T.H. & Doron, N. (1998); Agricultural education for sustainable rural development: Challenges for developing countries in the 21<sup>st</sup> century. The Journal of Agricultural Education and Extension
- Vogel, C.H. (1995). People and drought in South Africa: Reaction and mitigation. In: Binns, T. (ed.), People and Environment in Africa. Chicester: John Wiley and Sons
- Watts M (1983) Silent violence: food, famine and peasantry in northern Nigeria University of California Press, Berkeley

- Watts, M. (1987). Drought, environment and food security: Some reflections on peasants, pastoralists and commoditisation in dry land West Africa. In: Glantz, M.H. (ed.), *Drought and hunger in Africa: denying famine a future*. Cambridge: Cambridge University Press
- Weber, R. P. (1990); *Basic Content Analysis*, 2nd ed. Newbury Park, CA.
- White, G. (1974). *Natural Hazards: Local, National and Global* (Eds). New York: Oxford University Press.
- Wilhite, D.A. and Glantz, M. (1985). Understanding the drought phenomenon: The role of definitions, *Water International Journal*, vol. 10
- Wilhite, D.A., (1996). A methodology for drought preparedness, *Natural Hazards*.
- Wilhite D.A., (2000): *Drought. A Global Assessment*, Natural Hazards and Disasters Series, Routledge Publishers, U.K
- Wilhite, D. A and Olga (2002) Drought preparedness in the sub-Saharan Africa context. *Journal of Contingency and Crisis Management*
- Winpenny, James, (1991): *Managing water as an economic resource*. ODI/Routledge
- Wisner, B. (1977). *The Human Ecology of Drought in Eastern Kenya*. PhD Thesis
- WISP, 2008: *Policies that Work for Pastoral Environments: A Six-Country Review of Positive Policy Impacts on Pastoral Environments*, World Initiative for Sustainable Pastoralism
- WHO (2011) *World Health Organization Disability Report*.
- World Food Program (WFP): (1998), *WFP Vulnerability Mapping Guidelines*. <http://www.wfp.org>.
- World Bank, (1992); *World Development Report 1992—Development and the Environment*, Oxford University Press, New York
- World Bank (1995). *Staff Appraisal Report; Republic of Kenya; Arid Lands Resource Management Project*. Nairobi: World Bank Report NO. 13692.
- WWI (1998); *A guide to the global environment*; World Resources Institute, Washington DC, USA.

Zhao Z. (2003) Rural-urban migration in China – what do we know and what do we need to know? China Center for Economic Research, Beijing University

## 6. APPENDICES

### 7.1: Checklist for PRA and Focus group discussion

1. Outline the historical years and cultural interpretation of drought and famine by Kinango people.
2. How long did these droughts take? and how Frequent?
3. In your opinion what do you think are the caused of these droughts?
4. What do you think exerbates the causes of drought?
5. In your understanding, what are the effects of drought in this area?
6. What are some of the consequences of these effects to community livelihoods?
7. Which organisations deal with drought related issues in this area?
8. What type of support do you think these organisations have to the community?
9. What do you think they can do more on combating drought related effects?
10. In your opinion, what are some of the effective ex ante and ex post drought driven food insecurity in this area? Would you recommend them to be included in drought management programmes by the government?
11. Can you rank these strategies in order of effectiveness.
12. How best would the Kinango people themselves like droughts and famine be managed by them and by the Government?
13. Would you consider Kinango people to be more vulnerable to drought and famine today than in the past? Explain fully what factors are perceived to account for the changes in adaptive capacity if any?
14. What is the criterion used in relief food distribution in this region? In your view, is relief food being distributed to the needy people?
  - i. What are the existing drought mitigation mechanisms being implemented by the government?
  - ii. How effective are these mechanism?

## 7. 2: Questionnaire for Households interviews

### General information

1. Household head  
Gender: Male  Female
2. Total area under crops :------( Types of crops :-----,-----,-----
3. Number of Animals :------( Types of Animals :-----,-----,-----
4. Total income per month: -----Total expenditure per month-----
5. Total number of household members: -----Dependants: -----
6. Level of education: -Pre-primary  Primary  Secondary   
Tertiary
7. According to your understanding, what could be the factors affecting food security in the area? (Tick appropriately)
  - i) Unreliable rainfall
  - ii) Dependence on rain fed agriculture
  - iii) Low use of improved farm inputs
  - iv) Unchecked wild fires
  - v) Wildlife- Cropping conflict
  - vi) Poor soil fertility
  - vii) Low provision of extension services
  - viii) Persistent Drought
  - ix) Other(s) Specify
8. . Key issues related to Assets
  - i.) What are your main household assets? -----,-----,-----  
-----
  - ii.) How did 2005/2006 droughts affect your assets? Explain-----  
-----  
-----  
-----

iii.) How important are the assets during drought and famine situation?

-----  
-----  
-----

9 What impacts of drought did you experience?

(Tick appropriately)

- i) Crop failure due to low moisture content
- ii) Livestock deaths
- iii) Trees drying and dying
- iv) Water points drying causing a scarcity of both Livestock and Human water supplies
- v) Shortage of basic commodities on the local market
- vi) Hiking of foodstuff prices
- vii) Malnutrition especially children
- viii) Unemployment
- ix) migration
- x) Other(s) specify

10 What was your response to the effects of drought/famine?

(Tick appropriately)

- i) Charcoal burning
- ii) Borrowing from relatives
- iii) Casual labour
- iv) Consumption of wild vegetables
- v) Reduced food intake
- vi) Dilution of meals (porridge)
- vii) Skipping meals
- viii) Reduced meal sizes
- ix) Re-distribution of food rations
- x) Other(s) Specify

11. What indigenous technical knowledge did you use in strengthening food security situation? (Tick appropriately)

- i) Storage of fodder/farm residue and household wastes for feeding animals in dry periods
- ii) Use of cow dung /organic manure as farm inputs
- iii) Practice of Agro forestry
- iv) Adoption of zero tillage
- v) Cropping across slopes to check rapid water runoff
- vi) Intercropping cereals such as maize with nitrogen-fixing legumes
- vii) Other(s) specify

12. Were there any human losses in your family from drought and famine? **Yes**   
**No**  **if yes give details.**

Name;	Age	Sex	Date lost	Cause
i.)	-----	-----	-----	-----
ii.)	-----	-----	-----	-----

13. Were there any human losses you know of due to drought and famine in the neighbourhood outside your family? **Yes**  **No**

If yes give details

Name;	Age	Sex	Date lost	Cause
i.)	-----	-----	-----	-----
ii.)	-----	-----	-----	-----

14. Did you send any of your family members away to stay with relatives, friends or neighbours to ease the situation on domestic food resources? **Yes**

**No.**  **If yes give details**

	To whom	When	How long
i.)	-----	-----	-----
ii.)	-----	-----	-----

15. Did any member of the family migrate to town/any other place in search of food or employment? Yes  No  If yes give details
- | Name;     | Age   | sex   | Where migrated | When returned |
|-----------|-------|-------|----------------|---------------|
| i.)-----  | ----- | ----- | -----          | -----         |
| ii.)----- | ----- | ----- | -----          | -----         |
16. What livelihoods/adaptive strategies did the people use for fighting the problem of drought and famine? (Tick appropriately)
- i.) Zai pits ( water harvesting structures for crop production)
  - ii.) Diversification of crops
  - iii.) Diversification of income
  - iv.) Planting drought resistant varieties
  - v.) Agro forestry – planting of multipurpose trees
  - vi.) Keeping mixed animals ( cattle and shoats)
  - vii.) Irrigation
  - viii.) Use of farmyard manure
  - ix.) Zero Tillage
  - x.) Other(s) Specify
17. What do you perceive as barriers to adaptation to drought? (Tick appropriately)
- i) Lack of information about weather
  - ii) Lack of knowledge about adaptation
  - iii) No access to water
  - iv) Lack of appropriate seeds
  - v) Adaptation not cost effective
  - vi) Insecure property rights
  - vii) Lack of market access
  - viii) No barriers to adaptation
  - ix) Poverty ( Low income)
  - x) Other(s) Specify



18. What do you think are factors which influence adaptation? (Tick appropriately)

- i) Experience in farming
- ii) Access to Extension services
- iii) Access to Market
- iv) Level of education
- v) Head of a Household
- vi) Financial status
- vii) Land tenure
- viii) Other(s) Specify

19. What did you personally do to combat the drought and famine problem?

- i. -----
- ii. -----
- iii. -----
- iv. -----
- v. -----

20. How effective were these coping strategies in your case?

<b>Strategy/Ratings</b>	<b>Benefit; High, Moderate, Low</b>	<b>Sustainability; High Moderate Low</b>	<b>Knowledge; High Moderate Low</b>	<b>Quantities; High, Moderate Low</b>
Zai pits				
Diversification of crops				
Diversification of income				
Drought resistant varieties				
Agro forestry				
Mixed animals				
Irrigation				

Farmyard manure				
Zero Tillage				
Other(s) Specify				

21. What help did your family get from outside or from organisations?

- i) .....
- ii) .....
- iii) .....

22. What help did you give to friends and relatives?

- i) .....
- ii) .....
- iii) .....

23. During drought and famine were the Kinango people alerted of its coming?

Yes  No  if Yes, How?-----

.....

24. Did the people here take the warning seriously? Yes  No

if yes how?-----

.....

.....

25. How effective were the strategies in combating the drought and famine disaster?

- i) .....
- ii) .....
- iii) .....

26. In your case, when did you first learn that you were going to face an acute food shortage? -----

27. Were your assets enough to see you through the drought period without asking assistance from anybody? Yes  No

28. What were the consequences of food insecurity ?-----

.....

.....

**Appedix 7.3: Mapping of organizations operating in Makamini Location of Kwale County**

<b>Institution/ organisation</b>	<b>Role</b>	<b>Potential adaptation support</b>
World Vision	<ul style="list-style-type: none"> <li>• Construction of Water pans through Food for Asset programme</li> <li>• Educational support through construction of classrooms, provision of desks and water tanks to schools</li> <li>• Health care for children through provision of mosquito nets</li> </ul>	<ul style="list-style-type: none"> <li>• Enhance construction of voluminous water pans of 50,000 cubic metres capacity at every radius of 2 km.</li> <li>• Support with small scale irrigation equipment</li> <li>• Technical support on valuable crops &amp; value addition</li> <li>• Trainings on marketing strategies.</li> </ul>
Roads	<ul style="list-style-type: none"> <li>• Feeder roads under Food for Asset programme</li> </ul>	<ul style="list-style-type: none"> <li>• Enhance accessibility of feeder roads</li> </ul>
ALRMP in collaboration with Ministry of Agriculture & Livestock	<ul style="list-style-type: none"> <li>• Provision of Agricultural extension services/Trainings and inputs support to groups</li> </ul>	<ul style="list-style-type: none"> <li>• Support construction of water pans at least one for every 2 km radius of 50,000 cubic metres capacity.</li> <li>• Enhance technical advice on water harvesting and conservation structures for crop</li> </ul>

		<p>production</p> <ul style="list-style-type: none"> <li>• Trainings on Natural Resource Management and afforestation</li> <li>• Technical advice on Livestock feed production</li> </ul>
Tourism	<ul style="list-style-type: none"> <li>• N/A</li> </ul>	<ul style="list-style-type: none"> <li>• Promotion of community based eco-tourism sites</li> </ul>
Constituency Development Fund	<ul style="list-style-type: none"> <li>• provision of bursary</li> <li>• provision of relief food and water</li> <li>• construction of classrooms</li> <li>• support out of school youths through driving schools</li> </ul>	<ul style="list-style-type: none"> <li>• Enhance provision of bursary</li> <li>• Support small scale irrigation</li> <li>• Support livestock feed production</li> <li>• support livestock drought insurance</li> </ul>
Kenya Wildlife Services	<ul style="list-style-type: none"> <li>• provision of water during drought</li> </ul>	<ul style="list-style-type: none"> <li>• Support construction of water pans</li> <li>• Address wildlife/Human conflicts</li> <li>• Resolve crop damage issues by wildlife</li> </ul>
Coast Water Service Board	<ul style="list-style-type: none"> <li>• Supporting Samburu – Vivurungani water pipeline project.</li> </ul>	<ul style="list-style-type: none"> <li>• Construction of water pans at least one in every 2 km radius of 50,000 cubic metres capacity.</li> </ul>

		<ul style="list-style-type: none"><li>• Support natural resource management in remote fragile dry lands.</li></ul>
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